The Social Dynamics of Antibiotic Use in a Large American Medical Complex

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The Social Dynamics of Antibiotic Use in a Large American Medical Complex
by
Katharina Rose Rynkiewich

A dissertation presented to
The Graduate School
of Washington University in
partial fulfillment of the
requirements for the degree
of Doctor of Philosophy

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K. Rynkiewich

Washington University in St. Louis

May 2020
Dedicated to my three.

My father, Michael Rynkiewich,
the first in his family to go to college let alone pursue a doctorate degree.

My husband, Edgar Ramirez Vilchez,
the first in his family to study and settle abroad.

My baby, Eleanor Ramirez,
the first baby in this little family.
ABSTRACT OF THE DISSERTATION

The Social Dynamics of Antibiotic Use in a Large American Medical Complex

by

Katharina Rose Rynkiewich

Doctor of Philosophy in Anthropology

Washington University in St. Louis, 2020

Dr. Bradley Stoner, Chair

Based on 18 months of anthropological fieldwork, 35 in-depth interviews, and over 360 hours of participant observation with two specialty physician groups, my dissertation is an analysis of the social dynamics involved in antibiotic decision making, prescription, and use at a large North American medical complex in a Midwestern city. Due to the global problem of antimicrobial resistance, hospitals have been particularly interested in reducing antibiotic overuse and misuse. Though the use of antibiotics has long had an impact at the population level, physicians often advocate for additional antibiotic coverage in the individual patient. I examine a policy aimed at improving antibiotic prescribing – antimicrobial stewardship – the responsible use of antibiotics.

My dissertation uses microsociological methods to explain physician communication and decision making surrounding antibiotic use. I argue that antibiotic prescribing is a collective practice, and thus policies aimed at improving antibiotic prescribing in individual physicians miss the mark of what is actually happening with antibiotics in hospital settings. I propose a glance at the diverse factors influencing antibiotic use including the fearful affects surrounding the spread of contagion in the United States. Against a backdrop of academic precarity in the social sciences and humanities, this work attempts to balance the sanctity of anthropological work with the opportunity and power of medical settings in the United States.

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Introduction

“They say your whole life flashes before you when you are about to die, but I’m pretty sure that is not true. When I think of all the dying people I’ve attended – many of them, happily, stopped dying – I can think of none who have described to me a flashing montage of key events in their lives...Of course, many of the dying cannot speak at all; some are mercifully obtunded.”


Even with the best of intentions, hospital care can prolong suffering and complicate a patient’s inevitable death. I witnessed this contradiction painfully unfold in the case of a patient I call Samuel. The following ethnographic vignette shares his months-long suffering that coincided with my data collection period.

Samuel was a 71 year old man originally from Mexico. He had lived and worked, most recently at a local factory, in the United States for years. Samuel had two daughters in the city, each with their own families, but had lived alone for the many years since his wife’s passing.

When Samuel first presented with symptoms in early August, physicians thought he might have tuberculosis due to indeterminate tuberculosis test results. Samuel did not have a fever, chills, nor did he have night sweats. Furthermore, never having worked in healthcare or been in prison, two places people might come into contact with the disease, physicians determined that Samuel had been exposed but not infected with tuberculosis.
No, Samuel did not have tuberculosis, but the physicians found an underlying condition. He was experiencing liver failure. His rapid weight loss could have been explained by an infection, but the liver failure was the problem in the end. And Samuel’s liver failure was caused by hepatitis C infection that had gone untreated for years, resulting in liver cirrhosis. Samuel needed a transplant.

At the end of August Samuel received a liver transplant. Unfortunately, after he was admitted that day for the liver transplant, he never left. The next few months post-transplant were a vicious cycle of more surgery, more antibiotics, more surgery, more antibiotics. The surgery was complicated by post-surgical bleeding, organ decay, and respiratory failure. The surgeons were concerned about infection in such a complicated patient and added several powerful antibiotics (vancomycin, meropenem, and micafungin). Cultures taken in the operating room showed that Samuel was harboring enterococcus and candida in significant amounts. He was taken back to surgery to wash out the area, key in ensuring the success of the transplant and decreasing the opportunities for microbial barriers to wound healing. It seemed to work. The antibiotics were switched to better target the organisms found to be present on laboratory results.

In November, however, Samuel was still in the intensive care unit, status post more surgery and more positive laboratory results necessitating more antibiotics. Antibiotics were broadened again to cover more organisms, then narrowed to cover new enterococcus and yeast at his surgical site. Then Samuel’s bowel began hemorrhaging, and he was found to have a bile duct leak. Surgeons opened up his abdomen again, and at the beginning of December they placed diverting drains from his surgical site. The surgeons hoped they wouldn’t have to operate on his abdomen again, it was getting tricky in there with all the wires and dislocated organs. Samuel
hadn’t eaten food himself in months. The drains going into his stomach fed him and relieved him. Of course, having these extra drains meant additional chances for opportunistic infections. The surgeons wondered if the donor had cytomegalovirus (CMV). Why wasn’t Samuel getting better? They started him on anti-viral therapy as a precaution. They also suspected cholangitis, an inflammation of the bile duct system caused by bacterial infection. Zosyn was given as the antibiotic for suspected cholangitis.

By early January, Samuel was known to most physicians as he had been in the intensive care unit long enough to be cared for by countless rotations of physician teams. I’m walking with Dr. Boden one morning and we pass Dr. Tenorio, one of the first infectious diseases physicians to see Samuel. Dr. Tenorio cautiously asks, “How is Samuel?” Dr. Boden looks up. She pauses long enough that Dr. Tenorio continues, “He’s dying.” It’s a statement, not a question. Dr. Boden nods, shaking her head the slightest bit. We continue walking past. Samuel had developed another bacterial infection, blood clots, and had become septic in the past week. His body was simply not strong enough at this point to sustain continued microbial threats, let alone heal the complete mess that his abdomen had become.

The microbes in his abdomen were now resistant to many of the antibiotics used early on. Colistin was used, an antibiotic that no physician likes to use due to the terrible side effects, it is a toxic drug. However, physicians were up against a wall, the other antibiotics weren’t working. Dr. Boden wanted to try aztreonam and keep him on Zosyn, but even creative combinations of antibiotics were not enough to stop the inevitable. The last time I saw Samuel was in January, just before he passed. We walked in, he was a shadow of himself. His legs curled up, his stomach exploding with wires and tubes. He had foam coming from his mouth, his stomach lining was
failing and the tubes were not sufficient to create a functioning system again. Early on a fellow told me that he was saying “No more” when physicians came in. But now he was past the point of speaking, it was too late from the moment he was given the transplant.

Samuel’s case was incredibly emotional for the staff (and for myself) as it unfolded. Even signs like, “Spread holiday cheer, not infection” sparked a sadness because of Samuel’s case. Seeing a patient suffer so catastrophically and over so many months left a heavy weight. I keep coming back to his case, and would like to say that this dissertation is richer for the shock that I felt seeing cases like this unfold during fieldwork.

This is but one of many patient cases that stand out during my ethnographic research. My daily engagement with physicians existed within the overlay of the daily suffering of patients. It was messy, heartbreaking work that could stop you in your tracks. With Samuel’s case, what seemed like a textbook tuberculosis patient very quickly shifted into a marathon involving a transplant, countless interventions, and an eventual passing on of the patient. I choose not to focus on the suffering of patients like Samuel in the pages that follow. However, I do want you to know that my research happened alongside such constant suffering that was certainly most burdensome for the patient but also touched family, visitors, staff, and the itinerant anthropologist: myself.

I choose to share Samuel’s case here because of what it represents in relation to the global problem of antimicrobial resistance. Samuel’s case highlights what is at stake, it shows what happens in a world without effective antibiotic therapies, a post-antibiotic era (Alanis 2005) that constitutes a global crisis (Neu 1992). The bacterial infection in Samuel’s stomach was related to
his transplant, and the persistent need for surgery after the transplant was made. In such immunocompromised patients, complications are not uncommon. Indeed, an antibiotic-resistant infection was not the only complication Samuel experienced. But what is important is that the fact that there were no efficacious antibiotics to give Samuel, that antibiotic combinations and even last-resort antibiotics that carry with them organ toxicity did not make a difference. Thus, Samuel and patients with similar circumstances are more likely to have an antibiotic-resistant infection and are simultaneously more likely to suffer the most if they do get an antibiotic-resistant infection. As an ethnographer, I had not previously been exposed to such high-acuity cases. However, as I will detail in the next pages, complicated cases with no available antibiotic therapy could become more common in a world of fewer good antibiotic choices and more resistant infections.

**Global Antimicrobial Resistance**

If infectious diseases are mirrors held up to society (Briggs and Mantini-Briggs 2004: 8), then antimicrobial resistance adds a filter to the view. Antimicrobial resistance\(^1\) refers to the ability of a microbe to prevent an antimicrobial (e.g., antibiotic) from working against it (World Health Organization 2020). Antimicrobial resistance encompasses microbial interactions occurring in social, political, ecological, and industrial contexts (Barrett and Armelagos 2013, Orzech and

\(^1\) In this dissertation I will use the term antibiotic to refer to anti-infective agents used in human populations and to refer to the broad problem of resistance. Antimicrobial covers a broader range of anti-infectives including antibiotics that are made naturally, but these agents are not the focus of the dissertation. Similarly, antimicrobial resistance is a global problem that also exists far outside of the hospital space. I use antibiotic resistance to refer to specific resistance-related problems in human populations associated with hospital practice. I will continue to use the term antimicrobial when it is part of the title of an organization or policy, and in this section when referring to the global problem of antimicrobial resistance.
Nichter 2008). Antibiotics are used as growth promoters in livestock, but they are also used as final therapies administered to a patient in the intensive care unit. Antibiotics are readily available medicines for human and animal consumption in most parts of the globe (e.g., Peterson 2014). The first antibiotics saved millions of lives and were hailed as “magic bullets” (Levy 2002) that could wipe away disease. And antibiotics are powerful medicines (Whyte, van der Geest, and Hardon 2002), they can save lives. Yet, widespread indiscriminate use of antibiotics in the everyday lives of humans and animals has left us here, in an age of antimicrobial resistance.

Antibiotic use is not benign. Antibiotic use carries with it medical side effects (e.g., antibiotic-related diarrhea). Even when medical side effects are not present, antibiotic use can set the perfect conditions for acquiring infection by altering the microbiome of an individual. Furthermore, antibiotic use can accumulate in an individual’s system, leaving the long term health of an individual in jeopardy. Finally, antimicrobial resistance genes and antibiotic-resistant infections flow freely in environments like high-acuity intensive care units, long-term acute care facilities, public sanitation systems, animal farms, supermarkets, schools, office, and city streets. Even the individual attempting to limit their exposure to antibiotics would have a hard time isolating themselves due to the continual confluence of disease pools (McNeill 1976).

Antibiotic proliferation has become the norm in a world full of microbial traffic (Mayer 2000). Antimicrobial resistance is a tragedy of the commons (Hardin 1968). The population effects of individual antibiotic use are hard to measure in a scientific way. Unlike other infectious diseases, antibiotic-resistant infections do not generally have a visual element involved. Amy Moran-Thomas (2013) has described guinea worm disease as a “visually spectacular disease.” A
parasitic worm crawling out of your leg is an obvious choice for that phrasing. But antibiotic-resistant infections, especially those present in the blood, lungs, or brain, do not show themselves easily. An exception to this rule might be methicillin-resistant *Staphylococcus aureus* (MRSA) but even that antibiotic-resistant infection only sometimes creates lesions. That invisibility contributes to antimicrobial resistance as a moving target. The tragedy of the antibiotic commons suggests that seemingly harmless and limited use of antibiotics in one individual becomes meaningful when combined with the countless other individual uses of antibiotics globally. Antibiotic use is like other resources on earth in that continued chipping away at the ore does not have immediate effect. It is over time that the impact of antimicrobial resistance is felt.

When antimicrobial resistance is felt, we shudder. Countless news stories herald the spread of antibiotic-resistant “superbugs.” A traveler. A volunteer. What we often refer to as microbial threats surround us. Akin to the recent global pandemic associated with COVID-19 (a novel coronavirus discovered in Wuhan, China in December, 2019), when antibiotic-resistant infections spread our instincts kick in and a threat becomes a situation. But this story, the person-to-person transmission of antibiotic-resistant infections in the community, is rare. More commonly the spread of known microorganisms occurs from nursing homes to hospitals to homes, hitchhikers on the back of already-sick patients. The stakes of antimicrobial resistance, as seen with Samuel, are highest for marginalized populations like the drug user, the impoverished, the elderly, the migrant, the homeless, and populations that engage in high-risk sexual encounters. These marginalized populations as a whole have a difficult time accessing and affording healthcare. The interventions that they might receive can catastrophically fail without proper systems in place for follow up patient care.
The marginalized members of society are already likely to receive their healthcare in bits and pieces. For the problem of antimicrobial resistance, that means an antibiotic dose here, an antibiotic dose there. An admission to the hospital here, a surgery there. Antimicrobial resistance is a filter in the mirror held up to society (Briggs and Mantini-Briggs 2004) because it intensifies and focuses existing trends in population health. In infectious diseases epidemiology, exposures are what patients should be asked about: Where have you traveled? Where do you live? What do you eat? Who have you been around? The problem of antimicrobial resistance becomes intensified given answers to these questions that increase connection to poverty and devastation. Heather Paxson (2008) has said that “our uncertainties about how to live with microorganisms echoes our uncertainties and conflicted ideas about how humans ought to live with one another and with the other species with which we share the planet.” Certainly, antimicrobial resistance highlights the dangers of living in precarious existence, and threatens to challenge all of us on our attempts to self-quarantine from those types of lives.

The Evolving Trends in Antibiotic Overuse and Infection Control

The Centers for Disease Control and Prevention (CDC, 2019a) estimate that one half of all antibiotic prescriptions in the United States for human populations are “inappropriate” – meaning that 1) the patient did not have an infection, 2) the patient did not have an infection that would be effectively treated with the selected antibiotic, 3) the patient did have an infection that

---

2 Throughout the dissertation I will place common phrases related to antibiotic overuse and infection control in quotations such as “appropriate” to recognize the diversity of opinions in regards to the challenges of defining such terms. Later in the dissertation (particularly in Chapter 4) I question whether “inappropriate prescribing” is a matter of perspective, in other words, whether or not what is “appropriate” differs based on social dynamics and expert contexts.
could be effectively treated with the selected antibiotic but not in the prescribed dose or duration, or 4) the patient did have an infection but the antibiotic selected is not effective against the infection. This percentage of “inappropriate” antibiotic prescriptions does not account for the antibiotics consumed without medical prescription and inadvertently through our environment.

Medical and scientific understandings of microbes have expanded to include the role of beneficial bacteria (Singer 2015) and synergistic combinations of antibiotics (Acar 2000) in recent years. As knowledge about the function of antibiotics and the relationship of antibiotic use to medical complications and side effects grew, infectious diseases physicians and researchers became more interested in controlling antibiotic use (Podolsky 2015). By the late 20th century, antibiotic control efforts were often successful in undermining the influence that the pharmaceutical industry had on antibiotic prescriptions in medical settings. Diagnostic testing also improved and microbiology labs in major hospitals were able to prove when an antibiotic was prescribed but would not effectively treat infection (i.e., a “bug-drug mismatch”). As the push towards antibiotic control continued into the early 21st century, the pharmaceutical industry reduced their investment in research and development for antibiotic therapies (i.e., the antibiotic pipeline was drying up, Singer 2015). In recent history, the combination of increased awareness of the detrimental effects of antibiotic overuse combined with concerted efforts at regulating and controlling antibiotic use created the conditions in which antimicrobial resistance is worse but the antibiotics for treating infection are largely the same as twenty years ago.

Out of this context, antimicrobial stewardship has been solidified as a strong ally in the fight against antimicrobial resistance. Antimicrobial stewardship is a set of interventions aimed at reducing overall antibiotic use. In conjunction with the World Health Organization’s One Health
Initiative, antimicrobial stewardship has the potential to align the uses of antibiotics in humans, the environment, and animals. However, as of yet antimicrobial stewardship is most established in hospitals and outpatient clinics. Infectious diseases practitioners including physicians and pharmacists generally run antimicrobial stewardship efforts, and in resource-poor settings nurses can also be tasked with implementing antimicrobial stewardship. Some hospital-based methods of stewarding antibiotics include restricting certain antibiotics from general use and reviewing prescriptions made by physicians as noted in the patient chart. Antimicrobial stewardship thus attempts to change the current climate of antibiotic prescribing so that it more accurately accounts for population health considerations, and because of this push towards preserving antibiotics tends to come into conflict with individual patient care. The future of antimicrobial stewardship is unclear, though at this moment there are few alternatives.

An Anthropologist Intervenes

Antimicrobial resistance is a sprawling topic that has been researched from a multitude of angles. For example, anthropological work has demonstrated co-construction and manipulation of the understandings, uses, and effects of medicines (Whyte, van der Geest, and Hardon 2002). The anthropology of pharmaceuticals (van der Geest, Whyte, and Hardon 1996, Hardon and Sanabria 2017) has lent an ethnographic lens to the ingestion of medicines in lay populations, while critical work has criticized pharmaceuticalization as a reduction of complex social phenomena to medicinal solutions (Lakoff 2005, Biehl 2007, Petryna et al 2006). Antibiotics certainly fall within this domain as overly used medicines situated in a fraught biomedical context favoring “quick fix” solutions (Denyer Willis and Chandler 2019).
Anthropologists have also critically studied the complexities of global health and the burden of infectious diseases (e.g., Crane 2013, Koch 2013, Mason 2016). The intersection of systems of medical care and population health pressures is prescient in the study of antimicrobial resistance as antibiotics are conceptualized and utilized differently according to political, social, economic, and cultural context. In the area of viral infections, Theresa MacPhail (2014) has demonstrated the importance of studying influenza as a global network of unfolding expressions of the disease, what she calls a “pathography.” Similarly, the expressions of antimicrobial resistance are highly variable to context and must be understood within the pluralea (Singer 2015) of human-environment interactions.

The locales of antimicrobial resistance – including “reservoirs” and “hotspots” – has been a recent focus in anthropological research (Helliwell 2018), within the dairy industry (Begemann 2018), poultry farms (Kayendeke 2018), veterinary medicine (Fortane 2019), and global shrimp industrial contexts (Thornber et al 2019). Further, Brown and Nettleton (2018) have critically analyzed such economic markets and industrial structures that draw in and frame microbial life. Antibiotic overuse and misuse in animal husbandry is a burgeoning focus of critical cultural and medical anthropology. Claas Kirchhelle’s “Pyrrhic Progress: The History of Antibiotics in Anglo-American Food Production” (2020) provides an in-depth look at the histories of antibiotic use significant in modern antibiotic overuse and misuse.

Broader cultural perceptions of cleanliness (Douglas 1966) are significant in the problem of antimicrobial resistance. From the fear of contagion (Wald 2008) to public cultures of danger (Caduff 2015), how we socially engage antibiotic-resistant infections has been studied anthropologically. Further, how these cultural perceptions and social dynamics influence
antibiotic prescribing among physicians is a burgeoning area of research (Broom, Broom, and Kirby 2013, Charani et al 2013) with roots in the study of social determinants of health (Szymczak and Newland 2018). Fears of dirt and contamination are related culturally to our consumption of medicines (van der Geest, Whyte, and Hardon 1996) and increasingly it is becoming clear that these fears are also influential in the hospital-based practices of physicians.

Antimicrobial resistance touches most areas of life for humans, animals, and our environment. Anthropologists and non-anthropologist ethnographers, as in the examples above, have researched or are beginning to research many of these areas. However, I want to suggest that antimicrobial resistance is rarely addressed holistically, not by policymakers, not by physicians, not by laypersons, and not by researchers. How we deal with antimicrobial resistance is fractured depending on the resources, knowledge base, and amount of control over structures for implementing change.

Following Haraway (1989), this dissertation intervenes in specific contexts and with specific angles for viewing antibiotic overuse and misuse. The chapters in this dissertation do not fully address the multitude of problems surrounding antimicrobial resistance, and that is not my intention. Rather, each chapter provides an angle from which to critique and engage antibiotic use. Importantly, this approach leaves some angles for other researchers to address ethnographically (i.e., antibiotic use in animal husbandry, the pharmaceutical industry). As Dixon-Woods et al (2012) argue, detailed and specific ethnography surrounding the “complexity of simple things” (cf. Becker et al 1976, Rhodes 1995) is incredibly useful and provides a venue for in-depth analysis in lieu of expansive coverage. This dissertation is written in pursuit of that aim.
This is a hospital ethnography (van der Geest and Finkler 2004) situated in two institutions in the American Midwest. This is also an ethnography of healthcare workers (e.g., Livingston 2012), a snapshot of medical practice surrounding a health-related problem in human populations. By walking alongside medical practitioners during their day-to-day activities I gained a sense of the pressures, calculations, navigations, and frustrations of the hospital-based healthcare worker. I spent time both with specialists in infectious diseases and intensivists in critical care medicine and surgery. I intentionally spent time conducting participant observation of multiple groups of individuals and in diverse parts of the hospital setting in order to appreciate some of the social and cultural factors involved in antibiotic prescribing. This dissertation thus moves between microsociological approach to data collection (Broom, Broom, and Kirby 2014; Cicourel 1987; Heimer and Staffen 1998) attuned to local practice and broader cultural analyses of national trends in antimicrobial stewardship and infectious diseases practice. Finally, I draw on affective domains (Masco 2014, Street 2012) associated with national histories such as the history of warfare and security in the United States to explain physicians’ orientations and ideas surrounding contagion and antibiotic “weapons.” As antibiotic resistance lives with us I aim to be both specific about the work of anti-infective therapies and the humans that prescribe them and broad about the amorphous cultural worlds of fear and security. In the remaining sections of this introduction I will provide a grand tour (Spradley 1980) of the field site and explain the layout of the dissertation.

**Introduction to the Fieldsite**
Frontier City Medical Complex, located in a large Midwestern city in the United States, sits between two major roads, a popular metro line, and a highway beside the downtown area. Within Frontier City Medical Complex are several affiliated institutions, the oldest and largest of which are University Medical Center and County Public Hospital. Frontier City Medical Complex has existed in various forms throughout its history. From 1800-1850, the site was occupied by one of the first medical colleges in the Midwest. Physicians from this medical college provided free services to the poor, thereby fulfilling an obligation to the state general assembly requiring care to be provided to county residents. During the American Civil War an army hospital was built on the site, and a nearby contagion hospital served as end-of-life care for the severely-infected (e.g. tuberculosis) population of the city. In the late 1800s, both University Medical Center and County Public Hospital settled into permanent facilities. The early history of Frontier City Medical Complex is well-documented elsewhere, providing evidence and description of burgeoning hospital systems existing outside of New England prior to 1850.

Early into the 20th century, County Public Hospital established itself as one of the world’s great teaching hospitals. Continuing its tradition of serving the underprivileged in the city, County served European immigrants in the late 19th century and a booming African American population in the 20th century. Surgeons and physicians would travel from other institutions in the city and region to volunteer time at County. Meanwhile, what later became University Medical Center was formally two separate entities in the early 20th century: a teaching hospital

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3 Pseudonym.
and a Presbyterian hospital in the same area. Together with a revitalized medical college, these two entities combined to create University Medical Center in 1969.

Following a period of strikes and rebellion among hospital staff, County Public Hospital underwent further change when in 1969 the state legislature assigned a citizen’s commission to run the hospital. County Public Hospital is run to this day by commissioners and remains a public teaching hospital. University Medical Center is a not-for-profit private institution that emphasizes health care, education and research. Today, University Medical Center specializes in orthopedic and geriatric medicine among other specialties in which they are top-ranked nationally. County Public Hospital continues to treat the underserved of the city.

**University Medical Center**

University Medical Center has grown significantly in the past 20 years and, along with its regional facilities, is licensed to operate over 1,000 beds. U.S. News and World Report consistently ranks University Medical Center in the top 50 hospitals, most recently in half of its 16 specialties, putting the hospital in the top 5% of among United States institutions.

The hospital has been named a top teaching hospital by the Leapfrog Group (a non-profit patient safety watchdog organization), and was recently named a Center of Excellence in Antimicrobial Stewardship by the Infectious Diseases Society of America (IDSA). Furthermore, the CDC awarded the Frontier City Medical Complex over $9 million in 2016 for the study of infection control and antimicrobial stewardship, designating them a so-called “epicenter” of infection control research. In sum, University Medical Center is a top-ranked 650-bed hospital caring for adults and children leading the way in medical education and innovative research. Most
importantly for this dissertation, University Medical Center is one of only eleven facilities in the United States to have been acknowledged by the CDC for their efforts to combat antibiotic resistance. This hospital is a prime fieldsite location for this research.

This dissertation focuses on two areas of the hospital and their corresponding practice groups at University Medical Center: the Division of Infectious Diseases and the Section of Surgical Intensive Care. The Division of Infectious Diseases falls under the Department of Internal Medicine along with 10 other divisions. There are over 40 faculty members in the division with research areas spanning from HIV to healthcare epidemiology. The division provides both inpatient and outpatient care for University Medical Center and has a 2-year joint fellowship program with County Public Hospital. Faculty from this division run the programs for infection control and antimicrobial stewardship in the hospital. Finally, the practitioners are supported by trainees from the Department of Internal Medicine and a diverse support staff including infectious diseases-trained nurses.

The surgical intensive care unit is an area within the hospital where practitioners from multiple departments coordinate care. The Section of Critical Care within the Department of Anesthesiology provides specialists for the surgical intensive care unit, as does the Section of Acute Care Surgery (Division of General Surgery, Department of Surgery). The surgical intensive care unit is supported by trainees from the Division of Pulmonary and Critical Care Medicine (Department of Internal Medicine), the Department of Anesthesiology, and the Division of General Surgery (Department of Surgery).

The diverse support staff in the surgical intensive care unit includes pharmacists, nutritionists, and intensive care unit nurses. Additionally, surgery residents from County Public Hospital
occasionally rotate in the surgical intensive care unit at University Medical Center. The surgical intensive care unit is located in a wing of the main hospital tower along with the other intensive care units, and practitioners are frequently sending patients out either for surgery or to the main floors of the hospital once patients stabilize.

**County Public Hospital**

County Public Hospital continues to be a touchstone for the underserved of the city, and has bolstered both its emergency room and specialty clinics to be able to provide access to the community. The emergency room at County Public Hospital treats over 125,000 adults and children annually. Additionally, 40% of the hospital is dedicated to specialty clinics that frequently coordinate with hospital admissions if necessary for the patient. The hospital also boasts one of the first Level 1 trauma units in the United States, and also has a top-rated burn unit. In other buildings within the Frontier City Medical Complex, County Public Hospital has long-standing affordable (often free) HIV care and collaborates with both the County Jail and Veteran’s Administration. The robust services provided at County Public Hospital speak to their mission which highlights innovative care while “never neglecting those in need.”

Along with University Medical Center, this hospital is recognized as a leader in combating antimicrobial resistance. In sum, County Public Hospital is a 450-bed hospital with dedicated units for intensive care, a well-established emergency room, and on-site specialty clinics. Thus, this hospital is an ideal site for this research and provides a drastically different setting to University Medical Center. As with University Medical Center, the Division of Infectious Diseases falls under the Department of Medicine. There are over 20 faculty members in the division, which provides both inpatient and outpatient care for the hospital and has a 2-year joint
fellowship program with University Medical Center. Similar to University Medical Center, faculty from this division run the programs for infection control and antimicrobial stewardship in the hospital. Finally, trainees from the Department of Medicine work with faculty from the Division of Infectious Diseases in the course of their rotations.

At County Public Hospital, several specialists work in and around the surgical intensive unit. Practitioners in the surgical intensive care unit are certified in either anesthesiology or surgery, and are members of the Division of Surgical Critical Care in the Department of Surgery. The Department of Anesthesiology and Pain Management also has practitioners who rotate in the surgical intensive care unit. Trainees come from the Department of Surgery or Anesthesiology and Pain Management. Surgery residents from University Medical Center sometimes round on patients at County Public Hospital, but the hospital also supports a 1-year fellowship of their own in surgical critical care, trauma, and burn management. The surgical intensive care unit is a 14 bed unit that sees patients from surgery and other services including cardiothoracic, vascular, and ear-nose-throat (ENT).

This dissertation is an 18-month ethnography of University Medical Center and County Public Hospital, institutions that together form Frontier City Medical Complex. The dissertation fieldwork was conducted between July, 2017, and December, 2018. Starting in July, 2017, I spent 9 months conducting participant observation and semi-structured interviews with infectious diseases practitioners at both institutions. Starting in March, 2018, I spent 5 months conducting participant observation and semi-structured interviews with surgical intensive care unit practitioners at both institutions. During my final 4 months of fieldwork, I conducted a search of the archival records and institutional histories available for Frontier City Medical Complex. In
this chapter I provide a description of the fieldsite, methods, research experience and analysis that forms a basis for the remaining chapters of the dissertation.

**Ethical Concerns**

The ethnographic vignettes and extended quotations you will find in this dissertation were selected carefully and are anonymized to the fullest extent possible. I further concealed the location of this research by assigning pseudonyms and hiding details about the research relationships and geographical locations of buildings and groups of researchers. Any error found in maintaining the veil of confidentiality I intended to have for my participants is my own. This dissertation would not have been possible without the participation and access provided by local researchers at my field site and I am eternally grateful to them. Patient anonymity is an incredibly important ethical concern and I have done my best to limit the discussion of patients and substantially alter private patient health information to a level that it is unrecognizable to those involved. Still, those emotionally involved patient cases may strike a chord with some of my participants and I ask their consideration in keeping the patient names and cases private.

**Chapter Layout**

Part I of the dissertation consists of Chapter 1 and Chapter 2. Each of these chapters presents a contextual condition of the research. Chapter 1 details my positionality as collaborator on a CDC grant and as anthropologist “studying up” (Nader 1972) medical practice at my field site. Doing anthropological research in a highly-regulated setting requires the ethnographer to be flexible and navigate gatekeepers deftly. The added pressures of conducting work with powerful individuals (i.e., American medical researchers) while coming from an increasingly-precarious
discipline like anthropology are highlighted in this chapter. I begin with detailed descriptions of access conversations and data collection methods. Then, I work through the tensions inherent in “studying up” as they appeared at my field site. For example, my professional presentation and face-work (Goffman 1959; 1982) took constant renegotiation and adjustment (see Figure 1, my uniform during patient rounds). This chapter is both ethnographic and reflexive and I argue that this layout of the terms of my involvement at the site is critical for understanding the types of data collected and the manner in which I interpreted the data.
Figure 1. Ready to conduct participation observation of patient rounds at my fieldsite, 2018. Photo credit: Petya Shalamanova.
Chapter 2 provides a history of infectious diseases in human populations as well as a brief history of the infectious diseases specialty in internal medicine. I frame the history of antibiotic use in the United States within the broader histories of internal medicine and hospital practice and provide explanations from physicians at my field site that further contextualize the history of antibiotic resistance. Terms like “magic bullet” and “antibiotic restriction” are historically important and provide context for today’s debates in the specialty of infectious diseases regarding antibiotic overuse and misuse. Before moving on to the substantive ethnographic data, I ensure that the reader understands why antibiotic use has developed the way that it did in the United States. Furthermore, I trace the interconnectivities of the specialty of infectious diseases, hospital-based antibiotic use, and the rise of antibiotic-resistant infections.

Part II of the dissertation consists of Chapters 3, 4, and 5. Each of these chapters presents an angle from which to view antibiotic resistance. Chapter 3 provides a discussion of how antibiotic prescription gets done, by whom, and as a result of what types of interactions. The social dynamics of antibiotic use are the focus of this chapter and I utilize ethnographic case studies to convey the milieu of antibiotic prescribing. I argue that antibiotic prescribing is a collective activity that get done in conjunction with various other clinical activities. At times, antibiotic prescribing is relegated to trainee physicians. Additionally, inter-provider communication varies such that the individual physician prescriber has to navigate the social and cultural dynamics present as well as traditional dynamics including time and resource constraints. Together this chapter suggests that antibiotic prescribing is a cultural practice, and in so doing it sets the foundation for Chapter 4.
Chapter 4 introduces antibiotic stewardship as a favored policy for combating antibiotic resistance. Here, I challenge an individualizing rhetoric used in antibiotic stewardship that obfuscates the drivers of antibiotic resistance while simultaneously adding additional pressures to individual physicians. This chapter describes the theoretical foundations of antimicrobial stewardship practice aimed at responsible antibiotic prescribing. I question whether “appropriate” antibiotic prescribing is a misnomer due to the fact that antibiotic prescribing can be differentially considered “appropriate” over time, team, and patient case. I critique rational choice theory and social psychology based on evidence that antibiotic prescribing is a collective practice (from Chapter 3) with social foundations that cannot be changed with education and improved access to information for decision making. I argue that antimicrobial stewardship is unlikely to succeed when it individualizes prescribing with focused efforts on behavior change.

Chapter 5 fits within this dissertation by linking cultural understandings of germs and infection to the current problem of antibiotic resistance. In this chapter, I use ethnographic data and public-facing representations of antibiotic resistance to contextualize the fearful affects I observed in hospital-based physician communication and practice. My physician participants had a rich vocabulary associated with antibiotics and antibiotic resistance: “big guns,” antibiotic “weapons,” “superbugs,” “attack,” and “combat” being key examples. The fifth chapter presents a study of contagious affects in American life related to the fear of germs and the threat of antibiotic-resistant “superbugs.” The ethnographic data presented was collected in the confines of the work space that is the hospital. However, I argue that physicians in this space are influenced by the larger national setting, a United States that is risk-averse, fearful of immigrants, and has a rich history of cultural beliefs surrounding cleanliness and disease.
Part I
Chapter 1

Betwixt and Between: Anthropology PhD Candidate Studies Up in American Medicine

They’re going to leave me, I’m thinking. They had infection control gowns and gloves on and I was the last one to start putting on the garb. The physician turns and sees I’m still getting ready to go in the patient room.

Physician: Sorry. I had forgotten you were with us.

Me: It’s ok, I’m blending (smile). It’s good that I am blending in. Don’t worry.

Physician: You know, where I grew up there were a lot of indigenous folks. You are the first anthropologist I’ve worked with, but they, they just thought anthropologists were the devil.

The head of antimicrobial stewardship emailed me at 6:50 am. She apologized for the last minute invite but wanted to me show up for a research group half-day retreat on antimicrobial stewardship that she was hosting. My invites to these planning meetings were sporadic, and I did
want to hear more about the direction antimicrobial stewardship was taking at University Medical Center. I knew now, several months in, that I could not just sit in the meeting and listen. Presumably, she had invited me to share ideas and help build interventions. Indeed, she started the meeting by asking me to share my key findings with the group so that they could think of better ways to intervene in physician prescribing.

The status of anthropology as a discipline has changed drastically over time. Tenure-track opportunities have dwindled while the number of PhD-grantees has increased, leading many to suggest we are in a time of widespread academic precarity (Kawa et al 2018; Lyon 2018; Platzer and Allison 2018). Academic precarity has changed the landscape for anthropologists, in particular what is at stake for the PhD Candidate conducting research among elite industries and institutions representing a significantly more stable employment future. Attempting to “study up” (Nader 1972) power is a tradition in anthropology that we continue to uphold and value as a critical method (Gusterson 1996, 1997; Ho 2009; Ortner 2010).

Ortner, in her article “Studying Up Hollywood,” (2010) suggests that anthropologists are often “studying sideways” by researching industries where their academic appointments convey similar status in American society. However, for the PhD Candidate navigating an uncertain job market in anthropology, current status conveys little assurance of future, continued status in the field. Due to changes in the discipline of anthropology, dissertation fieldwork of powerful
industries and institutions today more likely represents an uncomfortable balance between representing an intensely critical and rigorous field and managing the potential for employment encountered at the field site. Thus, the critical period of exposure during dissertation fieldwork leaves the early-career anthropologist vulnerable to the same power dynamics they critically analyze in the course of research.

**Studying Up: An Introduction**

Laura Nader famously advocated for “studying up” – criticizing and exposing the bastions of power and privilege in modern life (1972). Nader suggests that there is value in researching power, but without the perspective of those that benefit from and in many cases determine the power structure, it is all too easy for the sources of power to remain nebulous. Decades later, other anthropologists have picked up the thread of Nader’s writing, and there are examples of “studying up” in several traditionally upper class fields and industries (Gusterson 1996, 1997; Ho 2009; Ortner 2010). Methods for studying elites were described around the time “studying up” was published (Harrell-Bond 1978), and were revisited with interest starting in the mid-1990s (Hertz and Imber 1995; Mikecz 2012). Nader’s message, while situated in the political and cultural context of the 1970s, has had lasting effect in the field of anthropology. Indeed, “studying up” has been a mainstay for anthropologists studying in the United States, demonstrating the usefulness of targeting sources of power in addition to the powerless.

Medical anthropologists since the 1980s have demonstrated overwhelming interest in studying patients and the underprivileged globally – what we might refer to as “studying down” or “studying across” due to emphases on the tangible impacts of Western dominance in medicine over the internal workings of medicine itself. This trend echoes emphases in anthropology more
broadly as described by Gusterson (1996). There are exceptions to this trend, as medical anthropologists have directed the gaze at Western medicine (e.g., DelVecchio Good 1998; Good 1994; Kaufman 2015); however, the area of hospital ethnography within medical anthropology and medical sociology has a strong tradition of conducting research among the privileged practitioners of Western medicine (e.g., Becker et al 1976; Kaufman 2005; Luhrmann 2000; Mattingly 1998; Prentice 2012; Rhodes 1995). Hospital ethnographies have identified important barriers to “studying up” in medicine, including access and institutional bureaucracy, fitting into available researcher roles, and privacy, confidentiality, and research ethics concerns (cf. van der Geest and Finkler 2004).

Anthropologists studying in Western medical institutions, beyond the barriers to “studying up” in hospital settings, are frequently positioned betwixt and between two fields – medicine and anthropology. In the 1980s medical anthropologists were split on the issue of working in or for medical institutions (Sargent and Johnson 1996). With more medical anthropologists than ever finding gainful employment in academic medicine and public health, the question remains: is medical anthropology research an anthropology of medicine or anthropology in medicine? Specifically, what are medical anthropologists spending time on in their research? What funders, supervisors, journals, etc., are medical anthropologists engaged with or answering to? Here, attention to the mundane (Brekhus 2000) can make visible what is at stake for researchers in and of Western medical institutions. In order to heed the call of “studying up” coming from cultural anthropology more broadly, the medical anthropologist may be inclined to attempt to gain access at powerful academic medical centers among scientists and practitioners at the top of their respective fields. By following the paperwork, conversations, negotiations of research
agreements, and working relationships we can see that “studying up” in American medical institutions can involve significant skin in the game for the researcher.

For an anthropologist at the beginning of their career, an experience like I had working in a well-respected American academic medical center was disconcerting. I was well-situated to conduct an ethnography of world-renowned infectious diseases researchers, which was exactly what I had wanted to engage in for my anthropological fieldwork. I had won a grant from the Wenner-Gren Foundation for Anthropological Research. However, I was also well-positioned to pursue long-term working relationships with their government funded research group. My professional goals and my research goals were beginning to align in ways I had not anticipated nor necessarily desired for my anthropological fieldwork experience. As conversations were breeched, it became obvious that I was not going to be simply the lone anthropologist who works and publishes alone. Rather, in order to get a foot in the door at my field site, I embarked on a research relationship with my participants that brought access and constraint.

This is a single-authored dissertation. As diligently as possible, I divided my time between my own work, the anthropology at the field site, and work earmarked for analysis in conjunction with my colleagues from the local research group. As such, some of what I achieved while in the field was done solely for the purposes of my PhD and Wenner-Gren Foundation funding. The results of this research have been published (Rynkiewich 2020), presented at research conferences (e.g., Society for Applied Anthropology 2016, American Anthropological Association Annual Meetings 2017, 2018, British Academy, London, 2018), and used extensively in this dissertation.
Other, additional data, was collected and managed with local stakeholders. Results of this additional data have been published (Rynkiewich et al 2020), presented at research conferences (e.g., Infectious Diseases Week 2019; Society for Healthcare Epidemiology of America Decennial Meetings 2020), and shared on several occasions with the national agency responsible for funding the local research group. Finally, I wrote two internal reports on the additional data collected for local stakeholders. Those reports were handed over to key researchers in the local research group in April and October of 2018.

**Accessing the Field Site**

In the two years preceding my arrival at Frontier City Medical Complex, I had been in conversation with the institutions securing access for my fieldwork. As an anthropologist aiming to conduct ethnography in an American hospital, the barriers to access can include institutional review boards, bureaucracy and paperwork, a lack of disciplinary understanding

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4 The project was first presented to the Centers for Disease Control and Prevention December, 2017. A co-author commented that I should be presenting my own work and that suggestion was heeded by the principal investigator. Dates that I presented internally to the local research group: January, 2018; March, 2018; November, 2018. I presented to the Centers for Disease Control and Prevention the final results and conclusions of my interdisciplinary work in May, 2019.

5 Previously I had garnered access and navigated institutional review boards at two medical institutions in the American Midwest during my undergraduate and graduate education. This prior exposure to the politics, paperwork, and regulation surrounding qualitative research in medical settings made me well-prepared to conduct such a study for my PhD fieldwork.

6 This research is conducted under Institutional Review Board (IRB) protocol #16-072 at County Public Hospital. My own academic institution, Washington University in St. Louis, ceded oversight of this research in light of a request on behalf of my field site hospitals to have internal IRB coverage. University Medical Center determined my IRB submission to be exempt from review.
(e.g. what is anthropology?), and geographical barriers highlighting the cost of traveling back and forth to set up a long-term research study out-of-state.

**Glass views: From the outside in**

Anthropology conducted “at home” can be deceptively familiar (Greenhouse 1985). In some ways, my research was indeed conducted “at home,” in the American Midwest. However, even as an American citizen conducting ethnography in an American hospital, I began my fieldwork as an outsider in multiple senses of the term. First, I was not a member of the institution I was contacting for access. For a PhD Candidate in Anthropology, it is the norm to leave your academic home and go into the field. However, for my field I had chosen an American hospital, and often these types of institutions conduct research within their own closed networks. I was an outsider to the research network at my field site. In my initial conversations with the Director of the Division of Infectious Diseases (also a researcher within this network), he brought up the need for me to be integrated into an existing group in order for my project to be supported by the hospital. I needed to pitch a project that would be picked up internally and supported via an existing large government grant. “You can do your project here, and we are happy to have you,” he told me, “but you have to do work that benefits us as well.” I was no longer looking through the glass.7

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7 In another sense I was an outsider to American culture on the whole. I had grown up in the Highlands of Papua New Guinea (1997-2002) and thus had imbibed the cultures of Oceania at an early age prior to my return to the United States. Being a Third Culture Kid (Pollock and Van Reken 2001) leaves traces that influence the ethnographic style of an individual like myself.
Second, I was not a medical professional or trainee. This made reaching out to hospital
administrators difficult as my current or future role within the hospital was not immediately clear
as it is with medical researchers or staff. The rigid hierarchies in academic medicine were
becoming visible, and though I acknowledge my privilege as part of American academia more
broadly, the restraints placed on me as part of academic medicine were new to my experience. In
this privileged space, for example, being in a PhD program but not having completed the degree
meant I was immediately put in the position of trainee. I was surrounded by individuals who had
already achieved terminal degrees in their field. In the process of initiating access conversations,
the research group at my site agreed to add an element of my project into their proposal for a
multiple-year, multiple-project government grant from the CDC on combating antibiotic
resistance and supporting antimicrobial stewardship efforts. The national grant was only awarded
to 11 medical centers or research groups, of which my field site was one (Prevention and
Intervention Epicenter 2016-2020: $5,000,000). The section that described the additional
research I would be doing for the research group included an MD as Principal Investigator, with
myself as Co-Principal Investigator and two other MD researchers as Co-Investigators. A
paragraph in the section of the grant focused on what I was bringing to the research project (i.e.,
my biosketch) describes my qualifications for conducting this research in lieu of the three letters
(PhD) after my name. Despite my work writing and planning the research, I was not the qualified
insider the research group was accustomed to dealing with. The gatekeepers to conducting any
research at my field site had decided where I fit within the hierarchies of academic medicine. I

8 A physician later informed me that Co-Principal Investigator was a made up title the research
group assigned me because while they did not understand the framing of the additional data
collection (I had written in the majority of the grant), they could not let an outsider without a
PhD be Principal Investigator.
was reminded again that I am studying up, but only by permission of the authorities and in the niche that they provided (Nader 1972): I was thus subject to the same powers I study.

*The formal nod*

From the first conceptualizations of my fieldwork I understood that doing both my own anthropological work and some interdisciplinary work with the local medical research group would be necessary for the purposes of accessing the bastions that are large academic medical centers (cf. van der Geest and Finkler 2004 on access and hospital ethnography). I also considered that pursuing ethnographic data in light of critiques of a common trend in the field of anthropology could help me overcome the myth of the lone researcher (Gottlieb 1995). In response to critique surrounding lone researcher trends, some ethnographers have taken up active engagement with local settings in ethnography as an ethical act (Fluehr-Lobban 2003, cited in Lassiter 2005). For my research, I knew requesting access to private doctor-patient conversations on secluded patient floors was going to be difficult. I had prior experience explaining the ethics of this type of research to institutional review boards, and I knew that getting the formal nod from multiple levels of hospital administration would be easier if I had the support of a division, and more specifically, of an influential insider. Once I had been integrated into the grant proposal of the local research group, I had formally embarked on a journey of two projects: my ethnographic data collection and my separate, interdisciplinary work conducted with local medical researchers.

But I was worried – this is all my research: my data, my project, all thoroughly embodied notions I had absorbed through all the years of framing and reframing I had done at the start of the PhD program. All this work getting access to the field site, and I was still paralyzingly preoccupied
over the details of ownership. Gottlieb (1995: 21) states, “For people whose business it is to be sociable, we anthropologists often have an oddly isolationist view of ourselves.” This was certainly the case at the start of my ongoing working relationships at my field site. However, I read through many of the classic hospital ethnographies of American medicine and came across a particularly enlightening passage in Sharon Kaufman’s *And a Time to Die: How American Hospitals Shape the End of Life*:

…My uneasiness, my lack of definitive status, helped me think through the contradictions I encountered, the differences of feeling and understanding between doctors and nurses, between health professionals and families, indeed, among all the players. My fluctuating position enabled me to hear the cacophony of their voices – all their different kinds of truths – and to explore the criteria on which those truths were established. (2005: 11).

I recognized that I could never really operate alone in the institutions I researched. I was always going to be surrounded by individuals who would have opinions and questions about my research and could exercise power over the work. Perhaps the “cacophony of voices” (Kaufman 2005) could actually enrich the anthropological work I was doing. I could let the experience of working together on the additional data collection and analysis, considered important to the local research group, put me in a good position to observe and understand how doctors define and solve problems in their practice. Indeed, I was proving in a formalized sense exactly how the lone researcher is a myth. Furthermore, postmodern understandings of fieldwork supported the co-constructing of research and productive dialogic relationships in the field (Lassiter 2005). The fact that I was thrown into research negotiations before I had actually set foot on the hospital floors demonstrates how complex and contested a field site can be, but also that problematizing
and working through these engagements is a critical step towards fully realized research (Gottlieb 1995).

Getting through the gatekeepers

June 2017. Before I could start my own data collection, the research relationships between myself and the medical professionals at my site had to be established. Finally, I was headed to the field, and excited to hit the ground running. Paperwork had been coming my way for months, covering everything from research agreements to institutional review board submissions. From March 2016 to June 2017 I had made 4 trips to Frontier City Medical Complex, including one preliminary research trip of 6-weeks, to sign paperwork and go through various health screenings. Since I was pursuing badge access at University Medical Center and County Public Hospital, the number of divisions I was passed through to get paperwork signed doubled. Thankfully Washington University in St. Louis, via summer funds available to PhD Candidates, covered part of the cost of this travel and testing. I estimate that in total the initial visits involving travel from my home institution, lodging in the city, and health screenings at both hospitals cost upwards of $8,000. The mundane aspects of setting up a research site and gaining access can indeed make or break a project.

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9 In the case of hospital ethnography in the United States, the hoops I had to jump through are also evidence of the heightened security concerns in medical settings akin to the pre-checks required at airports post 9/11. For physicians there is a longer history to consider, one filled with lawsuits, strikes, and physical violence in response to the actions taken in structures of medical care (Starr 1982). As such, the hospital remains a protected space to all variety of outsiders including, in this case, the anthropological researcher.
Still, even with the above bureaucratic measures taken to ensure access, upon arrival for full-time fieldwork June 2017 I was met with more hurdles. Long, Hunter, and van der Geest (2008) have said that gaining access to healthcare institutions for hospital ethnography can require “sensitive nurturing.” Despite my frustration at the soft barriers put up by office managers and hospital administrators who were generally unaware of what the project entailed, I persisted and got creative with my approach. Email chains that pointed me from division to division demonstrated that no one wanted responsibility for a researcher they had never heard of and had no interest in spending time on. Having made it through formal gatekeepers at my field site, I was now negotiating access with informal gatekeepers with different interests who were constraining the research via bureaucratic measures (cf. Wanat 2008). This is where having an administrator ally can help move conversations forward. When I didn’t have badge access to the hospitals within four weeks of arriving, I went unannounced to the Office of Research Volunteers and introduced myself. I pushed for details on next steps and process, and apologized for not knowing “how things are done here.” I mentioned the Director of the Division of Infectious Diseases, and even suggested that my inability to start research is holding up the research group (my influential insiders). The ball started rolling. I had badge access one week later at one hospital, six weeks later at the second hospital.

Retaining autonomy

Through my formal research with the group at my field site I was able to ensure access and an entrée into the professional world of infectious diseases practice. But I was also there to do ethnographic work. What I was about to embark on was a path towards benefitting both my participants and myself. However, what was critical to my research conduct, and what shifted the
power balance, was being awarded a Wenner-Gren Foundation for Anthropological Research Doctoral Dissertation Grant (2018: $17,990). By acquiring separate and independent funds to complete my research, I was able to pursue qualitative data collection over a longer period of time. Though my autonomy was consistently challenged (see ‘Framing relationships’ later in this chapter), ultimately, I was privileged in that I was sheltered from completely adapting my anthropological research into an interdisciplinary project, the agenda of the hospital gatekeepers and my newly established colleagues.

I was able to continue my pursuit of highly-qualitative, ethnographic data and follow the path of publishing anthropological research as a single-author and publishing interdisciplinary work as a co-author for my field site. The two projects gave me a modicum of power over my daily conduct, and essentially the right to drive my anthropological pursuits in the ways that made sense to me as researcher. Retaining autonomy while studying up became a matter of who was paying for the project to be completed and how I would save time and energy in the data collection and analysis while fulfilling my obligations to the project funders.\textsuperscript{10} This resulted in a tricky game of balance, a double bind, that I will further describe below.

\textbf{Breaking Through: Fieldwork Methods}

\textsuperscript{10} I refer to the project as being funded rather than my time being funded. That is because, while the national grant did fund the project it did not allocate any funds for my time or contribution to the project. The Wenner-Gren Foundation for Anthropological Research grant was awarded to myself as an individual and thus did pay me for my time and contribution. This is another way in which entering the world of medical research as an unknown entity, a PhD student in the social sciences, put me in a compromising position in terms of being supported in my fieldwork.
Hospital ethnography typically involves some combination of participant observation and semi-structured interviewing (Long, Hunter, and van der Geest 2008). For my research, I conducted a traditional hospital ethnography of the Frontier City Medical Complex, specifically focusing on the use of antibiotics among infectious diseases practitioners and intensive care unit practitioners. Figure 2 describes the types of activities engaged in as part of hospital ethnography at Frontier City Medical Complex. After a period of gaining access, I utilized my new status as insider to the hospital setting to fit in among medical professionals during patient rounds and daily work activities in division offices and hospital wards.
<table>
<thead>
<tr>
<th>Hospital areas of activity</th>
<th>Examples of activities observed</th>
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| Patient rounds            | -morning or afternoon formal rounds on patients completed throughout the hospital  
                            | -seated ‘table’ rounds on patient completed in a work room or office space  
                            | -individual patient rounds done with a junior staff member prior to group patient rounds  
                            | -inter-specialty daily check-ins organized around intensive care unit populations such as transplant patients |
| Working group meetings    | -weekly meetings with antimicrobial stewardship leadership  
                            | -monthly infection control meetings  
                            | -quarterly pharmacy and therapeutics (P&T) committee meetings  
                            | -government-funded research group meetings and presentations |
| Formal presentations within specialty | -weekly grand rounds presentations in infectious diseases  
                                          | -weekly grand rounds presentations in surgery or intensive care  
                                          | -monthly journal club in infectious diseases  
                                          | -monthly research lecture in infectious diseases |
| Daily work of infectious diseases staff members | -educational lectures given by antimicrobial stewardship leadership  
                                                     | -reading through electronic medical records of patient cases with infectious diseases practitioners  
                                                     | -reviewing evidence in medical journals pertinent to patient cases  
                                                     | -working on my computer in the shared offices of the division  
                                                     | -peer review of difficult patient cases conducted in shared office space |

Figure 2. Hospital ethnography at Frontier City Medical Complex
My participation in the above activities consumed most work days at the hospital. Being able to follow the workday schedule observed by staff members in the division under study gave me insight into the organizational side of hospital practice. Particularly in the Division of Infectious Diseases, participants in my study were consistently switching between office work, outpatient consultations, inpatient consultations, and educational activities (for themselves and contributing to trainee education). For my own daily work, my participation of formal hospital rounds comprises a majority of my ethnographic fieldnotes. However, my participation in the other activities listed in Figure 2 rounded out my schedule and left little time to reflect and type up notes while at the medical complex. Thus, a majority of fieldnotes were written in my evenings following long days of observation, mirroring the evening tasks of many staff members who continued working on their laptops well into the evening hours. I was also mirroring the work of early anthropologists who typed up notes under the light of kerosene lamps (Okely 1989).

Starting participant observation

Getting badges opened up a new level of research access for me. Now, with badge access, I could utilize the service schedules I had requested from administrative assistants in the Division of Infectious Diseases. At the beginning of my research stay I had been given an email address at both hospitals as part of my working relationship with the funded research group. Now, with badge access, I could utilize these email accounts to set up participant observation with practitioners in the Division of Infectious Diseases. I contacted individual attending physicians who were on service for the following two-weeks and requested access to their daily patient rounds. My e-mail requests appeared as below:
Dear Dr. ________,

My name is Katharina Rynkiewich, I'm a PhD Candidate in Anthropology. I'll be doing my research this year at _____________ (hospital name). It's a qualitative project and I'll be doing participant observation of rounds concerning antibiotic use and stewardship practices. I wanted to let you know that I was planning on joining patient rounds these next two weeks.

Please let me know if you have any questions or concerns about this, otherwise I'll plan on meeting you all Monday morning.

Best wishes,

Katharina

Physicians were willing to have me join their patient rounds, many citing their curiosity about the research or their conviction that antibiotic prescribing needed to be more rigorously studied in practice as reasons that they allowed me to conduct participant observation of their patient rounds. In contrast with anthropological work citing scheduling as a hurdle to studying up (cf. Souleles 2018 citing Ortner 2010), I had found an everyday activity that physicians normally participated in as my point of entry. Physicians at academic medical centers are accustomed to having medical students and other health professionals shadow their work. Therefore, though I had different reasons for joining patient rounds compared with the medical trainees, positioning myself as a student researcher interested in shadowing patient rounds allowed me to view up close how physicians made decisions and communicated amongst themselves.
August 2017. My first days of participant observation of infectious diseases patient rounds. In this setting, I was primarily an observer acting as participant (Gold 1958) in that my reason for being part of the group was to take notes on practice. I did not and could not perform any tasks relating to patient care. However, blending in and going with the flow so as not to disturb typical group dynamics was important given the concern that individuals’ behavior changes when they are aware they are being observed (see Payne and Payne 2004, “Hawthorne Effect”). Thus, I pursued passing as participant. I was already a relatable age and of similar ethnic appearance to other group participants, though I was younger than the attending physicians. I was sometimes the only woman in the group, and though we have come a long way from Boys in White: Student Culture in Medical School (1961), women are still underrepresented in many medical subfields.

For the purposes of blending in, I also adjusted appearance and behavior by 1) wearing the elements of a medical “uniform,” 2) introducing myself in a similar or relatable manner to other participants, and 3) moving with the group including writing approximately as often but not more than other group members.

In my efforts to “study up” amongst elite medical professionals, I contributed personal funds to buying a medical student wardrobe, a white medical coat, a badge holder with the hospital logo, and branded office supplies (e.g. folders, pens, notebooks) commonly utilized by medical professionals. In regards introductions, I commonly referred to myself as a “graduate student studying antibiotic use.” I navigated conversations with attending physicians and trainees by adjusting to the openness of each individual group. During this phase of research, I worked constantly to manage and adjust my self-presentation, what Goffman has referred to as face-work (1959; 1982). Goffman states, “A person’s performance of face-work, extended by his tacit agreement to help others perform theirs, represents his willingness to abide by the group rules of
social interaction” (1982: 31). In the first days of my participant observation, I aimed to demonstrate my willingness to follow the standards of group dynamics as I observed them. My previous ethnographic work among hospital-based practitioners was invaluable in this arena as it minimized the number of social errors made while conducting participant observation of patient rounds.

*Working alongside participants*

Though I took on a role of observer as participant while on patient rounds with infectious diseases practitioners, while working in the shared office space of the Division of Infectious Diseases after patient rounds I was working in an eerily similar manner to my office mates. Due to the schedules of patient rounds, when I wasn’t observing a group in action I was catching up on e-mail, looking through practitioner notes in the electronic medical record, eating a quick working lunch, or typing up fieldnotes. Physician fellows with whom I shared office space were often working through similar tasks with the addition of their individual patient consultations and clinics. Further complicating my role participant as observer, I was often included in group e-mails and discussions of literature searches covering patient diagnoses and suggested treatments.

While van der Geest and Finkler (2004) have demonstrated the limits of participant observation in hospital ethnography, including an inability to participate in patient care, in office spaces outside of patient rounds I was working alongside my research participants and was often drawn into a comfortable and inclusive office culture. My role as Co-Principal Investigator thus became more prominent when I was doing office work while my role as observer became more prominent during patient rounds. My experience doing participant observation could be isolating as it involved playing a part that had limitations and risks of exposure. However, sharing space
and conversation on a daily basis in the Division of Infectious Diseases offices made my experience of studying up less isolating as I was integrated into the professional dynamics of the division.

I experienced working alongside participants as a result of my new role as Co-Principal Investigator in the pre-existing research group at my field site. The face-work (Goffman 1959; 1982) involved in fitting into office spaces included conscious efforts to bring lunches, buy coffee at the local café, and generally be seen doing activities that could be identified as research (e.g. reviewing notes or reading medical journals). I had not become an insider (see above section “Glass views: From the outside in”) but I had achieved a day-to-day banter within the office culture at my field site. Though I did not enter fieldwork with this mindset, I had moved my work from a singular endeavor with my analysis and interpretation at the helm to a complex endeavor with multiple analyses and interpretations at play. The challenge of ethnography in sites of variable power within the field of anthropology responds to colonial legacies that have minimized local peoples voices and perspectives in anthropological work. Lassiter states:

If we indeed want to produce texts that move beyond the ongoing implications of the colonial encounter and that are responsive and relevant to the communities in which we work, then we must understand that the process of textual production is extremely important and that it can have significant implications as well. Thus, to take the still resonating experimental moment to its next logical step – from “reading over the shoulders of natives” to “reading alongside natives” – we have only to listen to our consultants, to respect and privilege their interpretations, and to not build things up that aren’t there (2005: 14).

Many anthropologists do consider the perspectives and interpretations of individuals at their field site. Still, there is a distinction that needs to be made between considering what participants say, think, feel, and do, and involving participants in the process. My experience working alongside participants in office settings, research meetings, and division presentations gave me the
opportunity of living alongside infectious diseases practitioners at an American academic medical center. More importantly, my experience was not my experience alone; I, as a Co-Principal Investigator in their division, was part of a shared experience among researchers on this multiple-year government grant. For the first few months of research I was content and had found productive space within medical institutions known for their hierarchy and bureaucracy.

Framing relationships

September 2017. 8:00 a.m. White coat on, two pens, two mini-notebooks, cell phone, hospital badge, patient list. Ready to embark on a day of patient rounds. My phone starts ringing, the Director of Infectious Diseases is on the phone. This is the first time he has called before e-mailing first. I sit back down. He tells me another building on the medical campus has closed. The staff there needs offices, and though he tried to save my office, it is needed by an administrator. It seems I’ll have to move offices. Surely, he’ll just move me to another one down the hall. However, he continues to say that they don’t have any open offices right now. He adds, “You don’t really use it anyway, right?” I pause, that stings a bit. I’m not at the office today, I’m at the other hospital to go on rounds with other physicians. But he knows that, so for a moment this feels personal. He gives me a few options. He says he thinks I could work with this other researcher and share an office or I could work in the shared office space with the fellow physicians.

At this hospital I was already sharing space with the fellow physicians. It’s not ideal, but I could manage. We agreed I would move into the fellow physician shared office. I would not have a regular desk but I could use one of six rotating desks and I was given formal entry when the passcode was shared with me. Having to return keys to my personal office didn’t feel great. In
that moment I was reminded that I was not an equal participant. I was not a “new hire.” The personal office was a visual representation of my interdisciplinary work, a move towards insider status, and a space to type up notes in the afternoons and conduct interviews at the end of my participant observation phase. The first cracks in the façade of a working relationship on equal ground appeared. Ironically, my efforts to present myself as a participant in patient rounds had led to a presentation of self as a researcher “out of office.” In Goffman’s (1959; 1982) terms, the face that I had saved (i.e., fitting in as a researcher) was still not enough for me to rise to the level of colleague.

October 2017. “We need to know what you are finding.” There it was. My biweekly meetings with the Director of the Division of Infectious Diseases had turned from friendly check-ins and hallway conversations to a formal request for data. Just weeks after losing my office space at one of the hospitals I was being further challenged to share the findings of my research. Up until this point I hadn’t shared summaries of my data because there was, in my opinion, nothing yet to share. I had only been at my field site for three months and I hadn’t reached data saturation. I had ideas, sure, but nothing that felt conclusive. Remember what role I had been given within the research group. I was a trainee, a PhD Candidate who needed the support of insider faculty members to operate within the hospital system. Beyond that, I was conducting unfamiliar (anthropological) research among powerful elites in academic medicine.

To build back trust into the working relationship, I wrote preliminary observations and provided a background literature document to the research group before the end of 2017. I participated in conversations on where the research was headed. I gave dates for the end of my participant observation and the start of my interviews. Finally, I began to keep track of data sharing
documents and presentations given to demonstrate my commitment to the research group if questions arose (again). This additional work required me to take three two-week breaks from participant observation of patient rounds, resulting in fewer fieldnotes on inpatient antibiotic use. This additional work also required me to delve into the medical literature more than I had done in the past to relate my observations to ongoing conversations in their field.

In framing my relationship to my field site and my research participants, I found that there is not one relationship and not one descriptor of it. I was studying up academic medicine from the bottom of a rigid hierarchy that wanted access to and frequent review of my research, but I was also making my participants nervous in that they worried about what I would find and felt out of control when I directed data collection and analysis efforts. Practically, for me this meant I was expected to morph my anthropological fieldnotes into digestible information for medical researchers which put me in a position of working for academic medicine. Hugh Gusterson, in “Studying Up Revisited,” comments:

In the past anthropologists wrote about people who lived far away for audiences that had to take our interpretations largely at face value. The anthropologist who studies up in the United States will have colleagues who may already have strong opinions about his or her subjects, who may even have met them, and subjects who will read and argue with what is written about them. In this situation we need to rethink both fieldwork and writing, as many already have, exploring hybrid research and writing strategies that blur the boundaries between anthropology and other disciplines (1997: 117).

The process of being in conversation with fellow researchers at my field site changed the type and amount of anthropology I could do. Primarily, because members of the research group were pulling me into conversation and activities related to the group, I was in a position to incorporate into my hospital ethnography a perspective on academic research and the mundane activities involved in producing research in a local medical group. Out of necessity as a result of my back
and forth with the Director of the Division of Infectious Diseases, the spaces of participant observation eventually expanded to include informal conversations and discussion of research expectations and data sharing. The type of public anthropology Gusterson (1996, 1997) discusses had the possibility of bringing in a more ethical approach to the conduct of research. However, my working relationships are also a stringent example of the power I was beholden to work around in American medical structures. In the ethnographic study of elite academic medical centers, research conducted by junior anthropologists may be restricted and constrained by influential gatekeeper-colleagues coming from other disciplines.

Interviewing

The daily activity involved in this dissertation research utilized participant observation as a primary method. However, to clarify understandings and allow practitioners to contextualize their actions, I embarked on in-depth interviews with 25 infectious diseases practitioners and 10 surgical intensive care unit practitioners. I selected individuals to interview who: 1) I had observed, 2) had research interests corresponding to early themes, or 3) had a high level of involvement in patient rounding and thus more exposure to daily practice. Every individual I interviewed was a practitioner whom I had met before through rounding on patients or attending office meetings and working groups. Following an e-mail request for interview, only 6 individuals were unable to meet due to scheduling conflicts or concern over the time commitment of the interview.

Interviewing took place after several months of participant observation. I did not start interviewing until December, 2017, and most practitioners were at least marginally aware of my lingering presence in the hospital working spaces. I frequently arrived early and greeted
participants enthusiastically (cf. Goffman 1959 and 1982 for face-work) to ensure trust in the encounter. The interview procedure involved meeting in a private room or semi-private table of the cafeteria for approximately 1 hour. At the beginning of each interview, I read an oral consent document approved by the Frontier Medical Complex Institutional Review Board (IRB) and asked participants to state their consent on the record. Every interview was recorded and later transcribed. After the receipt of oral consent, I used an interview guide that I followed up on with impromptu questions. Key areas of the interview guide included: describing common antibiotic-resistant infections and antibiotics, understanding relationships to other practitioners and practitioner groups within the institution, and soliciting rationales surrounding common problems in antibiotic prescribing. Quotes used in the remainder of the dissertation are taken largely from interview transcripts.

Analysis

Audio files were transcribed during breaks in fieldwork and completed within two months of returning from my field site. Fieldnotes were written up after every participant observation event or semi-structured interview, and were completed within one day of data collection. While I was in the field, I kept a schedule and journal of daily events. At the end of my fieldwork, by reviewing my schedule, journal, and fieldnotes, I put together a timeline of research. I used my timeline of research as guide to fieldwork completed and as a starting point to my formal analysis upon returning from the field.

Coding
To aid in qualitative analysis, I purchased a student license for the qualitative analysis software MAXQDA. While still in the field, I began open coding selectively from my fieldnotes using a constant comparative method (Glaser and Strauss 1967; Corbin and Strauss 1990). For my interview transcripts, I conducted word frequency searches using MAXQDA. Additionally, based on my initial open coding methods, I conducted directed searches for key words and themes. Each chapter in this dissertation has a reference to the key words and themes solicited from coding fieldnotes and interview transcripts.

**Professional meeting attendance**

A final research activity involved in the production of this dissertation project was professional meeting attendance. In order to become truly integrated into the research community of infectious diseases practitioners, I both attended the meetings and participated in networking with researchers from my field site. This opportunity demonstrated my serious intention of understanding national conversations surrounding infectious diseases practice which went a long way in convincing administrators at my field site that I was prepared to conduct this research. Additionally, as part of the production of a well-situated dissertation, it was important to gather data on the future directions and planned innovation in the field of infectious diseases. Thus, starting in 2016, I attended various national meetings where infectious diseases topics were discussed by leading experts. These meetings included ID Week, the combined meeting of the IDSA, the Society for Healthcare Epidemiology of America (SHEA), the HIV Medicine Association (HIVMA), and the Pediatric Infectious Diseases Society (PIDS), which I attended in 2016, 2017, and 2019. I attended the SHEA Decennial Meetings in 2020. Additionally, I
attended the Antimicrobial Research Workshop of SHEA in 2017. Attendees at these meetings include infectious diseases practitioners and national policymakers from agencies like the CDC.

The local research group I worked with has generously provided travel funds to support the presentation of research at these conferences, with the understanding that I would be unable to attend without support. However, I would also point out that attendance at multiple national and international conferences in a year for the medical research group is not feasible in conjunction with travel to professional conferences for the discipline of anthropology. Therefore, I suggest that while studying up can bring a researcher into new, powerful worlds, studying up can also put the researcher in a double bind that tests the relationship they have with their own discipline by demanding that their time and attention go elsewhere.

**Early-Career Research and Academic Precarity**

*Glass views: Shadowing a career*

An overwhelming majority (90%) of anthropology graduate students are working towards being hired into a tenure-track job in academia (Ginsberg 2016). Departments of Anthropology train their PhD students towards tenure-track jobs (Lyon 2018) even though following the receipt of their advanced degree, PhD awardees are met with an “extremely competitive, over-saturated job market” (Speakman et al 2018). Platzer and Allison (2018) note, “Despite these long odds, a tenure-track professorship remains the aspirational norm within the discipline.” During the first years of PhD program, tenure-track anthropology jobs were what my colleagues and I discussed and kept propped up as a goal. Talk of other opportunities outside of academia was often ignored or dismissed. Similarly, single-authored publications remain a norm both for my fellow PhD
Candidates and our advising faculty. Before entering the field, my expectations did not differ from those of most anthropology PhD students. Though I had early discussions with the research group at my field site, my expectation was still that I would adhere to these common norms and aspirations within the field of anthropology.

The tone shifted as I began my fieldwork “studying up” in a well-regarded academic medical center. I was pushed towards interdisciplinary work due to access considerations. However, I also found that I was able to enrich the fieldwork experience by being entrenched in the same research and practice groups that I studied. In the world of “studying up,” gaining access to a tight-knit community can lead to job opportunities or even on-the-spot job offers (cf. Souleles 2018). Particularly in the study of financial markets (Ho 2009), drawing on links within the world of elite academia can provide professional opportunities both for research and a researcher’s career long-term. Within academic medicine, researchers are often interested in individuals who propose methods of studying well-described medical challenges.

Drawing on my research experience, the problem of antibiotic resistance looms large over medical institutions. Thus, medical researchers were willing to look at antibiotic resistance from every angle available in order to find creative and effective solutions. Interest and support of my fieldwork was born of mounting concern about antibiotic resistance. I acknowledge that not every anthropology PhD Candidate or all dissertation research projects proposing to “study up” among medical elites would be welcome in the shared spaces of medical institutions. Certainly, for a topic less commonly discussed in the medical community, the opportunities surrounding being drawn into an existing research group would not be as prescient.
March 2018. After having made significant progress collecting data in the fall of 2017 and early spring 2018, my research group and I were in frequent conversation about my initial findings for the additional data collection. In a single month, I attended a conference with my research group at national headquarters set up by the funding agency, I presented at a local monthly research meeting for the Division of Infectious Diseases, and I submitted an initial findings report to the research group cataloguing my progress. In academic medicine, interdisciplinary research can therefore involve shadowing a career in medicine: networking, presenting findings, and data sharing were all part of my working relationships with my research group.

Increasingly in my 18-months of fieldwork, I engaged in research activities with my co-investigators. By following the mundane activities of my research, this period might be considered anthropology in medicine, though I was actively struggling to maintain the anthropology of medicine as an active part of my research agenda.11 I was trained for conducting individual anthropological fieldwork but engaged in a research network of medical practitioners and scientists. I was reminded of the opportunity that was dangling in front of me via my research relationships at my field site: “They could hire you” an anthropologist mentor suggested at a site visit (September 2018, personal correspondence).

11 For the purposes of this chapter, the question is not whether or not an anthropologist can productively work in and around other disciplines and fields of study. Indeed, there are many medical anthropologists productively engaged in medical schools, schools of public health, etc. In this article, I bring up the dichotomy of anthropology in medicine or the anthropology of medicine (see Singer and Baer 1995 for the original debate) to point to pressures often placed on early career medical anthropologists in their work schedules and professional relationships, pressures that effectively delimit their ability to choose a path unless their gatekeepers, funders, home/sponsoring institution, and co-investigators also share that path.
As a PhD Candidate in Anthropology, I am aware of the academic precarity in American anthropology (Platzer and Allison 2018). Therefore, when faced with opportunity via my affiliation with a well-funded research group in the more stable field of medicine, the “up” which I was studying transformed into a career opportunity. Laura Nader wrote “Up the Anthropologist: Perspectives Gained from Studying Up” so that anthropologists could better describe and critique individuals, groups, and institutions in power. However, in the current climate of dwindling tenure-track opportunities for PhD awardees in anthropology, the fieldwork experience can be shaped by necessity and the pursuit of job security in unexpected ways.

For me, as a medical anthropologist in long-term fieldwork, I navigated the landscape by adjusting anthropological interests based on what activities I participated in (e.g. taking fieldnotes on policy discussions and local dynamics among administrators). I worked with my research group and set aside time for their pursuits, but I also focused on my in-depth ethnography, even when it was questioned by my co-investigators. Above all else, I found that when I paid attention to what was happening in my mundane day-to-day work I discovered that it reflected my role as betwixt and between two worlds: a PhD Candidate “studying up” as a Co-Principal Investigator in an American medical research group.

**Conclusion: Risk and Reward**

The original intention in the term “studying up” included a hearty push towards critical research of traditionally upper-class industries (i.e. the powerful) and encouragement of research “at home” (i.e. the United States) as a way of acknowledging the bastions of power in American capitalist society. Nader states: “Anthropologists have a great deal to contribute to our understanding of the processes where by power and responsibility are exercised in the United
States” (1). The themes of “studying up” have filtered through American anthropology in particular, leading to a renewed call in the 1990s (Gusterson 1996; 1997) and well-known examples in the study of Hollywood (Ortner 2010) and finance (Ho 2009). Hospital ethnographies of American medical institutions have long studied the power of biomedical establishments (e.g. Becker et al 1976; Kaufman 2005; Luhrmann 2000; Mattingly 1998; Prentice 2013; Rhodes 1995). In particular, private academic medical centers hold enormous power and responsibility in their practice. Furthermore, many hospital ethnographies of American medical institutions might be considered anthropology “at home,” whether or not the author engages in this self-reflection in writing.

As Nader’s original article suggests, “studying up” power in the United States is essential to the ethnographic enterprise, and access is an ever-present issue for anthropologists eager to take on the call. Though access and gatekeeping are frequent barriers in other industries (cf. Ortner 2010; Souleles 2018), healthcare in the United States is notorious for endless bureaucracy and layers of red tape. If the medical anthropologists begin their research as an outsider to the institution they aim to study, the question of access is even more significant. For my fieldwork, I began conversations with local researchers in fall 2015 leading up to the start of my fieldwork period in summer 2017.

Nurturing the research relationship with a field site can take time and energy, but due to patient privacy concerns, paperwork and medical testing can further complicate the process. From my position as PhD Candidate (read: trainee), the access points given to me were as Co-Principal Investigator on a multiple-year government grant. Importantly, I was not allowed to lead this project on paper due to my outsider and trainee status. As much as I was reminded that I had
little power in this working relationship at the beginning of my research, I discovered that close access to the dynamics of research at academic medical centers gave me another angle for my fieldwork. In the pursuit of becoming insider, I had to be studied prior to entry and I had to study with my co-investigators on a daily basis. Thus, becoming Co-Principal Investigator as a part of gaining access to my field site was necessary and made for more nuanced data. Straying from the lone researcher mindset put me in a position to engage in “reading alongside” (Lassiter 2005) my participants.

What’s at stake for researchers “studying up” a powerful industry like American medicine? 12-months of uninterrupted research was, from the beginning, merely a romantic notion. What is more common to the research experience of anthropologists conducting fieldwork is being tangibly responsible to multiple entities. I argue that this is especially true among medical anthropologist trainees conducting hospital ethnography in American medicine, where funding or a long-term career might be on the line. Having set out alone in my fieldwork endeavor, I was surprised by the richness and vulnerability that arose in my 18-months of ethnographic and interdisciplinary data collection. Furthermore, via my connections with the research group at my field site, I am being drawn into additional research findings and publishing opportunities post-fieldwork.

Ethnography is an endeavor that does not fit neatly into pre-arranged time periods or notions of human subject research (cf. Lassiter 2005). This type of ethnography, done in the context of “studying up,” forms an axis of a simultaneously powerful and powerless researcher. Now that I have been removed physically from my field site to take up work again at my home institution, the balance has shifted again. Time will tell what future double binds I find myself in as an
anthropologist studying medicine. What I do know is: I have endeavored to keep doors and concepts open, as I have observed that there is much that it is still up in the air.

We are in a time of precarity in American anthropology (Platzer and Allison 2018), and early career anthropologists are being forced to consider multiple pathways outside of the traditional tenure-track route in academia. “Studying up” in a well-regarded American academic medical center, in conjunction with being represented on a multiple-year government grant, can thus give a glimpse of opportunity to the PhD Candidate in Anthropology. As I have described in this article, I was conflicted when presented with opportunities for funding and project work from the medical field while trying to conduct an anthropology of medicine. I might have asked: What would being drawn in as an insider do to my anthropological gaze? But I also might have considered the paucity of opportunities waiting for me in anthropology on the other side of a PhD program.

Others have described job offers and networking opportunities that presented themselves in the process of “studying up” (Ho 2009; Souleles 2018). In this historical moment in American anthropology, I argue that there is a fraught relationship between the precarity of a PhD Candidate “studying up” medicine and the privilege of a well-funded research group at their field site. Therefore, while I gained perspective by being Co-Principal Investigator at my field site that was invaluable to the dissertation data, “studying up” created a double bind which left me at risk of alienating an interdisciplinary career in American medicine for the sake of dedicating myself to anthropology-driven research in a tight academic market.

The next chapter builds on my experience of conducting research at Frontier City Medical Complex by laying the foundation for studying the topic of antibiotic resistance among hospital-
based practitioners. I discuss the history of antibiotic resistance, North American hospitals, and the infectious diseases specialty. Additionally, I provide segments of interviews from participants regarding their memory of key moments in the history of infectious diseases research and practice.
Chapter 2

Reform and Control: A Brief History of the Infectious Diseases Specialty and Antibiotics

Microbes have evolved over 3.5 billion years and are arguably the most adaptable organisms on earth. Restricted genetically by their inability to reproduce sexually, bacteria have acquired several additional mechanisms by which to exchange genetic material horizontally. Such mechanisms have allowed bacteria to inhabit some of the most inhospitable environments on earth. It is thus hardly surprising that when faced with a barrage of inimical chemicals (antibiotics) they have responded with an equal and opposite force.


Introduction

This chapter starts with an exploration of the problem of antibiotic resistance, including a brief history of infectious diseases in human populations. Though infectious diseases, and certainly microbes, have been in existence since before the anatomically modern human has walked the earth, the current problem of antibiotic resistance represents a return to early human-microbe interactions in which medicines may no longer prevent death from the most basic of infections (e.g., staph infections). This relationship is best viewed by looking closely at the history of the

12 Certainly infectious diseases have plagued animal populations and ecosystems for centuries. Where possible, interdependent relationships between and within ecosystems are discussed. However, this is a dissertation focused on antibiotic use in human populations, particularly within inpatient medical institutions.
physician specialty of infectious diseases, a specialty of internal medicine that only appeared in the mid-20th century. To understand the stakes of changed human-microbe relations, this chapter looks at a recent historical moment in American medicine where antibiotic overuse and misuse have become targets of outside intervention aimed at limiting physician’s freedom to prescribe. And so, this chapter frames the history of infectious diseases, antibiotic use, and physician specialties related to infection in the United States. How the physicians at my field site understand this disciplinary history and national trends in antibiotic use, and so I intersperse their perspectives and explanations throughout this chapter.

A Brief History of Infectious Diseases

Microbes and humans are forever entangled. Much of the relationship between microbes and humans is positive, or symbiotic, in that it benefits both humans and microbes. Recent reframing of these entanglements has emphasized the benefits of microbial life (Singer 2015). Infectious diseases physicians at my field site would often emphasize this point:

We have so many bacteria living in and on our bodies - trillions and trillions of bacteria – and many of them are completely harmless and possibly significantly beneficial. Antibiotics disrupt the symbiosis. The antibiotic comes in and it kills a whole lot of things, but the cockroaches of the world will survive, and they will take over the world. And I think that’s what antimicrobial resistance is. You give them antibiotics, the antibiotics kill a lot of things, including the diverse pool of bacteria living with you. What’s left becomes resistant.

In fact, infectious diseases physicians were well-versed in the potential benefits of having a diverse microbiome. The rest of the world is starting to follow. Amsterdam’s Micropia Museum serves as a shrine to microbes large and small (see Chapter 5), and interest and investment in the study of microbes has increased dramatically in the past decade (e.g., the Human Microbiome Project). Most of all, understandings of the relationships between humans and microbes have
expanded dramatically in recent years, including in the field of anthropology where depictions of human-microbe relations has flourished (Helmreich 2009, Tsing 2015). However, a glance at the history of infectious diseases reveals that the entanglement between microbes and humans has repeatedly been cast as a contentious relationship in which humans have been the prey of microbes. In fact, throughout much of human history, infectious diseases were mystified, or thought to be the result of magic (e.g., Evans-Pritchard 1976). In the following, I will discuss the changing logics of understanding infectious diseases as seen throughout recent history.

Within the medical profession, discussions of infectious diseases generally refer to four classifications of common infections: viruses, bacteria, protozoa, and fungi. Additional classifications representing infectious diseases include helminths (e.g., parasitic worms) and proteinaceous infectious particles (i.e., prions). These additional classifications are rare causes of disease in human populations, though outbreaks of bovine spongiform encephalopathy (i.e., Mad Cow Disease) can occasionally wreak havoc. Though not all infectious diseases cause illness, and many infectious diseases plague the animal world but do not make the leap into humans (i.e., are not zoonotic), there are hundreds of examples of types of infections impacting human populations that are caused by the four common classification groups (Figure 3).

Each type of infectious disease can be broken up into component parts that are even smaller than a bacterium or virus. Microbes is a general term used to refer to these microorganisms living in and around the bodies of humans and animals, and technically does not refer to non-living

\[13\] Illness is akin to sickness in my usage here. In line with medical anthropologists who have demonstrated that illness includes the cultural understanding of disease-related bodily experiences (e.g., see Kleinman 1989), I use illness to discuss the generalized symptoms experienced by the individual that might lead to a diagnosis of infection.
entities such as viruses. “Microbes occupy all of our body surfaces, including the skin, gut, and mucous membranes. In fact, our bodies contain at least 10 times more bacterial cells than human ones, blurring the line between where microbes end and humans begin,” Madeline Drexler (2010) writes. So while infectious diseases do cause illness in human populations, they are also a mundane aspect of our everyday life. We live with microbes and they live with us.
Figure 3. Classifications of Common Infectious Diseases Informed by Ethnographic Data Collection 2017-2018.
Historically, bacteria and viruses have caused the most mortality at the population level, though fungi are also capable of causing deadly infections. During the Age of Pestilence huge swaths of humans could be wiped out with a single outbreak (McNeill 1976). Strong cultural norms were established in reference to infectious diseases suggesting that insidious invaders or attackers lay in wait to cause destruction (e.g., Johnson 2007). Human populations began to respect and fear disease.

For example, the plague (Yersinia pestis) terrorized Europe over several centuries. Plague doctors were dispatched to assess those who had fallen ill, but they retained a full mask intended to protect themselves from the disease (Figure 4). The concept of quarantine was developed in response to widespread fear of the devastation that accompanied outbreaks of plague across Europe. Quarantine is a “wait and watch” approach to investigating infectious diseases outbreaks, often involving weeks or months of forced isolation upon entry into a new town, region, or country (Johnson 2007, Helman 2007). Throughout the Age of Pestilence, disease became closely linked to chaos and destruction. A true fear of unseemly death gripped the cultural conscious of the time.
Figure 4. Plague Doctor. Wikimedia commons. Source: Jean-Jacques Manget, Traité de la peste (1721).
Eventually, changes to the infrastructure of societies associated with industrialization altered the landscape of infectious diseases. Improved water and waste management as well as population hygiene led to an overall decrease in infectious diseases epidemics. Those who did fall ill during this time were thought to have erred. For example, cholera epidemics in London during the mid-19th century were repeatedly blamed on the poverty stricken and morally questionable (Johnson 2007).

Despite evidence to the contrary, microbial causes of infection continued to be captured in the lexicon of the age: “miasmas” and “mala aria” (bad air) lurked around every corner (McNeill 1976). In short, disease was thought to be aggressive and able to target its victims, while the afflicted were often thought to be impure and ultimately deserving of illness. For the most part, modern society had survived the age of pestilence. Still, untreatable infections like those caused by the bacteria *Staphylococcus* spp. could cause rapid decline and death. At the time even the slightest bump against a cabinet could be the beginning of a deadly staph infection. “Or you got an ear infection and you died. A cat bite and you died. Or you stepped on a stick, and you died. All of a sudden, antibiotics come along and bang (you didn’t die)” explains Matt Richtel, science reporter for the New York Times (2019).

*The Golden Era of Antibiotic Discovery*

Alexander Fleming discovered penicillin in 1928. It is then ironic that Fleming himself warned of the perils of antibiotic resistance (Institute of Medicine, 4). Other physicians and researchers at the time followed suit. However, the search for “magic bullets” left overeager populations ready to put penicillin into use. Stuart Levy, author of *The Antibiotic Paradox: How the Misuse*
of Antibiotics Destroys their Curative Powers (2002), describes the genesis of the antibiotic age, also called the “golden era of antibiotic discovery”:

The discovery of sulfonamides in the mid-1930s had revived the quest for what the 19th-century German chemist Paul Ehrlich called a “magic bullet,” that is, a drug that would kill bacterial invaders without harming the body. Penicillin seemed to be the epitome of the concept. It killed bacteria that the sulfonamides could not affect and produced fewer side effects…Penicillin clearly symbolized our ability to outwit and control the microbial world. (7)

Following the destruction of the plague, cholera, pneumonia, and tuberculosis, “magic bullets” were thought of as saviors. The first “magic bullet” was Paul Ehrlich’s discovery of Salvarsan, called compound 606, which was the first effective treatment against syphilis (Williams 2009, Sepkowitz 2011, Schwartz 2004). Ehrlich himself played a key role in popularizing the term “magic bullet” until it became solidified in the medical lexicon by the early 20th century (Cueto 2013). An established infectious diseases physician gave me a sense of the powerful of antibiotics when they were first introduced:

My grandchildren are 25, my oldest one. They couldn’t have a feeling, nothing to do with intellect, you understand, zero. They just couldn’t have a feeling of what an antibiotic could do compared to when there was no antibiotic. And of course, mankind in spite of all its weaknesses and defects keeps forcing itself into dependency on new information. So, the reason I am telling you this is when penicillin first came out, they were inventing and reinventing the process of production constantly. The thing is, we really needed penicillin. We had seen enough of the alternative.

Penicillin was thought to be the next magic bullet. After the initial discovery of penicillin in 1928, it quickly made its way into American households in the 1940s and 1950s. Until World War II, the major cause of death in war had been infection rather than battle injuries (Markel
2013). However, the tide changed when penicillin was distributed to American and British soldiers during World War II. The antibiotic helped heal infections from battle wounds and it staved off sexually-transmitted infections such as syphilis and gonorrhea (Figure 5, Brandt 1987). Penicillin was of great value during the 20th century due to these early victories. Many were confident that the era of infectious diseases was behind us. William H. Stewart, former surgeon general of the United States (1965-1969) is often cited as having said “It is time to close the book on infectious diseases” (Singer 2015: 157). Later antibiotic discoveries continued to bolster confidence that humans were winning out in the battle against microbes. Many infectious diseases physicians who remembered the genesis of antibiotic resistance were able to frame the tipping point with penicillin as the following retired infectious diseases did:

During the 20th century, if you go back, you can see spots of our advancement. You can see quinine for malaria, there was a chemotherapeutic agent, we controlled malaria with swamps, then eventually they died. Prontosil was a dye invested by a German, and that became the start of sulfa-drugs. Sulfa began to control certain infections that couldn’t be controlled before, and people stopped dying right away. Not always, but often. From strep, infections, wounds, and of course then penicillin was discovered, and then that was produced. Then we had the second World War. The scene was entirely changed.

Infectious diseases physicians were quick to reference penicillin in conjunction with warfare. It was a way to quickly convey how much penicillin changed the burden of infectious diseases in human populations. Before penicillin, it was exceedingly common for soldiers to die not in warfare, during battle, but afterwards when their wounds would not heal and would become infected.
Figure 1.2. When penicillin was first introduced it was not a prescription drug. It was not until the mid-1950s that prescriptions were required. Many companies advertised penicillin to the general public as soon as enough became available. This advertisement appeared in the August 14, 1944, issue of Life magazine.

Figure 5. Thanks to Penicillin...He Will Come Home! Wikimedia commons. Source: Life magazine (1944).
The Problem of Antibiotic Resistance in Human Populations

“Every time a patient takes an antibiotic, it inhibits or kills a whole range of bacteria....(the) survivors may be naturally resistant to the antibiotic ingested, or they may have acquired resistance during therapy. Sometimes the patient was already colonized with resistant organisms before treatment had even begun.”


Antibiotic use in human populations is not benign. Even antibiotic use that would be considered “appropriate” by key stakeholders has disastrous side effects, and antibiotic use that is prolonged or in low doses for the microorganisms present add to the opportunities for resistance to flourish. Some microorganisms are naturally occurring in the human body (e.g., Clostridium difficile) and are highly susceptible to imbalances caused by antibiotic use. Many microorganisms easily acquire resistance to antibiotics used (e.g., evolution in vivo such as with Staphylococcus aureus with ß-lactam antibiotics, see below).

Among microbes, bacteria in particular are known as promiscuous microorganisms in that they transfer resistance genes outside of their genera (Dancer 2008). These resistance genes contribute to bacterial defenses against antibiotic invasion, leading to the situation in which bacteria is resistant to multiple types and spectrums of antibiotic. Ventola (2015) states, “Antibiotics remove drug-sensitive competitors, leaving resistant bacteria behind to reproduce as a result of natural selection.” In addition, however, already-resistant bacteria can move across surfaces, healthcare instruments, bodily organs, and blood vessels. As such, the pathways leading to an antibiotic-resistant infection are many.

The understand the origins of antibiotic resistance, I begin with a history of antibiotic use. In the first century of antibiotic use, rampant misuse and overuse of antibiotics was the norm.
Antibiotics were consumed by servicemen and women during all major wars of the 20th century after World War I. Antibiotics were introduced to the public via physician’s offices, pharmacies, direct-to-consumer advertising, cleaning products, animal husbandry and consumption, and inpatient medical institutions. The proliferation of exposures to all forms of antibiotics directly contributed to the rapid rise of antibiotic resistance and antibiotic resistant infections. As such, antibiotic resistance is a prime example of the tragedy of the commons (Hardin 1968; Baquero and Campos 2003). The tragedy of the commons is an individual maximization of gain that has long-term consequences on the population as a whole. The individual person consumes or exposes themselves to antibiotics and when enough individual persons are exposed the population as a whole is at risk. Antibiotics have long been thought to be inexhaustible, net good resources. Thus the tragedy of the antibiotic commons has meant that antibiotic resistance continues to grow and become more problematic as use is continually measured on an individual basis (Institute of Medicine 1992: 6-7).

Epidemiologic transitions have been well-described in the literature as shifts in population health related to infectious diseases (Barrett et al 1998; Barrett and Armelagos 2013; Singer 2015). The first two transitions include the shift from the Age of Pestilence to industrialized society and the shift from industrialized society associated with Dickensian hard times (i.e. short life spans overwhelmed by sanitation-related illnesses) to rising incidence of chronic disease and increased life spans. Related to antibiotic resistance, the third epidemiologic transition is the shift from high incidence of chronic disease and increased life spans to a return of plague-like illness (Barrett et al 1998; Barrett and Armelagos 2013). The third epidemiologic transition involves a re-emergence of infectious diseases and the interaction of multiple diseases and conditions that create syndemics and increase healthcare costs (Singer 2015: 92). Indeed, diseases like malaria,
tuberculosis, and staph infections have all seen a comeback associated with high levels of antibiotic resistance.

MRSA is indicative of the challenges of the third epidemiologic transition. *S. aureus* is commonly found in the mucous membranes of one-third of human populations, and was a major cause of morbidity and mortality until the advent of penicillin (Sykes 2010). However, by the 1960s a majority of *S. aureus* bacteria were strains resistant to penicillin (ibid. 2010). At that time, scientists began to discover that β-lactamase enzymes were compromising the ability of antibiotics to destroy bacterial cell walls. A new antibiotic, methicillin, showed promise when it was discovered in the early 1960s. When it became clear that *S. aureus* was also becoming resistant to methicillin, scientists discovered that the bacteria was producing a modified target to which the antibiotic could not bind (Sykes 2010).

Thus, *S. aureus* began to become resistant to every available antibiotic, allowing what we now refer to as MRSA to emerge in the 1990s (Levy 2002: 52). *S. aureus* first developed resistance to penicillin, then to methicillin, and currently there are complicated strains of *Staphylococcus aureus* that are resistant to penicillin, methicillin, vancomycin, and other β-lactam antibiotics including carbapenems. MRSA is therefore a good example of what is colloquially known as a “superbug,” or an infectious disease that has become resistant to multiple available antibiotics (see Chapter 5 for more on the language surrounding antibiotic resistance). Figure 6 shows the development of antibiotic resistance for key antibiotic discoveries and critical microorganisms.
Antibiotic resistance is one of the defining challenges of our time, and availability of antibiotics has had significant impact on their overall use. The production of antibiotics has changed over time as knowledge and demand have shifted. In 1949, 150,000-160,000 pounds of broad-spectrum antibiotics were made compared with 400,000-500,000 pounds in 1954 (Levy 2002: 55). As Ventola (2015) demonstrates in regards to the academic pursuit of new antibiotics, in the five years between 1980 and 1985, new antibiotic approvals remained high (N=19), but between 2000 and 2014 new antibiotic approvals dropped off significantly (N=13). At the start of the 21st century, the landscape had changed. The development of novel antibiotics had stalled, antibiotic resistance was increasingly recognized as a threat, and policies aimed at reducing antibiotic use in human populations began to increase. Additionally, antibiotic availability varies internationally, with lack of regulatory measures and structured medical care heightening the risks related to self-dosing (Peterson 2014, Ventola 2015).

Today, the pharmaceutical industry has dramatically slowed investment in the research and development of antibiotics (Podolsky 2015, Ventola 2015). The combination of the expense in research and development, the pushback against overuse and misuse, and the nature of antibiotic use as episodic rather than lifelong (e.g., as it is for antihypertensives or cholesterol medications, Dumit 2012) has made antibiotics a poor choice for the profit-driven industry (Outterson et al 2015). Still, the production of antibiotics already developed and released has not ceased. Antibiotic use has not slowed in the last 10 years despite policy interventions at the local, national, and international level (see Chapter 4). In fact, over 50% of all hospital patients in the United States receive antibiotics at some point during their stay (Baggs et al 2016). In addition to significant use of antibiotics in animal husbandry (29 million pounds in 2009, FDA 2014), antibiotics continue to be highly utilized in the United States despite declining investment in
their production. In the following sections I will provide a history of the use of antibiotics in medical institutions by describing the origins of the specialty of infectious diseases. In particular, I will focus on the structure of infectious diseases practice over the years at Frontier City Medical Complex.

**Medical Practice and Medical Institutions in the United States**

Akin to the ‘golden age of antibiotic discovery,’ the ‘golden age of medicine’ (Brandt and Gardner 2003) is known as an era of advancement and triumph in medicine. From the early 20th century through the end of the 20th century, Western medicine made great strides towards understanding more about the human body and its ailments. Microbe and bacteria ‘hunters’ identified many causes of infection (Brandt and Gardner 2003) and ‘magic bullets’ to associated infections were discovered not long after. A period of consumption followed (Pickstone 2003) in which medicines were produced in mass quantities. Medicines were thought to be targeted to infections such that a pill could eradicate disease within the body. Individuals who distributed these medicines were given much respect as they were considered to be akin to lifesavers. Thus, the ‘golden age of medicine’ led to great trust and authority being placed with medical professionals and pharmaceutical companies.

The public’s engagement with medical institutions went through a similar transformation in the early 20th century. In early 19th century America, “Almost no one who had a choice sought hospital care. Hospitals were regarded with dread, and rightly so. They were dangerous places; when sick, people were safer at home” (Starr 1982). For most of the 19th century, the few hospitals in operation were not safe. Furthermore, those hospitals were not utilized by the majority of the population. However, medical professionals rose in rank during the early 20th
century, and subsequently well-respected physicians began to associate themselves with practices in larger cities. Families like the Bigelows, Warrens, Minots, and Peppers dominated medical practice around the turn of the century (Starr 1982: 89). Formerly hospitals tended to be poor houses and mental health dumping grounds run by religious groups. Hospitals by the early 20th century had transitioned into the central institution in American medicine. The number of hospitals also proliferated; by 1904 there were 1500 hospitals in the United States, by 1944 there were 4445 hospitals (Brandt and Gardner 2003). By the middle of the 20th century both births and deaths were commonly observed in hospital settings. The hospital became a space of great import in American life.

The changes in the medical profession and medical institutions signaled a shift in people’s encounters with infectious diseases. Specialization within medicine became the norm as understanding and knowledge of pathological processes grew. Additionally, since Americans started to utilize hospitals more regularly as part of their overall health maintenance, the need arose for physicians to be trained intensively for each ailment they might encounter. Having physicians based in hospitals and specialized through years of rigorous training created an industry out of Western medicine (Starr 1982). The 1946 Hill-Burton Act stated that every person deserved equal access to health care (Howell 2003) and the medical institution as a profit-driven enterprise molded itself to serve people and their health problems in a standardized and systematic manner. A period of excess care characterized American medicine through the middle of the 20th century. Though the number of hospitals declined between 1979 and 1996 (Howell 2003), frustration with the unnecessary expenses of Western medicine did not stop over the top medical expenses and procedures from continuing into the 21st century. As Howell (2003) describes, the consolidation of the hospital industry, the re-emergence of infectious diseases, and
the continued importance of specialization in providing knowledge in complex medical cases has meant that the hospital has remained an essential institution in American society. An established infectious diseases physician explained the rise of infectious diseases as a hospital-based specialty:

Right at the beginning of the 1980s we saw a rise in recognition and importance in the specialty of infectious diseases. Before then, in infectious diseases we almost had no outpatients. The only outpatients that we saw were people that were being treated for an infection that they needed weeks of therapy for, like tuberculosis, osteomyelitis, endocarditis. However, in the early 1980s HIV became recognized and when that happened things changed. First of all, many physicians were very uncomfortable taking care of people with HIV. But infectious diseases specialties, on the other hand, were generally quite aware of the disease. We were more familiar. We were treating patients for opportunistic infections and many people who were quite young had very serious complications related to that. As HIV research progressed, infectious diseases physicians were there to manage complicated therapy regimens. HIV is actually a chronic disease now, similar to diabetes or congestive heart failure. So infectious diseases found it’s place.

Today, the typical pathway for a patient with an antibiotic-resistant infection might look like this: 1) the patient will first visit a local or known medical institution (e.g., family medicine physician, outpatient clinic, urgent care, emergency room), and from there, 2) the patient will either be directly admitted to the hospital (i.e., emergency room to hospital floor) or they will end up in the emergency room with complications after days to weeks at home. Though microbes are freely shared among individuals such that you may harbor antibiotic-resistant bacteria on your body, the switch from a carrier that is colonized to an infected patient is critical to being treated. Thus, emergency rooms in American hospitals are critical access points where physicians are called on to assess the symptoms of infection without being specially trained in infectious diseases. Infectious diseases specialists do not generally work in the emergency room, though they can be consulted by an emergency room physician. With these pathways in mind, it
is important to note that hospitals are designed to triage patients prior to the engagement of the services of specialists who both cost the hospital more money to utilize and who have a narrow set of skills not amenable to treating the patient as a whole. The particular history of how the infectious diseases specialty came into existence and what role it serves in the management of infection at the hospital level is the focus of the next section.

**Infectious Diseases Specialists and Antibiotic Reform**

Infectious diseases specialists arose in conjunction with increases in the utilization of hospitals post-World War II (Podolsky 2015). In response to a decline in infectious diseases, specialists were trained to advise on “appropriate” therapy for the remaining infections. Early successes occurring in medicine more generally were related to “wonder drugs” like antipsychotics, steroids, and minor tranquilizers (Brown 2001). Broad-spectrum antibiotics fit into this category as they were hailed as cure-alls for infections. Interest in the infectious diseases specialty lagged following the discovery of sulfa drugs and penicillin (Kass 1987). Until hospitals consolidated and became the first line of medical care for Americans, infectious diseases specialists worked from public health departments and microbiology labs. Their numbers were dwindling until the discovery of new infectious diseases syndromes, advances in microbiologic understandings and testing, the rise of HIV/AIDS, and a general push towards specialization in American medical institutions (Kass 1987). The infectious diseases specialty later moved out of the basement of medical institutions to become consultants, but this was not until late in the 20th century. As the

14 Microbiology labs can typically be found in hidden corners of the hospital, either in the basement (as was the case at County Public Hospital) or in an outdated corner of one of the hospital buildings surrounded by construction projects (as was the case at University Medical Center).
specialty developed more recognition, some early infectious diseases specialists serving as antibiotic reformers resisted what they termed “irrational therapeutics” and forced government action on the regulation of pharmaceuticals (see Podolsky 2015 for more detail on this period of resistance). However, the prescription of antibiotics was not a focus of reform efforts until antibiotic control programs and later antimicrobial stewardship policies were put into place (Kass 1987).

The 1970s were an era in which the medical insurance industry grew substantially. Professional standards review organizations began to evaluate services in the medical community for the purposes of insurance reimbursement (Starr 1982). This included measures to improve antibiotic prescribing which were implemented in hospital settings across the United States, albeit with much resistance from many in the medical community. “The sensitized resistance to the proposed review measures apparently reflected a deep chord of resentment that a significant proportion of the medical community held against further centralized encroachment on physician prescribing autonomy” (Podolsky 2015: 129). When the Federal Drug Administration put together a taskforce composed of physicians, human behaviorists and other researchers of antibiotic use, discussion and debates led to the following contentious motion aimed at antibiotic control (Committee on Ways and Means 1974):

1. Each hospital should form a committee to monitor antibiotic usage.

2. The committee should develop individualized guidelines for appropriate antibiotic usage both for treatment and prophylaxis. These guidelines should be approved by the Executive Committee of the medical staff.

3. The reports of the Antibiotic Committee would be distributed internally to the medical staff and the Executive Committee.
4. There would be an annual review of antibiotic usage by an outside consultant who would submit written recommendations to the Executive Committee. However, at the time there was little agreement over whether or not antibiotics were being overused and misused. Some statements read that overuse was “possible” and that “suggested guidelines” might be all that is required to keep prescribing in check (Committee on Ways and Means 1974.). Even within the infectious diseases specialty, physician leaders were not all convinced that antibiotic control was the best way forward. Edward Kass, founding member of the Infectious Diseases Society of America (IDSA), introduced suspicion and mistrust of national policy aimed at reducing antibiotic use. In 1974, Kass was co-chair of the Inter-Society Committee on Antimicrobial Drug Usage (ISCAMU). He brought his concern to the committee that a “group of dictators” would tell physicians how to prescribe antibiotics. Instead, he suggested that antibiotic prescribing patterns could be reviewed locally and regionally and then brought back to the committee for the creation of bottom-up policies (Podolsky 2015).

Antibiotic reform efforts did end up being implemented mostly at the local level. Individual hospital staffs decided to keep one or two antibiotics “on reserve” so that they may be brought out when resistant strains were encountered (Kass 1987). Hospitals frequently had “restricted” lists throughout the 1970s and even into the 2000s. As Podolsky states, “…despite the scattered uptake of such measures, they would remain local and limited in nature throughout the 1970s” (2015: 135). Efforts at improving antibiotic use since have focused almost entirely on individualized physician (re)education (Dyar et al 2017) via academic detailing (e.g. grand rounds presentations) and/or adoption of society recommendations and guidelines.
A product of this era, *The Sanford Guide to Antimicrobial Therapy*, is updated yearly and kept in the pocket\textsuperscript{15} of most infectious diseases physicians and fellows. An underlying assumption in the use of guidebooks and associated guidelines is that solving the problem of antibiotic resistance hinges on the behavior of individual physicians. Thus, academic detailing and (re)education give physicians the ability to look up the “appropriate” prescription and use it at the right time for the right case. In chapter 3, I address how this logic plays out in everyday practice.

Today, federal and private funders have been moved to dole out more money to antibiotic resistance research. Journalists and professional organizations had an impact with reports and exposés on the issue of antibiotic resistant infections. Several key terms were introduced in this era that have had a long-lasting impact on antibiotic control policies, including “prudent,” “judicious,” and “appropriate” (Levy 2002). The professional and public opinion on antibiotics had shifted as a result of increasing awareness of evidence pointing to widespread antibiotic resistance, and move which leaves far behind the joyousness over the early efficacy of penicillin (Bud 2007). Antibiotic use is now the target of millions of spending at the national and local level.

For infectious diseases specialists, multidrug resistant organisms are a major challenge. The pull of focus towards antibiotic resistance, however sits in suspension with various other infectious diseases-related challenges for the discipline. A physician at my field site put into context the major challenges within the discipline:

\textsuperscript{15} While infectious diseases fellows often carried the updated pocketbook, many members of the infectious diseases consult team would have the digital version on their cell phone. Either way, the guide was readily accessible.
Mostly, people talk about multidrug resistant organisms as the challenge of infectious diseases. There are also the seasonal diseases, you know, this is a bad flu season so flu is on people’s minds. There’s the issue of diagnostics, and rapid diagnostics, and a lot of the rapid diagnostics are aimed at entities that are interesting to people that make diagnostic tools but aren’t that common, so there’s rapid blood culture diagnostics but there aren’t as good rapid diagnostics for say urinary tract infections or respiratory infections that are inexpensive and readily applied in the outpatient setting. So there’s the diagnostics challenge. There’s the issue about the drug development pipeline. We need more drugs for gram-negative bacteria. There’s the issue of vaccines, especially the flu vaccine. There still isn’t an HIV vaccine despite people working on it for probably two decades. There is the international focus and the threat of important diseases that either have never been here before, like Ebola, or that have been here and have been eliminated, like measles. There’s a lot of interesting stuff to keep up on in infectious diseases.

One of the recent policy changes in regards to antibiotic use in the United States has been antimicrobial stewardship – or the responsible use of antibiotics. Antimicrobial stewardship is now a required part of antibiotic use in every hospital in the United States as it has become part of accreditation bodies regulating medical practice. This policy change is the focus of Chapter 4 of this dissertation. In the next section I provide an ethnographic vignette conveying some of the social dynamics present in antibiotic decision making and infectious diseases practice. Following the interlude, I will transition into Chapter 3 where I will be discussing the social dynamics of antibiotic decision making at Frontier City Medical Complex. I will describe the institutional changes leading to key distinctions between the two hospitals. Further, I demonstrate how antibiotic prescriptions come into being as they are formed collectively.
Part II
Interlude

The Case of Ms. Jackson:

‘We don’t think you have an infection’

During day-to-day operations, infectious diseases specialists are aided by physician fellows who have completed medical school and a residency in internal medicine and have decided to pursue infectious diseases as a specialty. The physician fellow, after two or three years assisting infectious diseases specialists, is then prepared to take up a position as a specialist.

This day I am conducting fieldwork with the physician fellow Anthony and the infectious diseases specialist leading the team, Dr. Wollman. In the morning I observe as Anthony reviews all the patient cases for the day with three internal medicine residents who are assisting the team. Anthony visits each of the new patients individually before lunch. Every day that Anthony is on service this week, he is busy from 9am to 1pm reviewing patients with the team, looking through chart notes and collecting updated microbiology test results, and visiting new patients.

By 1pm, Anthony eats a quick lunch and gets ready to start the formal rounds with Dr. Wollman. As a well-established infectious diseases specialist, Dr. Wollman is involved in antimicrobial stewardship at the hospital and is looked up to as a leader in antibiotic use and decision-making among her peers. She is confident in her patient care role and has many years of experience behind her. Anthony and I are greeted by Dr. Wollman at the entrance to the physician fellow work room. We (plus the addition of three internal medicine residents) set off on afternoon
rounds, during which many of the final decisions will be made for patients on the consultation list.

The list is long today. As we proceed to visits, residents take turns introducing the patient case, Anthony steps in with any corrections, and Dr. Wollman pronounces her judgment following a short visit to the patient room. Near the end of the day I can see that everyone is becoming more frazzled. Although the team is eager to get back and type up recommendations and notes, we continue pushing through though it is already close to 4pm.

Anthony didn’t say much before we went into the next patient’s room. Dr. Wollman doesn’t stop us to talk outside the patient room but proceeds to get a quick pump of antimicrobial gel on her hands before stepping into the room. Anthony had checked in with the patient briefly after the consult was requested by the primary physician around noon, but the residents and Dr. Wollman had not yet met Ms. Jackson. ‘She’s the bed on the right’ Anthony says, guiding the team to her bedside. We step through the privacy curtains, Anthony and Dr. Wollman first, followed by the two residents and myself, the embedded anthropologist. Ms. Jackson was a small 50-year old woman taking up less than half of the surface of the hospital bed. There is a small pink tub placed at the bottom of her bed, along with some gauze and towels. She leans up as we walk in, her legs separated to accommodate the small pink tub.

Dr. Wollman introduces herself; she speaks first. Then Anthony says, ‘Hello again Ms. Jackson.’ Anthony picks up the pink tub, ‘Have you been using this?’ he asks. Ms. Jackson nods, she’s been vomiting a lot because of the radiation treatment coursing through her system. Dr. Wollman goes over some of the details of her visit. She’s from Florida, here in the Midwest to be with family while receiving end of life care. She hasn’t started chemotherapy, just radiation. Ms.
Jackson appears troubled, despondent even. She nods and shakes her head as Dr. Wollman goes over her patient history. She is making sure she has the details correct.

Dr. Wollman then says, ‘I’m going to examine you now.’ That’s when I look carefully at the rest of her body. I am surprised. Ms. Jackson’s neck is massively enlarged compared to the rest of her body. There are two bulges on her neck, the size of small ping pong balls. Dr. Wollman asks, touching the bulges, ‘How long have you had these?’ Ms. Jackson struggles to answer, clearing her throat. They’d been there a couple of months. Tear drops fall out of the corner of her eye. Dr. Wollman pats her hand after seeing her tears. Ms. Jackson is in the hospital suffering from advanced stages of cancer, the bulges on her neck evidence of the massive tumors growing underneath. There are many reasons that Ms. Jackson may have had delayed and restricted access to healthcare in her own state, including lack of healthcare insurance. However, in this encounter, what becomes evident is the impending sentence: Ms. Jackson is in pain and the hospital is running out of treatment options for her advanced disease.

The various clinical practice groups involved in her care had told Dr. Wollman the primary diagnosis: cancer. What they wanted from her and the infectious diseases consult team was a recommendation on the continuation of antibiotics. Does she have an infection on top of her cancer? Does she need to continue on antibiotics? Dr. Wollman collects her clinical assessment and takes a step back from Ms. Jackson’s bed. She looks to Anthony, then begins talking to Ms. Jackson. ‘We don’t think you have an infection. You aren’t having signs of infection, no fever, and no cultures have come back positive. You are on one antibiotic, Zosyn, which the primary team put you on because they were concerned about an infection. Because...when you arrived
here you weren’t doing so well. Do you feel better now?’ Ms. Jackson nods. Dr. Wollman considers.

After a pause, she starts to give her recommendation, ‘We’re going to recommend that your team continues giving you this antibiotic while you are in the hospital. It is making you feel better, and...’ Dr. Wollman pauses, then asks ‘Have you received many antibiotics in your lifetime? Have you had antibiotics before?’ Ms. Jackson shakes her head no. It seems decided then, Dr. Wollman continues, ‘Ok good. We’ll make sure you get this antibiotic while here and we’ll send you home to finish up a few days with an oral antibiotic. Thank you, Ms. Jackson.’

Dr. Wollman takes one more look at Ms. Jackson and leads us out of the patient room. We file out down the hallway and to the nursing station, out of earshot of the patient room. Dr. Wollman shakes her head and looks up at Anthony, ‘50 years old. She’s going to die.’ She lowers her voice and continues, ‘She is end stage (cancer), she has the symptoms.’ They discuss her travel to the area and lamented that nothing could be done in her rural home town. Still, being with family at the end can be comforting. Dr. Wollman summarizes the situation, ‘We removed some fluid from the tumors, but you can see their size. I mean, as if her shoulders were raised to her chin.’ Then the team discusses the infectious diseases recommendations. In this case, if it were an infection, it would be a subacute presentation. She is not immune-compromised at this point. They don’t find evidence of infection. But even if she did have infection, it is unlikely to mean much at this point. She was only diagnosed with cancer this spring and already she is at the end. She will die. The antibiotics will make her feel better. That matters. The discussion pauses. Anthony shakes his head, sighs. The resident goes through the recommendations. Yes, antibiotics. Yes, outpatient antibiotics. For a duration of two weeks. Dr. Wollman adds her
summary, ‘Complete a course of Zosyn and then switch to oral Augmentin. Sign off.’ Dr. Wollman, with this sentence, communicates to the team that they have made the final recommendations and nothing further needs to be monitored or adjusted. The infectious diseases team will no longer keep Ms. Jackson on their patient list, they are signing off as consultants to her case. We move on to the next patient, the final patient of the day. It is now past 5pm.
Chapter 3
The Social Dynamics of Antibiotic Prescribing at Frontier City Medical Complex

Diagnosis and treatment are not simply problems of cognition of information processing – of clinicians gathering patient data as objectively as possible and matching them to a given disease category and then selecting a therapeutic approach. These decisions are also highly social in nature, which involves the way that clinicians decide, via interaction with each other and with patients/families, how to label what is wrong, what can be done to remedy it, and what should be done.


Introduction

The ethnographic data introduced in this chapter shines a light on how antibiotics are prescribed at Frontier City Medical Complex, by which practitioners, and under what circumstances. I will detail national policies and standard practices that are acknowledged at Frontier City Medical Complex. I use extended case studies to demonstrate the social dynamics at play in antibiotic prescribing. In particular, I single out themes of work, practice, and interaction as constants in the everyday life of practicing physicians. Antibiotic prescribing is work, it is a task to be completed as part of the job of the physician. Antibiotic prescribing is also practice in that it becomes habit, a repeated behavior that is associated with the expertise of a physician and their specialty group. Finally, antibiotic prescribing is interaction. While work and practice can be
attributed to an individual or a group, interaction by definition involves multiple entities.

Antibiotic prescribing cannot be done in isolation, as I demonstrate in this chapter. Instead, it requires decisions, conversations, and orders to be played out over a specific length of time prior to the antibiotic being administered to the patient. These three themes guide the prescription of antibiotics in the hospital setting at Frontier City Medical Complex. This chapter is therefore an exploration into the social dynamics of professional antibiotic use in American medical institutions such as my fieldsite.

**Antibiotic Prescribing at Frontier City Medical Complex**

Despite skyrocketing concern over antibiotic use in the United States, antibiotic prescribing practice is still relatively unregulated. Furthermore, changes in national and local policy aimed at reducing antibiotic use proliferate. However, most hospital-based physicians can still prescribe most antibiotics. At Frontier City Medical Complex, the story is no different. In fact, in some key aspects, the story is even more surprising. Frontier City Medical Complex has a history of hospital leadership coming from the field of infectious diseases, including two former Chairs of Internal Medicine who specialized in infectious diseases. Additionally, the metropolitan area has a lengthy history of infectious diseases practice including serving as host to one of the nation’s longest running Contagion Hospitals.\(^{16}\) Area hospitals have several well-respected infectious

\(^{16}\) Contagion hospitals served as counterparts to public hospitals in the early part of the 20th century. They would host tuberculosis and polio patients, all side by side, who were not permitted into the larger institutions due to their diseased state. Contagion hospitals fell out of practice during the consolidation of medical practice that occurred in the late 20th century.
diseases fellowship training programs, including the program at Frontier City Medical Complex.

Physician fellows find great value in navigating the differences in both institutions:

At County Public Hospital, the pathology that I see is unparalleled, even compared with where I trained which is a safety net hospital. The variety of interesting cases I see at County Public Hospital is huge. But I also think that the difference in the two hospitals comes with the fact that at County Public Hospital, I’m in more of a teaching and doing role at the same time. So I take half the consults a lot of times, and so I’m working them up myself, and kind of seeing the whole picture, spending time, a long time, with the patient. Whereas at University Medical Center, on the general consult service, it’s essentially run by residents. They carry the pages, and we fellows are doing more of a leadership role. Without actually seeing the patient and hearing/talking to the patient, I’m relying on the resident to give me history.

And another physician fellow:

The [physician] fellows have similar levels of autonomy at both institutions. Attendings [physicians] will listen to your impression and plan. They will expect you to have a plan at both hospitals. I don’t think the education is very different, but obviously the cases are different. The populations are different. There are things, like other therapeutic interventions that we don’t have at County Public Hospital, like advanced cardiac devices, transplant. That in and of itself changes our therapeutic options, but also [increases the likelihood of] complications from those interventions, and the types of immuno-suppression that we see.

Overall, physician fellows identified that the diversity of patients, differences in resources and the structures of daily practice at Frontier City Medical Complex contributed positively to their education. Physician fellows suggested that learning in a joint infectious diseases fellowship program such as the one at Frontier City Medical Complex gave them the tools to work almost anywhere in the infectious diseases professional world. Concretely, they were exposed to a large variety of infectious diseases pathologies and the significant differences between a resource-poor and resource-rich setting in the United States. Physician leaders had worked hard to set up the fellowship in such a way that physician came out of the program able to navigate the private and public hospital space adeptly. A senior physician commented:
It is a good marriage of the haves and have nots. From a training standpoint and teaching standpoint, it’s a great environment to have both County Public Hospital and University Medical Center as part of the training program for infectious diseases fellowship. Our infectious diseases conference is the best I’ve ever been to, it’s really very good education, it’s better than taking continuing medical education courses. Administrative stuff is always challenging, the clinical stuff is interesting, especially the County Public Hospital patients.

In fact, Frontier City Medical Complex’s foresight in the development of their fellowship program and general investment in infectious diseases as a specialty extended into the realm of antibiotic control. Prior to the national push towards antimicrobial stewardship, both hospitals had established leaders and committees on antibiotic use and control. Indeed, antibiotic control programs existed at both institutions, though County Public Hospital had a more robust offering through the 1990s. By the beginning of the 2000s, County Public Hospital had moved their antibiotic control program into their Anti-Infective Subcommittee which dealt not only with antibiotic use but also yearly flu vaccine acquisition and other infection related concerns. This subcommittee reported to the Drug and Formulary Committee which then voted on proposals put together by the Anti-Infective Subcommittee.

University Medical Center had a similar Anti-Infective Subcommittee that met in the Division of Infectious Diseases and reported to the Pharmacy, Nutrition and Therapeutics Committee (PNT Committee) but in 2018 the Anti-Infective Subcommittee boldly renamed themselves the Antimicrobial Stewardship Subcommittee. Both hospitals had a chain of command that solicited input from infectious diseases practitioners (physicians and pharmacists) then brought cases to a hospital-wide committee that made final decisions on the selection and ordering of antibiotics.

To put this in perspective, when the national mandate of antimicrobial stewardship was released many hospitals did not have existing committees with which to collaborate on implementing new measures to reduce antibiotic use, but these two did. A physician lead explained:
When I arrived there was already a quality assurance infrastructure here at Frontier City Medical Complex. There was a committee chair who was fairly activist in his view that medication use errors are widely prevalent and largely avoidable with proper effort. He correctly identified that many of these problems pertained to antibiotic use and assigned me to the Anti-Infective Committee. We worked on antibiotic control then, in the late 1980s and early 1990s. We figured if we are doing it everyone is doing it, right? We couldn’t Google to see who has this or that stuff. We even started a data warehouse, who is on antibiotics, when, what they were treated with. And this was long before stewardship.

In terms of antibiotic prescribing at Frontier City Medical Complex, the mechanics of how an antibiotic gets into the patient chart and where it fits within other items on the patient chart were standard. The antibiotic prescribing culture fit within existing cultures of chart preparation that included impressions, problem lists, recommendations, and microbiology results. Prescribed antibiotics would be listed, and many physicians would either write the duration, the start date, or the anticipated end date of the antibiotic. An antibiotic indication could be recorded, signaling to other physicians what the primary attending physician thought the patient was afflicted with. For example, the antibiotic vancomycin might be added to a patient with a presumed pneumonia. Prior to microbiology culture results, the antibiotic indication was preliminary but useful in determining what the primary attending physician thought was happening and why they then wanted antibiotics on board. Further detail on microbiology results would be a click or two beyond the patient chart. The intended effect of the chart structure was to give a detailed look at the patient history without making predictions about the outcome. Most chart updates on the patient written by physicians looked like the following (Figure 7).
Hudson, George DOB

Impression:
Mr. Hudson is a [redacted] year old male with a past medical history of recently diagnosed AML who presents for planned initiation of chemotherapy. He then was started on induction chemotherapy with [redacted] He developed neutropenic fever [redacted] He was found to have tree-in-bud findings in the lungs. Ddx includes viral, fungal, less likely Tb/mycobacterial, less likely bacteria. [redacted] Awaiting results VZV and HSV PCR, histoplasma antigen and sputum culture. Fever curve improving on Zosyn and [redacted].

Problem list:
-- Neutropenic fever
-- AML s/p induction chemotherapy
-- Vesicular rash, papular rash, petechiae – ddx viral, HSV, VZV; thrombocytopenia

Microbiology:
Pleural fluid culture [redacted] negative (pending fungal cx)
Pleural fluid culture [redacted] NGTD

Urine culture [redacted] negative
HSV oropharynx PCR pending
HSV oropharynx PCR [redacted] negative
Serum CRAG negative
Urinalysis (plasmodiasis) Ag pending
HSV and VZV skin swab pending
HSV PCR throat pending
Blood culture [redacted] NGTD
Blood culture [redacted] NGTD
Blood culture [redacted] NGTD

Antibiotics:
Valacyclovir [redacted]
Zosyn [redacted]
Micafungin 50mg QD [redacted]
Acyclovir 400mg BID [redacted]
Vancomycin [redacted]
Cefepime [redacted]

Recommendations:
-- Continue Zosyn and valacyclovir
-- Pending urine histoplasma antigen, VZV and HSV PCR swab skin lesion, HSV PCR throat
-- Please send sputum culture if able (now not making much sputum) for routine, AFB and fungal smear/culture.
-- Continue micafungin prophylaxis
-- May need bronchoscopy if no clear cause of lung findings found
-- Continue on respiratory and contact isolation until VZV and HSV PCR skin lesion is returned.

Notes. DOB=date of birth. AML=acute myeloid leukemia. Ddx=differential diagnosis. VZV=varicella zoster virus. HSV PCR=herpes simplex virus polymerase chain reaction. Tb=tuberculosis. s/p=status/post. Cx=culture. NGTD=no growth to date. RPP=pressure rate product. CRAG=serum cryptococcal antigen. Ag=antigen. QD=on prescription, 1x day. BID=on prescription, 2x day. AFB=acid-fast bacilli. All protected patient information removed. Mr. George Hudson is a pseudonym.

Figure 7. Patient chart for Mr. George Hudson.

17 This is a pseudonym.
Due to the existing subcommittees and their dedicated members, local antibiotic use guidelines and antibiotic susceptibilities\textsuperscript{18} were available at both institutions. At County Public Hospital the antibiotic use guidelines were embedded within the electronic medical record. At University Medical Center the antibiotic use guidelines were only recently made available within the electronic medical record, though their Antimicrobial Stewardship Subcommittee had been compiling pamphlets with antibiotic susceptibilities and other antibiotic use guidelines each year for the last 5 years.

Both hospitals were eager to get other physicians looking at their antibiotic use guidelines. However, after my participant observation began with intensive care unit practitioners, I quickly realized that physicians were not regularly referencing local antibiotic use guidelines. In fact, intensive care unit practitioners worked with their own department-level antibiotic use guidelines and national guidelines coming from the professional societies associated with their own specialty. What other hospital-based practitioners did use were data from the microbiology lab, when available. In the cases where cultures (e.g. blood, urine) were sent to microbiology to determine whether or not the patient had an infection, those results were followed up by hospital-based practitioners.\textsuperscript{19} The primary methods of antibiotic use oversight and influence, however,

\textsuperscript{18} Each institution had an antibiogram which labeled for every possible infection what antibiotic would be suitable given the hospital-level data on types of infections and their susceptibilities to antibiotics. I will be discussing antibiograms more in Chapter 4.

\textsuperscript{19} In some cases the patient was discharged before the culture results appeared in the medical record. In these cases the results were not followed up on unless the patient had follow-up visits scheduled. In figure 7 the culture results had been regularly followed up on as the patient remained in the hospital and their diagnosis had not yet been determined.
that other hospital-practitioners encountered were 1) infectious diseases consulting recommendations, and 2) antibiotic restriction.

First, infectious diseases consulting recommendations were only given if they were requested by the primary physician or a trainee from the primary physician team. County Public Hospital has a primary HIV/AIDS service, but that in itself is one of the last examples nationally of a patient group in which infectious disease physicians serve as primary. For the infectious diseases consulting service, which is a vast majority of the workload for the division, a primary physician must request an infectious diseases consultation. In this scenario, the primary physician holds the cards as to whether or not they want help prescribing an antibiotic. Due to the process of requesting an infectious diseases consult; most infectious diseases physicians have developed complex pathways of navigating making recommendations to the primary team. After all, their advice may or may not be taken up, even when it pertains specifically to a confirmed infection or antibiotic decision. A senior infectious diseases physician described his mindset for being added to the physician team as a consultant:

You have to learn how to interact with the primary team, as a consultant. You really have to get people to do what they should have done on their own without having you tell them, so it requires some degree of personality, and you have to keep up with [the case], you have to look up stuff, so for every patient you should probably do a literature search to see if there is something new that you’re, that you don’t know about that might help that patient. You know, an outpatient Escherichia coli-sensitive urinary tract infection most infectious diseases physicians could do that in their sleep, but you know there’s always something new about every disease. Then in terms of consultations, when you do a consult, you have to kind of think, first of all, what does the person want? Are they calling you to tell you how smart they are? Some consults are just, “Look it, we figured this out.” Some of them really are totally at a loss, you know, help us, we’re drowning. Some know the disease, but they want the antibiotic. Some want the best approach to diagnose a disease, so you have to kind of think about what the, what the consultation is being called about and then address it in that way, and then person to person interaction is important. The physician might say, you
know, “We want to discharge the patient in 20 minutes, tell us what to give.” Or, “We want the patient to be on outpatient antibiotics, please help us arrange that.” But sometimes it’s, you know, “We think this patient has lupus, the rheumatologist won’t treat for lupus until you’ve ruled out an infection.” So often it’s not that hard to figure out, but if you’re not sure you just ask them. If you ask, they’ll tell you. I start with “What can I do for you today?”

Not all infectious diseases consultations are for antibiotic approval. As you can tell from the above example, some consultations are to compare notes or to get confirmation on a suspected infectious diseases case. However, advice and recommendations on antibiotic selection, dosing, approval, and duration fits within this already-existing consultation dynamic. As such, the decision on whether or not to give an antibiotic is one that infectious diseases physicians weight in on, but do not have ultimate say over.

The second method of antibiotic oversight involves more power in the hands of the infectious diseases physician. Antibiotic restriction, part of antibiotic control programs and now antimicrobial stewardship, is a much more jarring encounter for the hospital-based physician. An antimicrobial steward explained the prevalence of restrictions at Frontier City Medical Complex:

Restriction is an important approach. We identify drugs that were being overused and influence that phenomenon by means of restrictions. Sometimes it works sometimes it doesn’t. Like with Augmentin, we had restrictions of other broad spectrum antibiotics through the late 1990s, but that approach was modified in light of the worsening of antibiotic resistance. Since these broad spectrum antibiotics became necessary first line treatment options, in a busy hospital you really couldn’t restrict them feasibly, at least not the first use of it. We couldn’t feasibly use restrictions as another impediment to getting the right drug to the right patient at the right time.

Antibiotic restriction involves an antibiotic being placed on a restricted list that prevents any physician from ordering the antibiotic. If a physician were to require an antibiotic previously placed on a restricted list, the physician would have to make a case to the infectious diseases physician (sometimes to the head of antimicrobial stewardship or to the head of the division)
explaining why they require the antibiotic for their patient. Due to the additional work and social engagement required for a restricted antibiotic to be released, this avenue of acquiring an antibiotic was rarely taken by the time I arrived at Frontier City Medical Complex. Furthermore, so few antibiotics make it on to the restricted list in part because the infectious diseases physicians do not always have time to review every use of an antibiotic in the hospital as mentioned in the above conversation. Thus, resource constraints and worsening antibiotic resistance can also contribute to which antibiotics are restricted. Out of all the antibiotics available for use at Frontier City Medical Complex (key antibiotics represented in Figure 8), only a small minority make it onto the restricted list.
<table>
<thead>
<tr>
<th>Antibiotic Class</th>
<th>Generic Name</th>
<th>Brand Name</th>
<th>Year Introduced*</th>
<th>Spectrum of Activity**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aminoglycoside</td>
<td>Amikacin</td>
<td>Amikacin</td>
<td>1976</td>
<td>Gram-negative organisms</td>
</tr>
<tr>
<td>Carbapenem</td>
<td>Meropenem</td>
<td>Merrem</td>
<td>1996</td>
<td>Gram-negative organisms</td>
</tr>
<tr>
<td>Cephalosporin</td>
<td>Cefazolin</td>
<td>Ancef</td>
<td>1971</td>
<td>MSSA, <em>Klebsiella pneumonia</em></td>
</tr>
<tr>
<td></td>
<td>Ceftriaxone</td>
<td>Rocephin</td>
<td>1982</td>
<td>MSSA, <em>Streptococcus pneumoniae</em></td>
</tr>
<tr>
<td></td>
<td>Cefepime</td>
<td>Multiple</td>
<td>1994</td>
<td>Gram-negative organisms</td>
</tr>
<tr>
<td>Fluoroquinolone</td>
<td>Levofloxacine</td>
<td>Levaquin</td>
<td>1993</td>
<td><em>Streptococcus pneumoniae, Enterobacter</em></td>
</tr>
<tr>
<td>Glycopeptide</td>
<td>Vancomycin</td>
<td>Vancocin</td>
<td>1958</td>
<td>Gram-positive organisms</td>
</tr>
<tr>
<td>Monobactam</td>
<td>Aztreonam</td>
<td>Azactam</td>
<td>1986</td>
<td>Gram-negative organisms</td>
</tr>
<tr>
<td>Nitroimidazole</td>
<td>Metronidazole</td>
<td>Flagyl</td>
<td>1959</td>
<td>Gram-negative and gram-positive organisms</td>
</tr>
<tr>
<td>Oxazolidinone</td>
<td>Linezolid</td>
<td>Zyvox</td>
<td>2000</td>
<td>Gram-positive organisms</td>
</tr>
<tr>
<td>β-lactamase inhibitor</td>
<td>Amoxicillin-clavulanate</td>
<td>Augmentin</td>
<td>1985</td>
<td><em>Klebsiella pneumoniae, Proteus mirabilis</em></td>
</tr>
<tr>
<td>Piperacillin-tazobactam</td>
<td>Zosyn</td>
<td>1992</td>
<td>Gram-negative organisms</td>
<td></td>
</tr>
</tbody>
</table>

*Indicates first commercial use. Some antibiotics have been discovered to have extended-spectrum activity since their initial release date.

**Full spectrum of activity is not included, only common infection types that are covered.

Figure 8. Commonly Used Antibiotics at Frontier City Medical Complex.
University Medical Center’s restricted antibiotic list is represented in Figure 9. For access to the restricted antibiotics, a physician must call the “restricted pager” and explain their rationale for needing the antibiotic to a physician or pharmacist specializing in infectious diseases. The pager is usually held by an Antimicrobial Stewardship Subcommittee member and is taken seriously as it is the last barrier preventing antibiotic misuse. University Medical Center calls their restricted antibiotics by the softer “protected” antibiotics, but the list serves the same purpose. Other hospital-based physicians are aware of the restricted list, and most have had to make their case for an antibiotic for at least one patient, though they will make every effort to avoid doing so as it adds time and pressure to their practice. For most patient cases the restricted list can be avoided by utilizing unrestricted antibiotics or combinations of unrestricted antibiotics.20 Physicians at Frontier City Medical Complex typically preferred this manner of avoiding tapping into the restricted list.

20 Using common antibiotics instead of restricted antibiotics also speaks to the rationales behind how and why antibiotics become restricted. At Frontier City Medical Complex, restricted antimicrobials were either toxic and dangerous for human use or they were overused in unnecessary situations and removed from the formulary by antimicrobial stewardship committees. Thus, restricted lists protect antibiotics from being used for an infection which it does not treat.
Restricted Agents

Please note: In 2016, tedizolid and ceftolozane-tazobactam were removed from formulary, and carbapenems (ertapenem, meropenem), ceftazidime, flucytosine and itraconazole were added to the restricted antimicrobial list. In 2017, ceftolozane-tazobactam was re-added to formulary.

<table>
<thead>
<tr>
<th><strong>Antibacterials</strong></th>
<th><strong>Antifungals</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aztreonam IV</td>
<td>Amphotericin B IV</td>
</tr>
<tr>
<td>Ceftaroline IV</td>
<td>Flucytosine PO</td>
</tr>
<tr>
<td>Ceftazidime IV</td>
<td>Itraconazole PO</td>
</tr>
<tr>
<td>Ceftazidime/avibactam IV</td>
<td>Micafungin IV</td>
</tr>
<tr>
<td>Ceftolozane/tazobactam IV</td>
<td>Posaconazole PO</td>
</tr>
<tr>
<td>Colistimethate IV, inhaled</td>
<td>Voriconazole IV, PO</td>
</tr>
<tr>
<td>Daptomycin IV</td>
<td></td>
</tr>
<tr>
<td>Ertapenem IV</td>
<td>Cidofovir IV</td>
</tr>
<tr>
<td>Fidaxomicin PO</td>
<td>Foscarnet IV</td>
</tr>
<tr>
<td>Fosfomycin PO</td>
<td>Peramivir IV</td>
</tr>
<tr>
<td>Linezolid IV, PO</td>
<td>Ribavirin PO</td>
</tr>
<tr>
<td>Meropenem IV</td>
<td></td>
</tr>
<tr>
<td>Rifampin IV, PO</td>
<td>Albendazole PO</td>
</tr>
<tr>
<td>Tigecycline IV</td>
<td>Praziquantel PO</td>
</tr>
<tr>
<td></td>
<td>Ivermectin PO</td>
</tr>
<tr>
<td></td>
<td>Miscellaneous</td>
</tr>
<tr>
<td></td>
<td>Pentamidine IV</td>
</tr>
</tbody>
</table>

*Notes. PO = per os (i.e., given orally). IV = intravenous (i.e., given through a vein)*

Figure 9. Restricted Antibiotic List at University Medical Center.
Among hospital-based physicians, the more that other practice groups tried to intervene in their work the more adamant they were to maintain their physician autonomy. Despite the fact that the restricted list contains only a few rare antibiotics, hospital-based physicians still felt the need to assert their right to decide which antibiotics should be selected for their patients. I argue, however, that what physicians actually wanted was the veil of authority rather than actually being involved in every antibiotic decision. Being the primary physician in this case means doing the face-work (Goffman 1959; 1982) to maintain a level of respect within the hospital setting so that in the instance that the physician does actually want to change the antibiotic, they are able to do so without pushback. In the next section, I will present an ethnographic case study demonstrating the collective nature of antibiotic use and I will analyze the social dynamics of power, influence, and the face-work that is necessary to maintain those attributes.

**The Social Dynamics of Antibiotic Prescribing**

Qualitative research has established that there is a myriad of factors, such as professional hierarchies (Livorsi et al 2015; Papoutsi et al 2017), professional autonomy (Rynkiewich et al 2020) and communication styles (Linkin et al 2007; Skodvin et al 2017), that go into antibiotic decision-making in medical settings. The social milieu surrounding antibiotic use and decision-making is increasingly at the center of medical research on antibiotic use among physicians with analyses addressing resources and access to information (Cabana et al 1999), etiquette and expectations (Broom et al 2017; Charani et al 2013), and the interpretation of guidelines (Castro-Sánchez et al 2014; Dixon-Woods et al 2012). Research on the diffusion of innovations (Rogers 1995) has also addressed underlying social dynamics related to the adoption of innovations like antibiotics, demonstrating more broadly that a recognition in the social sciences of social
dynamics and technological interventions is not new. Specifically, Rogers highlights research done by Coleman, Katz, and Menzel (1957) on the antibiotic tetracycline, showing how physician decisions at the time were influenced by social forces as much as scientific evidence of efficacy. Recently, pinpointing the particular domains in which social dynamics influence antibiotic prescribing has garnered some purchase among major funding bodies in the United States. However, there are still many medical institutions and practitioner groups that are behind the curve.

At the beginning of my research, a nationally-recognized infectious diseases physician at Frontier City Medical Complex was complimentary of my research questions but cautioned me that my area of research is new and promising but so rare that it will be easily misunderstood. Indeed, studying the social dynamics of antibiotic prescribing has not yet saturated the academic fields of medicine, public health, or epidemiology. Furthermore, an underlying assumption behind his cautioning that my research will be misunderstood is that my research is not of the common social science fields whose research is accepted within the medical community (e.g., economics, see Chapter 4 for more about this assumption as it plays out in antibiotic use).

At the heart of burgeoning research in the area of qualitative studies on antibiotic prescribing is a conversation with sociologists and anthropologists who studied institutions such as Erving Goffman, Pierre Bourdieu, Howard Becker, and Anselm Strauss. In explaining why antibiotic

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21 Much of the applicable work on practice in medical institutions has come from the Second Chicago School (1945-1960), a group of sociologists and ethnographers who investigated the daily lives of workers and practitioners in urban areas. Gary Alan Fine has written “A Second Chicago School? The Development of a Postwar American Sociology” (1995) on these individuals and associated movement.
use is sub-optimal, meaning antibiotics are overused or misused, demonstrating the barriers and
thought-processes of individual antibiotic prescribers has been of interest to medical institutions
looking for actionable findings. Alex Broom and colleagues have described sub-optimal
antibiotic use using Pierre Bourdieu’s theory of practice, arguing that sub-optimal antibiotic use
is a logical choice given the confines and surroundings of the medical institution (Broom,
Broom, and Kirby 2014).

My ethnographic study of physicians at Frontier City Medical Complex demonstrates that
arrogant, know-it-all physicians who bulldoze through suggestions and recommendations to
prescribe the antibiotic they want are far from the norm. Certainly, physicians carry with them
status and respect they believe to be in accordance with their position (Starr 1982), but even that
recognition is complicated by the social dynamics of medical society including a preference for
the white male physician over all others (Becker et al 1976). In short, the assumption that every
physician leading a primary team has the authority and autonomy to make antibiotic decisions
stick on their word alone is not accurate to context.

With respect to the contexts of antibiotic decision making, what I encountered more frequently at
my field site was a scene in which individual prescribers were held in suspension by the
structural boundaries of medical practice. The manner in which antibiotics are prescribed and
ordered itself serves as a jungle gym of wills, burdens, and resources. Beyond that, every
physician is assisted by their team and is supported by various hospital staff including nursing
and pharmacy. Even further, no team operates in isolation without the input and interaction
coming from other physician teams. While an appearance of authority is maintained, under the
surface there are social dynamics being worked out with competing interests (Heimer 1999). I
argue that antibiotic use is a collective practice, it does not exist in a vacuum. Circumstances and conditions can work in favor such that sub-optimal antibiotic use is the norm without physicians performing badly at antibiotic decision-making.

Antibiotic prescribing is 1) work, 2) practice, and 3) interaction. Antibiotic prescribing is work as it becomes another mundane aspect of caring for patients. Not every prescribing physician is a specialist in infectious diseases, and so deciding on and giving antibiotics might be akin to giving any other medication to the patient. Antibiotics, for the worker, are not “special.” Additionally, antibiotic prescribing is a practice. As a practice, antibiotic prescribing differs between every physician specialty. Surgeons become familiar with and comfortable using antibiotics for surgical prophylaxis, while cardiologists become familiar with antibiotics for endocarditis. Similar to any expert, the extent to which they are familiar with tools outside their profession is typically limited. Finally, antibiotic prescribing is interaction. There are numerous microsociological elements involved in antibiotic prescribing, including the amount of chance in the process of decision-making. Numerous times during fieldwork, the following interaction would occur:

(I’m walking with the intensive care unit practitioner during morning patient rounds.)

*Intensive care unit practitioner: Oh hey!*

(The practitioner moves towards an infectious diseases practitioner walking by)

*Infectious diseases practitioner: Hey.*

*Intensive care unit practitioner: Can you help us out? We have this patient...*
This is known colloquially as a hallway, drive-by, or curbside consult. This practice is sometimes essential to the patient case, particularly a patient case that is timely or in one that the patient is otherwise ready to be discharged. These interactions save time, and money, and are convenient for the intensive care unit practitioner since they avoid needing to remember to make a call later in the day. However, the infectious diseases practitioner is not always around.

Infectious diseases physicians conduct patient rounds for a couple hours a day if they are on service as consultants. Infectious diseases pharmacist practitioners may attend patient rounds with their infectious diseases physician counterparts, but frequently they operate behind the scenes reviewing electronic medical records and internal alerts. And if the infectious diseases practitioners aren’t around, face-to-face interactions like the hallway consult cannot happen.

Furthermore, since the infectious diseases practitioner’s habits are dependent on a host of other factors including but not limited to the direction they choose to walk through the unit, there is an element of chance in whether or not they will cross paths. Thus, antibiotic prescribing is also interaction and all the underlying factors that determine a social interaction. Together, these three themes characterize the world of antibiotic prescribing in a way that acknowledges multiple sides of the story (i.e., from how prescribing is viewed in the medical world to how physician behavior is viewed in the social sciences). I will use the rest of the chapter to discuss the unfolding of social dynamics in the course of antibiotic prescribing decisions at Frontier City Medical Complex. In the following ethnographic case study, antibiotic use decisions are described over the course of the work day full of patient rounds, calls, and chart writing.
Surgeons at Frontier City Medical Complex, as they are in much of the world, were known for their stubborn nature. Throughout my fieldwork, each medical institution had particular surgeons known to all rotating physicians. They had a reputation. Certain names kept coming up in my notes. One recurring figure was Dr. Kline. “Dr. Kline keeps whipples (patients who have undergone a Whipple procedure) seven days so let’s make sure we do that.” “Dr. Kline is particular about pain control – ask him what he wants.” My notes continually referred to Dr. Kline as a surgeon with peculiar preferences for his patients, known to other physicians as a ‘problem’ in that he wreaked havoc to ensure his preferences were enacted.

One morning I was part of the group of resident physicians rounding with Dr. Tuttle on the surgical intensive care unit. These patients had undergone surgery and were not yet stable enough to begin recovery on the hospital floors or at home. Dr. Tuttle’s team oversees the care of these patients and collaborates with the operating surgeons to decide trajectories for each patient’s care. Dr. Tuttle is engaged in conversation with the resident physicians as they discuss Mrs. Rodriguez, the current patient. Dr. Tuttle asks about fluids, chastising the resident physicians for not being more vigilant. “Fluids are like a vital in the intensive care unit, you need to trend those.” The new bacterial cultures were in. The cultures showed growth, and the patient had a fever and hypotension. Now, vancomycin, cefepime, metronidazole, and

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23 This antibiotic was referred to as Flagyl at my fieldsite but I am keeping the references uniform as with the other antibiotics I have used generic names.
micafungin could be peeled back to a streamlined course of antibiotics targeted to the culture results. The team discussed options, and Dr. Tuttle suggested, “Dr. Kline always does seven days.” The resident physician took note but nothing was decided at that moment.

We continued rounding on patients for another hour and a half. As rounds died down, Sarah the team pharmacist checked in with the resident physicians. She clarified the dose and duration of antibiotics for several patients, including Mrs. Rodriguez. For Mrs. Rodriguez, Sarah left two options. If Dr. Kline does want to change the antibiotics, it’ll be to this combination and this duration (Sarah put a paper down in front of the resident). If Dr. Kline doesn’t want to change the antibiotics, go ahead and get rid of the micafungin. Either way, she instructed the resident physician, “Check in with me before you enter the changes.”

Dr. Tuttle and Sarah broke off to go to meetings while the resident physicians headed back to the work room to write their notes. The resident physician in charge of Mrs. Rodriguez’s case, Justin, picked up the work room phone and called one of Dr. Kline’s resident physicians. Justin brought up the new bacterial culture results, Dr. Kline’s resident physician confirmed that they’ve seen them. Unfortunately, Dr. Kline was in surgery at that moment. However, Dr. Kline’s resident physician didn’t ask to wait until Dr. Kline was out of surgery. Instead, with the bacterial culture results at hand Dr. Kline’s resident physician decided that getting rid of micafungin was a good plan. There was no discussion of duration. Justin nodded, then confirmed the other antibiotics: vancomycin, cefepime, and metronidazole.

The resident physicians continued working for another hour, then we broke for lunch. I returned to the work room at 1pm to a new update in Mrs. Rodriguez’s case. The infectious diseases consulting team on her case had put their notes in the medical record. This team commented on
bacterial cultures, antibiotic selection, and antibiotic duration, among other specialty-related topics. The infectious diseases recommendations suggested that removing micafungin is indeed the first step for Mrs. Rodriguez. However, the infectious diseases consult team also recommended removing metronidazole on the basis that the bacterial culture results did not show evidence of microbes that would be targeted with metronidazole, thus rendering it useless in Mrs. Rodriguez’s case. Finally, the infectious diseases consult team suggested only two additional days of antibiotic, arguing that the patient had already received three days and a total of five days was all that was necessary per the institution recommendations.

At this point, Justin had gathered information from various teams regarding Mrs. Rodriguez’s antibiotics. He wrote up his note in a hurry, he was being called in to another patient’s room. The note was entered into the medical record, though the recommendations in his note were not put into action. Dr. Tuttle settled the case by signing the patient note and recommendations at just after 5pm. It was one of the last notes that she signed for the day. The completed recommendation? Dr. Tuttle commented that she agreed with Justin’s characterization of the case and updates for the day. The antibiotics that will continue into tomorrow include vancomycin and cefepime, but not metronidazole or micafungin. Justin had written that the duration of remaining antibiotics would total seven days, or four additional days from the current date. Dr. Tuttle signed off on this duration.

**Antibiotic Prescribing as a Collective Practice**

In the ethnographic data presented above, physicians and pharmacists at various points in time and at different locations within the medical institution are involved in making antibiotic decisions for the surgery patient Mrs. Rodriguez. The timing of decision-making within the
surgical intensive care unit daily practice is critical. There are three key elements demonstrating the collective nature of antibiotic decision making in Mrs. Rodriguez’s case. First, on this day, Dr. Kline isn’t really involved in making antibiotic decisions. We see that he is unavailable during the call between teams asking about antibiotic preferences. Further, we do not see any later intervention on Dr. Kline’s behalf to change what others have prescribed to the patient. Thus, Dr. Kline has effectively delegated responsibility to the resident physician. The resident physician from Dr. Kline’s team, though he could have waited to confirm with Dr. Kline which antibiotic and what duration of antibiotic were needed, took the initiative to make recommendations himself. This scenario can be compared to Charani et al (2019), where antibiotic decisions for surgical patients are similarly delegated to junior physicians.

Second, other physicians and pharmacists are involved in making decisions regarding Mrs. Rodriguez’s antibiotics. Though Dr. Kline does not have an active role, Justin, Dr. Tuttle, and Sarah all have significant influence over the decision to give Mrs. Rodriguez vancomycin and cefepime (not insignificant, they could have chosen to give no antibiotics or different antibiotics) for a total of seven days. In the morning during patient rounds, these individuals were communicating and making suggestions for how to reach a decision on the antibiotic course.

There were in fact two decision making processes involved in the sense that physician schedules and physician rank came into play. In other words, it was important who was present at particular moments, and that was in part determined by schedules. However, it was also important the type of individual who was present. In other words, the fact that physician trainees took up some of the work involved in antibiotic decision making suggests another process at hand. Justin took notes on what was being said by Dr. Tuttle and the pharmacist Sarah. Later in the day Justin had
written out his note including the antibiotic orders. Dr. Tuttle then signed off on this note and it became a signed order in the electronic medical record, meaning that the antibiotic was scheduled to be given as ordered. The engagement of multiple individuals in the case demonstrates the collective nature of antibiotic decision making. These social determinants are important considerations that do not fit easily into current formulations of antimicrobial stewardship.

A third key element is how time pressures and the structure of medical practice impact the antibiotic decision. Importantly, had any of these individuals been called away or with another service that day (ex. Sarah often rotates which intensive care unit team she works with), the outcome could have been different. Additionally, had the team had several days to ruminate over the antibiotic choices, the outcome could have been different. During my research, I was constantly aware of the time pressures that physicians were placed under. Since notes in the medical record must be signed within the time limit set by insurance companies, notes end up getting signed by end of day (or night). Thus, the requirements of the structure of medical practice also shape the manner in which antibiotic decisions are made, further expanding the circle of individuals involved in antibiotic decision making to include insurance companies.

There are numerous twists and turns in the daily practice of the surgical intensive care unit. In addition to describing the timing of antibiotic use, the moment in which an antibiotic is decided upon means it is closer to being given to the patient. Thus, a focus on timing signals or hints at

\[24\] Though an antibiotic order is placed in the electronic medical record, there are many steps that have to be taken for it to actually be administered by the nursing staff. How and when antibiotics are actually administered is not within the purview of this chapter as I have focused on how and when antibiotics are prescribed.
when the antibiotic will meet the microbe in the body of the patient. A background to the
discussion of the social dynamics of antibiotic prescribing is that the longer and more
complicated antibiotic decision-making becomes, the more delayed treatment is for patients.
Adding nuance to the perception that antibiotics are prescribed too often and without second
thought, I found that antibiotics were sometimes prescribed almost as an afterthought due to the
fact that the input of antibiotic orders occurred towards the end of the day. Compared with
intravenous fluids for patients in the surgical intensive care unit, antibiotics were rarely a ‘stat’
order. Antibiotic prescribing orders would be passed around to other consulting services and
support staff before finally making it into the chart with other non-immediate orders. In this
sense too, antibiotic prescribing becomes a collective practice regulated by the flow of the
everyday work occurring on each medical team.

I have proposed that antibiotic prescribing is characterized by three constants: work, practice,
and interaction. First, the antibiotic prescribing in this ethnographic data is work. Like the
Second Chicago School, I found that there were particularities of hospital practice that made
antibiotic prescribing just another task to be accomplished during the day (Becker et al 1976).
For Justin, the work was collaborating with other physician teams and the attending physician of
his team to navigate varied opinions on the correct antibiotics and the correct duration of therapy.
For Dr. Tuttle, her busy schedule kept her away completing other work rather than being
involved of the technicalities in this case. Dr. Tuttle’s work was mundane in a different way in
that she was needed for the signing of the prescription at the end of the day. Practically,
antibiotic prescribing being work means that antibiotic decision-making was constrained by

\[\text{statum}\] meaning immediate.
physicians work hours, the ranked priorities that draw attention away from the less acute patient, and time pressures associated with the care of very sick patients.

Second, antibiotic prescribing is a practice in that it requires repetition and expertise to be effective in decision-making. Studies of institutions (see Bourdieu 1977) have described the development of a habitus, or the embodied practice that institutional workers can inhabit as a part of daily involvement in the work of an institution. In this case, physicians fall into a habitus of antibiotic prescribing when they develop a style of antibiotic prescribing that is in line with their peers and in accordance with their social status. For example, a surgeon may prescribe antibiotics differently from a dermatologist, but a surgeon tends to prescribe antibiotics similarly to other surgeons. Being an expert in a particular field recognized by others in the institution puts a social pressure on an individual to prescribe “appropriately.” In fact, what is of concern to the antimicrobial stewardship team are not the differences between physicians in various specialties but rather when physicians from the same specialty prescribe antibiotics differently. Here, “appropriately” means antibiotic prescribing that doesn’t raise eyebrows and thus is the norm for the institution (see Chapter 4 for an analysis of what “appropriately” means from the lens of antimicrobial stewardship).

Third, antibiotic prescribing is interaction. Physicians learn and embody a habitus as a result, in part, of the hidden curriculum (Becker et al 1976) taught to them in medical school. The question of how to be a physician, or how to be colleagues with a physician, that is all part of what medical socialization encompasses. Once physicians start their practice in an institution, interaction comes into play as the ways in which individuals communicate and work around one another. In particular, physicians utilize face-work (Goffman 1959; 1982) to be listened to, to
improve their standing, among colleagues. Two very capable experts, Dr. Tuttle and Sarah, make sure not to lose face in their antibiotic decision-making by checking in with Dr. Kline about his preferences. The story about Dr. Kline’s reputation, though exaggerated by the perception of surgeons as hard-headed and explosive, is kept in place due to the forced deference and face-work of individuals who are arguably qualified to make the antibiotic decision on their own. Thus, in interaction again and again, the social dynamics of the institution are reinforced. The social dynamics of antibiotic prescribing make antibiotic prescribing less a question of “Why did this physician prescribe this broad-spectrum antibiotic?” and more a question of “How did this broad-spectrum antibiotic get prescribed?”

**Conclusion**

In this chapter I have presented ethnographic data showing antibiotic prescribing as a collective practice influenced by social dynamics present in medical institutions. These social dynamics include the themes of work, practice, and interaction, that I argue are hugely influential in the prescription of antibiotics at my fieldsite. While I do not claim that individual physicians are not the ones pushing the button on the start of antibiotics, or that nurses are not the ones administering antibiotics on their own, I am arguing that it takes everyone working together and interacting with one another as part of their daily practice to get to a single antibiotic prescription. Antibiotic prescribing does not occur in a vacuum, and in this chapter, I have shown some of the conditions and constants of antibiotic prescribing at Frontier City Medical Complex.

In the next chapter I will continue a discussion of antibiotic prescribing by moving into the realm of policy and expectations at the national level. I will demonstrate how national policy on antibiotic use translates into local practice at Frontier City Medical Complex. Physicians make
antibiotic decisions in conjunction with their peers and support staff, but they are also poked and prodded from outside their practice groups by antimicrobial stewardship teams aimed at reducing overall antibiotic use. Furthermore, antimicrobial stewardship teams are themselves monitored and directed by national stewardship committees who set the standards (e.g., The Joint Commission). Recent changes in the national policy and guidelines related to antibiotic use mean that accreditation groups and antimicrobial stewardship leaders are increasingly intervening in the practice of other hospital-based physicians. Chapter 4 will examine the changes in antibiotic prescribing as a result of these new factors, as well as what is at stake for individual prescribers as they try to satisfy broader calls for improved antibiotic prescribing and the impetus to do what they think is best for the patient in front of them.
Chapter 4

Reducing Antibiotic Use: Responsible Physicians and Antimicrobial Stewardship

Stewardship is about making sure that everybody, not just infectious diseases physicians, are using antibiotics only when needed, and for the durations required, and hopefully the narrowest spectrum that we could possibly use. We have to make sure that we get the patient better now and also have antibiotics in store for them when they come back with an infection that is harder to treat, as a lot of patients tend to do. We have to use antibiotics as they are meant to be used and not kind of as a vitamin that everybody gets.

-Infectious diseases physician

Introduction

In the 1970s clinical pharmacy services began to notice clear increases in antibiotic resistance. In response, local antibiotic use guidelines for pharmacy and therapeutics worked to gain more influence over antibiotic use. Any existing efforts at restricting antibiotic use in the hospital setting were related to cost containment rather than slowing antibiotic resistance. Furthermore, any national guidance on the rising problem of antibiotic resistance had yet to be realized.

Antimicrobial stewardship (AS), the most recent intervention aimed at combating antibiotic resistance, is born out of this context. AS was introduced in the United States (McGowan and Gerding 1996), and quickly went global (Gould and van der Meer 1999). AS programs focus on
overseeing antibiotic prescribing and intervening when trends inconsistent with “appropriate26” use are discovered. But what is “appropriate” use? Historically, “appropriate,” “judicious,” and “rational” have been descriptors of good antibiotic use (Podolsky 2015). In AS programs, “appropriate” use tends to signify adherence to guidelines (i.e., compliance). Physicians who adhere to antibiotic use guidelines are “champions” of AS. Physicians who do not adhere to guidelines are “problem physicians.”

Discussions surrounding “workarounds” are abundant, and AS programs tend to target “irrational” prescribers in order to correct their path. Without much regard to the social dynamics of antibiotic prescribing (see Chapter 3), AS programs base their assessments of physicians and physician groups on quantitative data demonstrating critical findings like a “bug-drug” mismatch (i.e., the antibiotic being given does not treat that particular infection). Daily review of the quantitative data on antibiotic prescribing is the norm for hospital-based AS programs. At professional conferences, the conversations are often about how to optimize antibiotic use. A persistent focus at these conferences is how to get through to the “irrational” physicians, or how to convince physicians that they are wrong and need to change. Studies of “stealth dosing” (LaRosa et al 2007) and “physician defiance” (Mortell et al 2013) that highlight the “bad” behavior of physicians have saturated the field, though some innovation such as the introduction of “handshake” stewardship (i.e., a rounding-based, face-to-face feedback given to prescribing physicians, see Hurst et al 2016) and “nudge-concordant prescribing” (Meeker et al 2014) has recently appeared in the medical literature. Importantly, AS programs are comprised of

26 Throughout this chapter I will utilize quotation marks to mark words and phrases that were common at my field site. There is some overlap between these words and phrases and those used in the medical literature. Where possible, I distinguish using citations from the medical literature.
physicians who operate with a dual lens in that they are sometimes clinicians and sometimes stewards. In other words, AS program proponents and leaders target individual prescribers but often also find themselves in the position of deciding on or recommending antibiotics during their clinical practice. An antibiotic steward can thus be framed as “irrational” during their clinical practice and “rational” during their AS program participation (see The Case of Ms. Jackson), bringing into question whether “irrational prescribers” actually exist outside of situated, particular contexts.

This chapter critically engages AS practice at Frontier City Medical Complex by situating the institutional developments within the larger national uptake of AS. After starting with a discussion of how AS has been described in the literature, I then ethnographically explore what AS looks like in practice at Frontier City Medical Complex. I argue that AS must be contextualized in order to make sense of hospital-wide efforts made at Frontier City Medical Complex. With that aim I do a deep dive into the complexities and technical toolkit of AS. Both County Public Hospital and University Medical Center are national leaders in the area of AS and have received funding from the CDC for their novel approaches to combating antibiotic resistance. However, even at institutions known for their commitment to the world of AS, the tendency to lean on methodological individualism, social psychology, and rational choice modeling leaves the individual physician in an ethical dilemma and thereby compromises the pursuit of “appropriate” antibiotic prescribing.

By sharing the various ways that infectious diseases physicians justify AS and attempt to “educate” and “change” other physicians, I illuminate how the theoretical foundations of AS and the practical implementation of AS leave “appropriate” antibiotic use difficult to achieve. In
particular, the ethnographic data presented in this chapter intervenes on debates regarding the moralizing forces bearing down on individual physicians. I will show how the antibiotic stewards’ focus on reducing antibiotic use by “targeting” individual prescribing physicians forces an ethically irreconcilable dilemma: save the patient now or save the population later. Practitioners are challenged through AS because of their authority and power to prescribe antibiotics. However, they are scrutinized when they do not display the “appropriate” responsibility and guardianship over antibiotics. Thus, there is no clear solution for the individual physician and as such, AS is doomed to fail.

What is Antimicrobial Stewardship (AS)?

The practice of AS is intended to combat the problem of antibiotic resistance by changing the prescribing behavior of physicians. AS first appeared in the literature in 1996 (McGowan and Gerding), though references to the philosophy behind AS appeared earlier (Kunin and Dierks 1969, Kunin, Tupasi and Craig 1973, and McGowan 1983). John McGowan Jr. and Dale Gerding were infectious diseases specialists at Emory University School of Medicine and leaders in the infectious diseases community. During an interview reflecting on their invention of the term, McGowan and Gerding describe the concept of preserving antibiotics as the practice of being a “good steward” which they were inspired to write about because of a Sunday homily emphasizing contributions to the community (Dyar et al 2017). McGowan and Gerding’s intention in introducing the term comes from their sense that reducing antibiotic use could have a global impact on population health.

In conjunction with rising concern over antibiotic resistance, AS has become an essential intervention in hospital antibiotic prescribing practice. AS could be found in many individual
hospital settings throughout the 1990s and 2000s (Dyar et al 2017). Recognition of the term rose dramatically between 2008 and 2011, and it continues to rise such that now stewardship is being used with other medical terms (e.g., see ‘diagnostic stewardship’, Morgan, Malani and Diekema 2017). The timing coincides with the release of IDSA and SHEA guidelines for developing AS programs. AS has been enthusiastically embraced by international organizations and governments (Mendelson et al 2017), but it took a while for formal guidelines and requirements to be developed. While California laws have required that hospitals develop programs aimed at enforcing “appropriate” use of antibiotics since 2008, it was not until the Presidential Executive Order “Combating Antibiotic-Resistant Bacteria” was released in 2014 that AS was thrown into the limelight. Former United States President Barack Obama worked to produce a goal-oriented national strategy document following the release of the Executive Order. This document describes the inclusion of AS and calls on national agencies such as the CDC to continue their work developing and promoting antimicrobial stewardship as a favored policy against antibiotic resistance. The CDC published guidelines for AS in hospitals (2014), nursing homes (2015), and outpatient physicians’ offices (2016a). The CDC also created an online AS education program (2016a).

Researchers like Dyar et al (2017) have suggested that AS is at risk of becoming a meaningless “catchword.” Indeed, the implementation and implications of AS are varied. Mendelson et al (2017) point out that AS can be differentially implemented at the individual, multidisciplinary, institutional, national, and global level. Furthermore, AS can involve complex groupings of physicians, pharmacists, infection control specialists, microbiologists, nurses, surgeons, hospital-wide committees, policymakers and non-governmental organizations. However, the “many meanings” (Mendelson et al 2017) and manners of implementation can be a distraction from
what many infectious diseases practitioners sees as the essential intervention of AS. Based on a review of the literature and interviews with the term’s originators, Dyar and colleagues (2017) attempt to clarify the ethos of AS: “We suggest that antimicrobial stewardship is about using antimicrobials responsibly, which involves promoting actions that balance both the individual’s need for “appropriate” treatment and the longer-term societal need for sustained access to effective therapy.” McGowan and Gerding’s original intention with AS was that it could be a way to move forward towards addressing the population level implications in an age of increasing antibiotic resistance. Dyar et al (2017) contend that AS can provide a balance between caring for the individual patient and the larger population. That remains to be seen.

Generally, AS can be thought of as interventions, activities, and approaches aimed at combating antibiotic resistance. Ensuring that antibiotics are selected, dosed, and managed “appropriately” is the major crux of an AS program (Dyar et al 2017; Pakyz et al 2014). Techniques used to achieve AS include antibiotic “time outs,” prior authorization, and prospective audit and feedback. An antibiotic “time out” occurs when an antibiotic needs reassessment after a predetermined period of time (e.g., 48 hours). Prior authorization is historically the most common, it predates AS, and involves putting antibiotics on a restricted list such that they can only be prescribed after discussion with an expert in antibiotic use. Prospective audit and feedback involves review of antibiotic prescriptions by an expert who provides feedback based on “appropriateness” of the therapy. All of these forms of AS require guidance by an infectious diseases physician or other expert in antibiotic use who can advise on which antibiotics, for which durations, in what quantities require oversight.

**The Theoretical Foundations of Antimicrobial Stewardship (AS)**
AS draws from a tradition of methodological individualism prominent in both social psychology and, more recently, in behavioral economics (Thaler and Sunstein 2008; Pedwell 2017). Essentially, the basic assumptions about an individual physician’s attitudes, perceptions, and behaviors tend to highlight ego, education (or lack thereof), or unrealistic social dynamics (see Chapter 3). The relationship between sociobehavioral theories and AS policy can be seen in efforts to change behaviors in individuals. For example, a nudge involves “manipulating the work environment to nudge better choices” (Szymczak and Newland 2018), and has been shown to reduce rates of “inappropriate” prescribing in a recent study involving poster-size commitment letters in outpatient physician offices (Meeker et al 2014). Nudging prescribers towards better antibiotic choices can contribute to the much bigger issue of antibiotic resistance. Nudging promises low-cost, high-impact solutions since it relies on small changes to the structural setting in the hospital that then impact the perception and understanding of situations among prescribing physicians. However, there are problems to this approach.

The theoretical foundations of AS, foundations that are drawn on in the medical literature but are rarely stated explicitly in everyday practice, come from economics, specifically rational choice theory. Rational choice is a socioeconomic theory based on the understanding that individuals make choices based on their own interests and with an awareness of the costs and benefits of their decision. Rational choice has been critiqued from many social science fields, including anthropology. In the context of AS, rational choice has been critiqued using evidence that education on appropriate antibiotic use does not significantly change physician behavior as desired (Szymczak and Newland 2018, Arnold and Strauss 2005). While within the field behavioral economics is responding to critiques of rational choice and in significant ways is contributing to a viewpoint that humans do not neatly fit within rational/irrational frameworks, I
suggest that within AS programs the uptake of sociobehavioral modeling has not made clear the distinctions between these economic theories and approaches.

Additionally, while sociobehavioral modeling is increasingly part of AS programs there are several barriers to its efficacy in the hospital environment. AS programs are steeped in history and theory that has not moved beyond rational choice understandings of human behavior, even if they do engage in recent developments in the field of economics like nudge-concordant prescribing (Meeker et al 2014) associated with behavioral economics. This is evidenced, in part, by continued pushes toward “changing behavior” and “educating” errant physicians, as if individual physicians’ thought processes were the problem. In a related point, there are social norms related to antibiotic use that are not accounted for by simply changing the working environment to prompt individual physicians into “better” behavior (Szymczak and Newland 2018). The overarching barrier to both approaches is that in their utilization there is not enough attention to the social dynamics at play in antibiotic prescribing.

**The Antimicrobial Stewardship (AS) Toolkit**

Formally, AS includes personnel and structured intervention practices to target “inappropriate” antibiotic prescribing. A nationally recognized approach comes from the CDC in the form of the Core Elements of Hospital Antibiotic Stewardship Programs (2014). These elements are: leadership commitment, accountability, drug expertise, action, tracking, reporting, and education. The first three elements call for financial, technical, and expert resources needed for AS to run smoothly. The remaining elements are activities that AS programs can engage in including the targeted education of other physicians. Not every institution has the resources and dedication to pull off a robust AS program. In the case of Frontier City Medical Complex, University City
Medical Center actively monitors the core elements to ensure their program is staying on track. County Public Hospital achieves most of the elements but does not have as many individuals or as many resources to dedicate to the program. Thus, while University City Medical Center regularly publishes updated guidelines and pamphlets on AS, County Public Hospital has an online set of guidelines that are published yearly with occasional hospital-wide antibiotic updates. One measure of this difference is how often University City Medical Center was able to meet with their entire AS team (1 x week) compared with County Public Hospital (1 x month).

The techniques of AS (e.g., “time outs,” prior authorization, and prospective audit and feedback) as practiced at Frontier City Medical Complex were aided by several key visual tools available to the hospital-based physician.

Two of these tools were mentioned regularly by the AS leaders as “effective” and relatively “intuitive” aids: the antibiogram and antibiotic susceptibilities. The antibiogram (Figures 10 and 11 below) is a chart showing the percent chance that each antibiotic has working against a particular organism at a particular hospital. In other words, the antibiogram gives physicians a prediction of how well their selected antibiotic will work against a confirmed infection in a patient. The antibiogram is developed using all microbiologic testing from the previous year (e.g., showing which organisms cultured in the lab from patients at that hospital are the most resistant to available antibiotics). Figure 10 shows the chance that an antibiotic (rows) will have against a gram-positive organism (columns). Figure 11 shows the chance that an antibiotic (rows) will have against a gram-negative organism (columns). For example, in Figure 10, vancomycin is 100 percent effective against MRSA. On the other hand, in Figure 11, meropenem is only 40 percent effective against Acinetobacter baumanii. To clarify, these examples are true
only of organisms found in patients from Frontier City Medical Complex. An antibiogram could feasibly be created at the regional or national level, but typically they are utilized at the hospital level.

Notes. *x* = Not test, no activity, or is not normally used in infections caused by this organism. *R* = Organism has intrinsic resistance to this drug. Do not use. Small black triangle = Protected antibiotic: requires approval by Restricted Anti-Infective Approval Pager. *NR* = Not Reported – activity exists, and micro may provide *E* test or *KB* data on susceptibility testing, but it is not routinely reported.

Figure 10. Cumulative Susceptibilities at University Medical Center. Susceptible Percentage of All Inpatient [Microbiologic] Cultures for Gram-Positive Organisms. January-December 2017/Organism (No. Tested).
Notes. $x =$ Not tested, no activity, or is not normally used in infections caused by this organism. $R =$ Organism has intrinsic resistance to this drug. Do not use. Small black triangle = Protected antibiotic: requires approval by Restricted Anti-Infective Approval Pager. ** = Should not be used alone to treat gram-positive infections. SYN = Synergy with ampicillin or vancomycin expected.

Figure 11. Cumulative Susceptibilities at University Medical Center. Susceptible Percentage of All Inpatient [Microbiologic] Cultures for Gram-Negative Organisms. January-December 2017/Organism (No. Tested).
Based on these antibiograms, physicians at Frontier City Medical Complex were in a position to make “informed” decisions about “appropriate” antibiotic use. Antibiograms bolster infectious diseases physicians arguments that antibiotic selection is critical and should not be overlooked.

The above antibiogram took a significant amount of time to compile since it required collaboration between the microbiology lab, infectious diseases specialists, and the AS team. The antibiogram used each fiscal year was therefore based on antibiotic resistance rates from the previous year. The antibiogram allowed for targeted therapy based on the institution’s actual rates of antibiotic resistance. Most of all, the AS teams wanted individual physicians to choose antibiotics well. Dr. Miller, an enthusiastic yet overworked steward at University Medical Center described to me the antibiogram as an important tool in getting physicians help with their prescribing:

We try to educate them with antibiograms. (laughs) Whenever I’m on rounds, it’s like “Where’s your orange card?” I always have multiple orange cards scattered around at any given time, it’s like “Hey you guys know that both our antibiogram is on this card, and our guidelines, did you see that?” (showing me the card as she explains) Here, there, see they’re there. So what are you supposed to use, you think they have Escherichia coli so what percentage of time is your antibiotic susceptible to that, and look at our guidelines, so our guidelines are based on our antibiogram, so I try to do that. A little bit here and there, just to show them how to use this card. Right now our guidelines are buried under some ridiculous, like, no one’s going to find it. I swear to you, beyond these, (points to the card again) I don’t think anybody knows our guidelines.

The AS team at University Medical Center had worked tirelessly at the end of every fiscal year to produce a pamphlet of anti-infective guidelines, dosing recommendations, allergy guidelines, and restricted antibiotic lists. This colored pamphlet would be distributed at events for incoming physician residents and fellows, and would be passed around informally to individual physicians throughout the institution. In particular, the antibiogram (Figure 10 and Figure 11) was intended
to be a quick reference guide to selecting an antibiotic most likely to work based on the patient’s confirmed diagnosis.

Based on these reports, an individual physician could feasibly read the microbiology lab report confirming a diagnosis, pull out their pamphlet, look across the top for the organism and find the most “appropriate” antibiotic at University Medical Center to treat that infection.²⁷ The culture result was generally available prior to the release of antibiotic susceptibilities indicating, specific to that patient’s infection, what antibiotics would be effective. The susceptibility report listed below (Figure 12) is an example showing how a physician might select a “targeted” antibiotic for a specific patient. Unlike the antibiogram, the susceptibility report comes from the microbiologic testing done on one specific patient. The example below shows Escherichia coli, so this susceptibility report gives information on whether the patient’s infection of Escherichia coli would likely respond to the listed antibiotics.

²⁷ I say it would be “appropriate” at this institution because every institution has unique rates of antibiotic use. Though some antibiotics are generally overprescribed, each institution has varying levels of patient exposure to an individual antibiotic and those exposures impact the levels of resistance found in the organisms tested at that institution. This form of local biologies (Lock and Nguyen 2010) impacts the landscape of antibiotic resistance and makes it all the more difficult to cull.
### Escherichia coli MIC Interpretation

<table>
<thead>
<tr>
<th>Medication</th>
<th>MIC Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amikacin</td>
<td>S</td>
</tr>
<tr>
<td>Amox/K</td>
<td>I</td>
</tr>
<tr>
<td>Amp/Sulbactam</td>
<td>R</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>R</td>
</tr>
<tr>
<td>Aztreonam</td>
<td>R</td>
</tr>
<tr>
<td>Cefazolin</td>
<td>R</td>
</tr>
<tr>
<td>Cefepime</td>
<td>R</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>R</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>R</td>
</tr>
<tr>
<td>Ertapenem</td>
<td>S</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>R</td>
</tr>
<tr>
<td>Imipenem</td>
<td>S</td>
</tr>
<tr>
<td>Levofoxacin</td>
<td>R</td>
</tr>
<tr>
<td>Meropenem</td>
<td>S</td>
</tr>
<tr>
<td>Piperacillin/Taz</td>
<td>S</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>R</td>
</tr>
<tr>
<td>Tobramycin</td>
<td>R</td>
</tr>
<tr>
<td>Trimeth/Sulfadiazine</td>
<td>S</td>
</tr>
</tbody>
</table>


Figure 12. Table of susceptibilities for an Escherichia coli culture.
In this case, ampicillin, aztreonam, cefazolin, cefepime, and other antibiotics are resistant to the Escherichia coli found in this patient. However, ertapenem, imipenem, and meropenem are all susceptible, making them better antibiotic choices for the physician. If a physician were to consult their antibiotic susceptibilities for a culture, assuming it’s available and they know how to find it, they could select a “targeted” antibiotic that would effectively treat the infection.

The toolkit of AS programs includes antibiograms and antibiotic susceptibility results, among other technical tools. Infectious diseases physicians at Frontier City Complex see these tools as useful in reinforcing the importance of “appropriate” antibiotic therapy. Often, infectious diseases physicians would pull out their pamphlet containing the antibiogram or recommend to the primary attending physician that they should refer to the antibiotic susceptibility for a patient’s infection. This, of course, does not mean that individual physicians are always successful in processing the information in a timely manner leading to effective use of antibiotics (see Chapter 3), just that the antibiogram can be used to avoid “bug-drug” mismatches by making individual physicians better stewards. The AS toolkit relies on the assumption that if physicians have the “appropriate” information at their fingertips, their decisions regarding antibiotic use would be “appropriate.”

In the next section I will discuss how infectious diseases physicians define AS and how they see their role as antibiotic stewards, including what they see as the difficult aspects of AS. The next sections will also present a problem at the heart of AS, namely the pressure that physicians feel to take better care of the patient in front of them while also caring for the population as a whole.

**Defining Antimicrobial Stewardship (AS) at Frontier City Medical Complex**
The CDC has published AS guidelines and recommendations for hospital settings (2014). Further, AS became a medication management standard for The Joint Commission on Accreditation of Hospital Organizations, the largest accreditation agency in the United States (2016). Still, local investment in an AS program is variable due to institutional factors such as resource availability and infectious diseases leadership. Both University Medical Center and County Public Hospital had robust AS programs (see the above technical tools developed within the programs) with an infectious diseases physician leading the group. At County Public Hospital, the head of the AS program was also the head of the division, while at University Medical Center it was a physician recruited because of their background in AS research. Frontier City Medical Complex as a whole had received ample funding from the CDC to research antibiotic-resistant infections, with AS falling under that umbrella.

Infectious diseases physicians were generally aware and supportive of the AS programs at Frontier City Medical Complex. Not all infectious diseases physicians were actively involved in AS activities, but many were and took it upon themselves to educate other non-infectious diseases physicians about “appropriate” antibiotic use. In fact, AS programs often do rely on the infectious diseases consult team to make suggestions about reducing antibiotic use or switching up antibiotic recommendations. Though AS program members can call the primary attending physician directly, sometimes the infectious diseases consult team would be used to spread the word about a recommended change. As with much of medical practice, certain divisions and specialties collaborated more seamlessly with AS than others. Generally, however, other hospital-based physician groups reeled at being told they had to get prior authorization to prescribe an antibiotic. Other interventions were more acceptable, such as replacing one antibiotic with a better antibiotic in the same category with the same function.
Infectious diseases physicians used terms like “appropriate,” “good,” “restrict,” and “change” to describe the AS program. Overall, infectious diseases physicians at Frontier Medical Complex were concerned with what they term the “appropriate” use of antibiotics because of their overarching concerns with protecting antibiotics so they can be useful in the future. As an infectious diseases physician describes the term:

Stewardship is to care for something that you would pass on after you are done. That’s true about stewardship of a country, stewardship of a national park, or stewardship of antibiotics. You have to care for them, and protect them, so that you would have something to leave behind to people that come after you.

The infectious diseases physicians I worked with were all aware of the need for AS. The threat of antibiotic-resistant infections was well-described by infectious diseases physician participants (see Chapter 5), who see a world without effective antibiotics as a realistic future. This fear, in part, drives infectious diseases physicians to be advocates of AS in their practice and, in some cases, in their research.

For example, as infectious diseases physicians rotated on and off service as specialty consultants to inpatient primary services, many took time to educate fellows and residents on the finer points of AS. The most commonly used rhetorical move from infectious diseases physicians at Frontier City Medical Complex was a form of clarification as a part of medical education during patient rounds.

\[28\] The same cannot be said for other hospital-based physicians. AS is a concept developed in the infectious disease specialty, and for that reason it is intuitive to most infectious diseases physicians why AS is necessary practice.

\[29\] Done in addition to their outpatient clinic and research responsibilities.
During my participant observation of infectious diseases physicians going on daily patient rounds, I listened to numerous patient presentations done by physician residents. On this particular day, Dr. Tenorio, a middle-aged man who was a stickler for precision, challenged the resident during their presentation. The patient had just arrived and the primary physician team had immediately asked for infectious diseases to come in and provide their opinion as consultants.

We stop outside the patient door. We are in the middle of the list, halfway through the afternoon and the team is really getting into a flow: resident presentation outside patient room, enter patient room and gather patient history, leave patient room and listen as attending physician provides final notes on the patient.

But in this case, Dr. Tenorio stops the resident in the middle of their presentation, “Wait — What was the antibiotic prescribed for?” This seemingly straightforward question made the resident flounder. Dr. Tenorio jumped ahead without a response, this was the moment he had been waiting for. “You residents need to know what antibiotics the patients are on!” Dr. Tenorio continues by asking how the residents can know whether antibiotic prescribing is “appropriate” if they don’t know what the antibiotics are treating. “This is important, you should be collecting this data for every patient.”

After the momentary pause and shudder among the physician residents, Dr. Tenorio gives them the answers. He knew the answer to the above question, he just wanted to make the point to
reinforce how important AS is to hospital practice. Dr. Tenorio had engaged in a teaching moment benefitting the AS program’s overall goals.

Dr. Tenorio is but one of the many infectious diseases physicians at Frontier City Medical Complex who incorporates the ethos of AS into their daily practice of rounding on patients. This informal method of spreading the message of AS is complemented by various formal activities done by AS members. In particular, the review of antibiotic prescription alerts in the electronic medical record is conducted behind the scenes by infectious diseases pharmacists and physician fellows. The head of AS will also review cases and help manage the electronic system of reporting. In this way, AS is also about management. An infectious diseases physician shared:

[Antimicrobial] Stewardship is being a good manager of the resources you are given and being accountable, right? It’s about making the best use and not abusing the resources we have, because antibiotics are resources that are finite in terms of their continued efficacy. If we abuse them they won’t be effective. So, stewardship means knowing the resources you have, using them in the most effective and efficient way, and also being accountable for your actions.

This infectious diseases physician emphasizes the management aspect of AS and the importance of being accountable, and infectious diseases practitioner typically described the value of an AS program that can make others accountable in their antibiotic use. The ability to “restrict,” or “change” physicians so that their overall use of antibiotics is more “appropriate” is something AS strives for. At Frontier City Medical Complex, the spread of AS was geared at making every physician a responsible antibiotic prescriber. But what does it mean exactly to be a steward of antibiotics? Infectious diseases physicians grappled with their role in promoting AS at the institutional level.
Being an Antibiotic Steward

An antibiotic steward can be any prescriber or overseer of antibiotic use. However, most often they are infectious diseases practitioners of some kind, either pharmacists specially trained in infectious diseases or infectious diseases physicians. Because AS operates from within the Division of Infectious Diseases with committee heads that are themselves infectious diseases physicians, antibiotic stewards are most likely to be found within the ranks of the infectious diseases specialty. At Frontier City Medical Complex, most infectious diseases physicians did identify themselves as antibiotic stewards. In discussing their role related to AS, most physicians said they had no formal role but that they do consider themselves a steward. Compared to the literature and descriptions of AS given by institutional leaders on the topic, the regular infectious diseases physician does quite well in describing the concepts and behaviors associated with AS. Therefore the challenge I introduce here lies with the concept rather than the interpretation of it among physicians.

AS at Frontier City Medical Complex is about using antibiotics “appropriately.” Physicians at my field site would emphasize the 6 D’s: diagnosis, drainage/debridement, drug, dosage, duration, and de-escalation (cf. Schwartz 2016). The 6 D’s are an expansion of a common phrase in the infectious diseases specialty: “Give the right drug, at the right dose, for the right duration.” Diagnosis is first among the 6 D’s because a patient should not be on antibiotics if they aren’t infected with a (treatable) organism. Drainage/debridement is next because a patient should not receive antibiotics for an infection that is localized and could be surgically removed (via drainage/debridement). Drug is next because given a confirmed infection that cannot otherwise be removed, the correct antibiotic must be chosen that will effectively treat the infection. This
means that a narrow antibiotic that does not treat gram-negative organisms should not be given
to a patient with Escherichia coli. Dosage is important because the correct antibiotic in the wrong
amount will be ineffective. Duration, similarly, is about the antibiotic prescription. Giving an
antibiotic for one week may or may not work depending on the organism and the recommended
length of treatment. De-escalation is last. De-escalation is important because once a patient is on
antibiotics, even if they are “appropriately” prescribed, there should be a plan to get the patient
off of antibiotics long-term. So if a patient starts out with broad-spectrum antibiotics prescribed,
eventually the steward will want to suggest narrowing the spectrum of the antibiotic or peeling
back on some of the various antibiotic prescribed.

For example, a 48-hour antibiotic “time out” for the antibiotic vancomycin was implemented at
University Medical Center in the medical intensive care unit, the pediatric intensive care unit,
and a medicine floor of the main hospital. This antibiotic “time out” involved monitoring all
vancomycin orders beyond 48 hours and took significant resources to accomplish. After 6
months, the AS team decided that vancomycin orders should be under continued monitoring after
72 hours and that new starts of vancomycin in high volume areas of the hospital should be
observed. This pilot study draws on multiple D’s including drug, duration and de-escalation
because it targets one antibiotic, vancomycin, and the length of therapy (LOT, duration) for that
antibiotic. Monitoring LOT in itself is a form of de-escalation since if a patient needs antibiotics
but has been on vancomycin too long, an option would be to use a narrow antibiotic based on an
“appropriate” diagnosis. Interventions like this one target areas of antibiotic prescribing practice
seen as “inappropriate” because they do not follow one or several of the 6 D’s.
Dr. Helen Hill, a well-considered young physician fellow in infectious diseases, details this rationale for AS as it relates to “appropriate” prescribing:

Stewardship, to me, is understanding when to use big [antibiotic] guns and when you can use little guns, and feeling confident that using a little gun in a situation to get the patient better is overall the right thing to do. You know, and it’s kind of like, I liken it to any little thing where we as humans, we have a footprint. That, that day, in that moment, we don’t notice any difference, but in the grand scheme [of things], if you throw out a Styrofoam cup from your car into the street, who cares? But, you do it, everyone else [also] does it, then we have a problem. So, it’s like that. Like, you can make one little change, and it may not matter, but if you’re doing it all the time, and those around you are doing it, it will eventually matter.

So AS exists to try to steer the physician in the direction of caring about their individual actions that collectively have a population-level impact. Dr. Hill is describing here the individual actions that together comprise a catastrophe of antibiotic overuse and misuse. Dr. Hill suggests that by selecting antibiotics with our “footprint” in mind, we might avoid antibiotics being useless when it really matters.

Physicians are inundated with pressure to infuse into their practice a consideration of the implications of their actions. In the case of AS, that means acknowledging and dealing with the fact that antibiotic use in the individual has a disastrous effect for the population over and above the potential side effects and long term effects for the individual. Some infectious diseases physicians and policymakers deny that there is an issue. Dr. Wollman, a leader for AS at County Public Hospital, repeatedly told me that physicians should be able to consider the population-level effects of their prescribing habits while simultaneously caring for the patient in front of them. Other infectious diseases physicians pointed out the complexity of the issue, Dr. Tenorio among them:
So that’s the problem, right? There’s the broad definition of wanting to protect antibiotics and make sure that they are useful for generations to come, but then the practice of stewardship is difficult. What does it mean in the inpatient setting? How do you protect an antibiotic in an inpatient setting? I don’t think anyone has quite figured that out. You know it’s easy to say “Restrict antibiotic use!” But then how do you restrict antibiotic use when you’re not there at the bedside. You know, the tension always is, the practitioner taking care of the patient is interested only in the outcome of the patient, and then stewards are interested in the outcome for the population for generations to come. And that has no bearing on immediate concerns of the physician taking care of the patient at the bedside. So I think that’s, (pause) yeah, I find it such a difficult field to be honest with you.

The tension Dr. Tenorio introduces here is that of whether the physician should be concerned with the patient or the population. In the next section I will further draw out the following tensions. First, in everyday practice the physician does not act alone (see Chapter 3). Yet AS targets individual prescribing physicians in attempts to create responsible stewards of antibiotics. What effect does placing the responsibility of “appropriate” antibiotic prescribing place on the individual physician? Second, in everyday practice the physician treats individual patients. The Hippocratic oath is not geared at making physicians responsible to the population but to each patient that they encounter.

So how can AS charge physicians with the additional responsibility of reducing overall antibiotic use for the sake of the population? It’s an impossible choice, or rather an ethical irreconcilability, brought together with the fallacy of methodological individualism highlight antibiotic prescribing habits. Physicians are expected to demonstrate power and authority over the care of their patients, but with AS, they find they are also expected to maintain the values of responsibility and guardianship. Antibiotic stewards in this formulation are charged with steering physicians in the direction of taking on more responsibility for the guardianship over antibiotics in the medical institution, a position that the stewards themselves find difficult to uphold in their
practice of caring for individual patients (Szymczak and Newland 2018, Broom, Broom and Kirby 2014).

**Incepting Change: Antimicrobial Stewardship (AS) in Daily Practice**

During everyday practice, infectious diseases physicians are variably successful at performing AS. The following ethnographic vignette demonstrates a scenario typical of infectious diseases practice on the hospital floors.

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for suspected sepsis. The patient is currently on vancomycin and Zosyn in addition to the long-term prescription for Augmentin.

Dr. Song joins in. He’s not septic now. He doesn’t even have a fever. Dr. Song pauses. Seems reasonable to de-escalate antibiotics. There isn’t anything focal that would require us to be more cautious. This is the easy part, he says, they can give antibiotics and the patient will get better. That doesn’t mean the antibiotics are “appropriate.” He’s been on Augmentin for such a long time, I worry about resistance there. We don’t even have antibiotic susceptibilities because we don’t have a confirmed infection.

Dr. Song looks to the physician fellow, asks her to suggest getting additional cultures from the patient. Dr. Song tells her, “Follow up on the cultures, make sure we know what we’re dealing with.” Then Dr. Song concludes, speaking to the resident physicians, “Tell them [the primary physician team] they can de-escalate. No signs of sepsis.” He asks the resident physicians to be careful. “Never order the primary team to do something. Remember we are the consult service. But yeah, they really should de-escalate. Tell them we don’t have any evidence of infection.” Finally, Dr. Song asks the infectious diseases pharmacist, “The dosing is correct on the Augmentin?” She nods “Yes.”

Later in the week the physician fellow has tracked down the nursing home and is waiting for the blood culture results to be sent over. The infectious diseases team still couldn’t find any source of infection and the primary physician team eventually backed off of their very broad prescription coverage: vancomycin and Zosyn.
Infectious diseases physicians would prefer to have all of the information at their fingertips regarding microbiologic testing and antibiotic susceptibilities. Given the “appropriate” information, the hospital-based physician can effectively utilize the antibiogram to select antibiotics that will work for a patient’s infection. However, as I observed in daily practice at Frontier City Medical Complex, physician teams are rarely able to confirm an infection initially and therefore do not have the evidence needed prior to starting a patient on antibiotics.

Importantly, for some fast-moving infections waiting to see susceptibilities would mean letting the patient suffer needlessly. Most physicians start patients on broad spectrum antibiotics to avoid letting the patient suffer and risking medical decline if they are correct that there is an underlying infection. Then, when the physician has more information, they often narrow the spectrum of antibiotics so that they can better target infection. Still, this scenario happens enough that in general antibiotics are grossly overused and misused in places like the emergency department and in patients who have been recently admitted.

Dr. Song in the ethnographic vignette is navigating this uncertain, amorphous territory with a patient who has just been readmitted. The primary physician team does not yet know what is happening, but they are sufficiently fearful (see Chapter 5) of sepsis and that leads them to pack on broad spectrum antibiotics. Dr. Song walks through some of the key principles in AS. Namely, that there is currently no diagnosis. Without a diagnosis an “appropriate” antibiotic cannot be selected. Second, not having a diagnosis means that the antibiogram and antibiotic susceptibilities cannot be used. But Dr. Song presses on, he focuses in on de-escalation, another mainstay of AS.
De-escalation in this case means opting out of using vancomycin and Zosyn in favor of either a narrow spectrum antibiotic or no antibiotic at all. At this moment, with no confirmed infection, Dr. Song asks the resident physicians to talk to the primary physician team about removing both antibiotics without suggesting a replacement. The Augmentin stays because it is for an actinomycoses infection that was already confirmed with the standard treatment decided. The presence of a long-term antibiotic prescription was another consideration for Dr. Song as it increased the chances of complications related to antibiotic resistance in the individual (of his actinomycoses infection). Additional antibiotics in this type of patient was not something Dr. Song was willing to risk. These are just some of the considerations that antibiotic stewards make in everyday practice. The primary physician team in this case wants to avoid suffering and complications in the individual patient, while Dr. Song has embodied the ethos of AS in that he emphasizes the importance of de-escalation and de-emphasizes the risk of sepsis in the patient.

Responsibility and Guardianship: Conflict within Antimicrobial Stewardship (AS)

Antibiotic prescribing is a collective practice (see Chapter 3). The individual physician does not exist in a vacuum and antibiotics require an infrastructure (Chandler 2019) to be administered to the patient. Yet AS policies still target individual physician prescribers as “problem physicians” to be changed. Infectious diseases physicians at my field site frequently conveyed their frustration at other physicians for behaving “irrationally” in regards to their antibiotic prescribing. The individual physician prescriber is singled out and pressured. The physician is singled out as an individual prescriber, not as part of a team that, as a unit, does the prescribing (see Chapter 3). In accordance with our understandings of governmentality, responsibilization is
thought to be how a state avoids blame by shifting pressure and obligations on to individual citizens (Rose 2007; Trnka and Trundle 2017). The individual citizen is thus expected to absorb the duties and responsibilities of the larger state or government entity.\textsuperscript{30} Climate change and education are good examples of the shifting of responsibility that states engage in, as we find it is up to the individual to recycle or educate themselves in lieu of proper state-run programs aimed at structural change. In the case of antibiotic resistance, responsibilization shifts the blame for antibiotic overuse and misuse away from corporations, states, and hospital systems, and places blame on individual physicians.

However, responsibilization is about more than just blame. Susanna Trnka and Catherine Trundle write about the competing responsibilities that individuals are placed under, suggesting that an individual is caught in a web of tensions that come from multiple aspects of their life and not just the state (2017). Trnka and Trundle write that, “…calls for responsibility, including self-responsibility, cannot be analytically reduced to a facet of governing at a distance. Not only is there a variety of forms of responsibilities that govern social and political life, but there are also the myriad ways that people respond to calls to be responsible” (2017: 8). For the physician, navigating competing responsibilities becomes a regular aspect of their daily existence at the hospital. The infectious diseases physician navigates making recommendations that are good for AS and making recommendations that put physicians’ concern over the individual patient. The

\textsuperscript{30} My use of responsibilization emerges from ethnographic data and does not solely draw on neoliberal individualization but rather speaks to methodological individualism as taken up by the medical institution in their burdening of physicians.
hospital-based physician navigates receiving recommendations from consultants like Dr. Song and making their own interventions based on their understanding of the patient’s condition.

Physicians are aware of the distributed responsibility that antibiotic prescribing involves as they can sometimes blame their resident or fellow or another team for not administering the antibiotic “appropriately.” However, the fact that physicians describe AS as pulling them in another direction away from other responsibilities exhibits one of Trnka and Trundle’s related points, namely that a government policy can make an impact on the individual by advocating for policies that have an element of existing beliefs related to important values in medical practice. Drawing on Foucault (2007), the way that governmentality works is not heavy-handed. Individual physicians are rarely boxed into a corner waiting for approvals to practice medicine. Instead, an inculcated need to care for others is preyed upon via regimes of biomedicine that require attunement to the patient. That is how the doctor-patient relationship works: the doctor exists as the provider of care and the patient as the recipient. The structures and institutions hide behind the face of a physician who treats the patient.

This is where AS runs into trouble. How can the physician, who is already attuned to the patient, begin to care about the future of antibiotics and antibiotic-resistant infections? AS asks the physician to consider a cause which does not fit within their worldview or traditional competing responsibilities involving being a “good” caretaker of patients. As Dr. Tenorio conveys, this presents an impossible choice, an ethical irreconcilability (cf. Laidlaw 2014). In other words, no choice is a good choice for the physician. For this reason, it is worth looking at the everyday practice of physicians such that the “complexity and specificity of ethical reflection, reasoning, dilemma, doubt, conflict, judgement and decision,” (Laidlaw 2014: 23) can be elicited. When we
zoom in to see what physicians do in practice, we see that a moral economy (Daston 1995; Fassin 2009) plays out in which the individual patient presents with the immediacy and severity of illness to sway the physician away from the moral ranking system associated with a future-oriented (cf. Welchman 1999, on stewardship) and intangible AS. Though AS exists within the same walls as individual care of the patient, its rationale and expectations do not easily fit into the responsibilities of being a physician as understood by the physician. Particularly in regards to time, physicians are looking for a “quick fix,” and antibiotics, on the surface, offer that solution (Willis and Chandler 2019).

Proponents argue that there is an increasing need for AS (Doron and Davidson 2011). However, as I have elucidated in this chapter, there are key tensions in the framing and practice of AS that make it unlikely to achieve overall lower and more “appropriate” antibiotic use. AS is heavily influenced by rational choice theory and social psychology, which tend to focus on changes at the level of the individual. Similar to theories of responsibilization, blame and expectation are shifted away from structures, institutions, and governments and onto an individual. Through the lens of competing responsibilities, individuals actually have multitudes of stakeholders invested in their behavior. First, physicians must uphold the standards of care. If standards are not followed, the physician or their physician group can be non-compliant and therefore liable. This might lead to a lawsuit initiated by a patient or their family. Then, physicians suffer interventions for scientific and medical studies aimed at improving practice. AS interventions are often guilty of this intrusion into everyday practice.

These physicians, as individuals, are capable of holding several lines of thought, or a complex moral economy of practice, at the same time. The individual physician, therefore, cannot deviate
far from their current practice as they have additional responsibilities that cannot be
compromised. All non-essential tasks can be thrown out the window if a life-threatening or
career-threatening problem arises. Such is the case with AS since it often does not have an
immediate impact on patient care. And when you put together multiple individuals required to
make one antibiotic decision, the on the ground understanding of what AS represents changes.

All things considered, through careful inspection of the everyday habits of physicians, AS is not
always the most rational choice. AS regularly comes into conflict with caring for the individual
patient. It is these tensions that my participants have spoken about, which other participants have
struggled to deny exist, and which colors antibiotic prescribing in an era of AS.

Conclusion

In this chapter I have introduced ethnographic data on how infectious diseases physicians at
Frontier City Medical Complex define and interact with AS. I have described the structure of AS
programs at both institutions and have connected the AS toolkit to infectious diseases
physicians’ everyday practice. As a policy that filters down into everyday practice, AS can be
critiqued for having theoretical foundations beholden to methodological individualism. Based on
these foundations, AS forces an ethical irreconcilable dilemma for physicians: should they care
for the individual patient or for the population? AS is a flawed policy in that it uses a rationale of
combating antibiotic resistance to attempt to create antibiotic stewards out of individual
physicians who are morally attuned to the patient in front of them. By looking at the local
contexts of AS, we can see that responsibilization of individual physicians skews AS logics to be
a question of whether the physician wants to save the patient or save the population. This ethical
irreconcilability leaves physicians without a viable option if they want to continue being a “good” physician.

So what does the future of antimicrobial resistance look like? Drawing on the history of infectious diseases as a discipline (chapter 2) and the social dynamics of antibiotic prescribing (chapter 3), I argue that AS is not structured to value the nature of antibiotic resistance as a complex cultural amalgam that preys on the individualist tendencies in the United States more than it does any other type of socioeconomic system. Furthermore, since antimicrobial resistance is a global issue that plays itself out in varied contexts, the weakest link can do great damage due to the ever-increasing reach of the global superpowers. Much like climate change, the problem of antimicrobial resistance is a tragedy of the commons in that widespread individual use of antibiotics has disastrous effects on the population as a whole.

In the next chapter I will delve into another of the social dynamics related to antibiotic prescribing, fear-based prescribing. The American brand is about being faster, about producing and consuming more and more and more. Furthermore, protecting the American way of life, protecting our borders, extends into the protection of health and wellness. Thus, antibiotic resistance is a threat to all we hold dear. Physicians, under pressure to contain the threat, go for “big gun” antibiotics and quick fixes (i.e., magic bullets). In Chapter 5, I introduce fearful affects as one of the many influencing factors in antibiotic overuse and misuse.
“Physicians go for the biggest guns [antibiotics] when people are sick, because I think a lot of it is motivated by fear. Because the patient is going to die, going to turn septic, or they are septic and they are going to die. Or you know, a lot of antibiotic usage is not necessarily evidence-based but fear-based, so if we let the flood gates go, people would do whatever I think their fear taught them to do.”

-Infectious diseases physician

Describing Antibiotic Resistance

At Frontier City Medical Complex public health and population health concerns including the re-emergence of tuberculosis in migrant and itinerant groups, HIV/AIDS related syndemics (Singer 2009), and the revolving door of either orthopedic replacements and repairs (University Medical Center) or trauma patients (e.g., gunshot wounds, County Public Hospital) proliferate. For the Divisions of Infectious Diseases, the urgent overarching concern of their practice is the problem of antibiotic resistance. Will their antibiotics work? How will they know the antibiotic is working? Infectious diseases physicians and pharmacists I studied had familiar, colloquial terms for the antibiotics they worked with. Furthermore, infectious diseases physicians and pharmacists sometimes used cheeky referents or metaphors for their working relationships with antibiotics.
Anthropomorphism of the antibiotic creates an entire collection of quirky, difficult, and sometimes intimidating metaphorical society of medicines. While some, like aztreonam, could be compared to extended family members, others, like colistin, were more like the grim reaper. Colistin is increasingly being used as a last resort antibiotic when physicians are faced with treating highly-resistant infections (Nation and Li 2009). Infectious diseases physicians shared, “We need better drugs than colistin,” and “I try to avoid colistin as much as possible.” Infectious diseases physician fellows would get upset that they had to use colistin on a patient. “Everyone I’ve ever pulled colistin for has died,” an infectious diseases physician fellow said. Compared with aztreonam as the uncle with expensive tastes, colistin signaled upcoming complications and poor outcomes for the patient and attendant physician teams.

Infectious diseases physicians and pharmacists’ use of terms for antibiotic medicines fit into an existing framing of the “war” against microbial adversaries (Harper 2005). Antibiotics were separated into various camps and outposts across the terrain of combat, some becoming the “big guns” and some becoming the “little guns” against the “urgent threat” (Hancock 2019) of antibiotic resistance. The language surrounding antibiotic medicines and resistance suggests that there is an arms race between man and microbe (Hede 2014; Plazak, Tamma and Heil 2018; Podolsky 2015). Indeed, thinking of antibiotics as “weapons” was a theme that I heard consistently throughout my interviews with infectious diseases physicians and pharmacists.31

31 A history of infectious diseases reveals the origin of the term “magic bullet” rests with Paul Ehrlich’s discovery of Salvarsan, compound 606, the first effective treatment against syphilis. The term was popularized and solidified into the terminology of infectious diseases and public health by the early 20th century. See chapter 2 and the following for reference: Williams 2009, Sepkowitz 2011, Schwartz 2004.
Using “bullets” to “target” infection were both terms that physicians regularly used to talk amongst themselves about treating infection.

While in general the spectrum of the antibiotic agent impacted the categorization as a “big gun” or “little gun,” the classification goes deeper to account for which antibiotics are ineffective because of overuse, and which antibiotics are kept in the back pocket for a special “mission.” Whereas the intensive care unit practitioners I later involved in my research did use some of this shop talk to refer to their use of antibiotics, the infectious diseases physician and pharmacist use of shop talk revealed further depths of meaning. Similar to Karin Knorr Cetina’s (1999) work with physicists, the average practitioner might be familiar with particles (in this case antibiotics) or the notion of experiments (in this case laboratory testing). However, what makes this a case of epistemic cultures is 1) the level of detail with which infectious diseases physicians and pharmacists have filled out this world of language about antibiotic use, and 2) the elaborate system of relationships between the terminology, everyday practice, and the realms of knowledge needed to ensure understanding amongst coworkers in the specialty.

Historical referents to antibiotic medicines hailed them as “magic bullets” (see Inhorn and Brown 1990; Singer 2015). While this backdrop set the tone for today’s “war” on antibiotic resistance, in the past it was assumed that humans were winning the “war.” Today’s referents signal a shift in the tide of warfare as antibiotic-resistant “superbugs” proliferate. Following

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The spectrum of an antibiotic communicates the types of microorganisms that the antibiotic is effective against. For example, the spectrum of vancomycin includes gram-positive organisms. Vancomycin is a common first line therapy for methicillin-resistant Staphylococcus aureus (MRSA), and because the spectrum of vancomycin includes gram-positive organisms like MRSA the treatment is likely to be effective.
Sontag (1978), the “war” on antibiotic resistance leads to the following assignments: microbes as “enemy,” infection as “threat,” patients as “casualties,” antibiotics as “weapons,” and physicians and pharmacists as “generals” engaged in “counter-attack.” An infectious diseases physician described his understanding of the scene:

Microorganisms have been around and existed much, much longer than humans have, and so they’ve had a long time to develop both weapons to fight other organisms and also defense mechanisms to combat and survive. So, there’s been really just millennia of natural selection and evolution of microorganisms. It’s a continuation of the process. That’s where you have to start the conversation with antibiotic resistance, is that bacteria are smart. They reproduce quickly, and they’re able to adjust their genetics to be able to survive, they’ve honed that skill for much longer than we have. They’ve been around since before we were able to master the creation of antibiotics. We’re talking about a formidable type of organism.

Another infectious diseases physician describes the pressure and potential benefits of selecting the right antibiotic weapon:

We want to try to preserve the organisms we want to keep. It’s like the atomic bomb versus a single sniper bullet. Sometimes you need an atomic bomb. Sometimes you need a sniper bullet. It really depends on the situation. There isn’t one ideal weapon because of that diametric issue. We’re always looking for broad stuff when someone is really sick and we don’t know what’s going on. And then once we do know, we want something as narrow as possible, like a single bullet.

In the contexts above the antibiotic is a “weapon of warfare.” But in other contexts, like other medicines, antibiotics are healing, objectified (van der Geest and Whyte 1989; Whyte, van der Geest, and Hardon 2002). However, seen in broader context, the use of antibiotics enacts a strategic defense against ever-evolving microorganisms that attack, threatening to kill and wreak havoc (see Chapter 5 for an application of this logic to the national policy of antibiotic stewardship). “Magic bullets” as a descriptor thus captures the violent use of antibiotics as “killing machines” while simultaneously communicating the wonder with which antibiotics can
heal or save a patient. Infectious diseases physicians and pharmacists are particularly adept at the language of antibiotic resistance due to their membership in the specialty, the epistemic culture of infectious diseases.

**Fearful Affects**

Hospitals are an affective infrastructure (Street 2012) where the space reflects local, personal, and national perspectives that coalesce and prime individuals for action (Thrift 2008). Street (ibid.) shows how a hospital in Madang, Papua New Guinea, elicits hope and disappointment in locals that are uniquely tied to the post-colonial anxieties of the moment in the country. In this case, I argue that the American hospital elicits both hopeful confidence in the strength of biomedicine and national prowess and fearful affects surrounding the rapid, uncontrollable spread of contagious disease (i.e., of “bugs”). Indeed, hospitals have a history of being theorized as small societies (Caudill 1958, Goffman 1961) that mirror larger societal concerns and mechanisms of order and control, and so our fear of germs (Tomes 1998) is manifested and perhaps heightened in hospitals where the spread of antibiotic-resistant infections is rampant.

This chapter discusses the way that antibiotic resistance is conceptualized and engaged among hospital-based physician practitioners, the media, and policymakers in the United States. I show how the global problem of antibiotic resistance pits hope and security against a post-apocalyptic future in which all antibiotics are useless tools.\textsuperscript{33} Though the languages of antibiotic resistance

\textsuperscript{33} There are already highly-resistant strains of bacteria for which no antibiotic is effective. However, the fear of a post-apocalyptic future is one where these highly-resistant strains constitute a majority of bacterial infections. We are a long way from this future, though it is approaching.
are pervasive internationally, and it is certainly true that the problem of antibiotic resistance is not uniquely American, the specific linkages between a national history of warfare and the fear-based mindsets regarding contagion reflect a mixture of power and vulnerability (cf. Masco 2014) that comes together often in today’s United States. For a nation that prides itself in military prowess, the right to bear arms, and continuous involvement in global conflicts, the threat of infection constitutes another challenge to be dominated.

From being in involved in the major wars of the 20th century to being seen as a world leader, the United States is risk averse, including in reference to our sentiments surrounding contagious disease. Anthony Giddens (1999) and Ulrich Beck (1992) have argued that while there is an acceptable level of risk encountered as an everyday part of life, today’s societies are exposed to additional risk encountered in the pursuit of modernity (e.g., pollution, new infectious diseases exposures). How society mitigates risk depends on factors such as class structures and forms of government. Here, I engage the United States as representing a modern form of risk society as described by these authors, arguing that the size of the threat related to antibiotic-resistant infections informs the milieu surrounding risk aversion behaviors that end up being fear-based. This chapter introduces the backdrop for much of the contemporary discussions surrounding the problem of antibiotic resistance, and as such I aim to answer the questions: How did we get here? What understandings of antibiotic resistance do hospital-based practitioners share?

Physician sentiments surrounding antibiotic resistance are connected to broader public affects related to contagion, contamination, and bio(in)security. I draw on the concepts of affect and security to highlight a certain and particular kind of sentiment surrounding microbial threats that is imbricated in everyday life. This chapter does not discuss additional possible affects that shift
the understandings and perceptions of physicians. For a closer look at other social dynamics and the cultural milieu of hospital-based antibiotic prescribing, see Chapters 3 and 4. I use this chapter to focus on one particular affect inflected with fear and anxiety indicative of the current moment of antibiotic-related crisis. Along with Masco (2014), I argue that a national affective infrastructure (cf. Street 2012) is constructed in individuals (and particularly, physicians) that works towards national security (and here, security from contagious microbes). The infrastructure informs on affects that are both mundane feelings and anticipations of doomed futures, drawing on both the ordinary (Stewart 2007) and fearful (Masco 2014) elements of daily life: infrastructure refers “not only to the material structures that support social life in complex urban societies but also to the imaginative and affective contexts that enable fear to be nationalized on specific terms…(working to) reveal the priorities of a given historical moment” (2014:28).

I argue that the affects in this historical moment, surrounding a fear of contagion and perhaps heightened in the age of antibiotic-resistant “superbugs,” inflect physician practice in that they streamline understandings of the potentiality of infection as dangerous and threatening. By altering the assessments physicians make about the patient (i.e., if they actually have an infection), affects surrounding antibiotic resistance actually raise the stakes of antibiotic use, while also increasing the drive to combat antibiotic resistance via more antibiotics. Antibiotics are regularly prescribed too early, too often, and for too long. These actions drive up levels of

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34 In the medical literature the overuse of antibiotics has been linked to “fear-based prescribing,” (Broom and Broom 2018, Szymczak and Newland 2018) which it has been argued arises from the fear of poor individual outcomes and the threat of legal proceedings in addition to the fear of antibiotic resistance complicating patient pathways.
antibiotic resistance, ironically necessitating additional use of broad-spectrum and multiple combination antibiotics to cover ever-more-complex “superbugs.” As such, the fearful affects surrounding antibiotic resistance create a milieu in which physicians operate with an affective infrastructure priming them to identify and target threats.

The ethnographic data in this chapter show that physicians have a heightened awareness of the fearful affects surrounding microbial threats. The non-specialist physician often does not have an elevated understanding of antibiotic resistance, such that there is a schism between infectious diseases practitioners (e.g., antibiotic resistance experts) and other antibiotic-prescribing physicians (e.g., hospitalists, surgeons, intensivists). The way in which threat language is folded into existing semantic networks is of note in this chapter. Despite the various differences among hospital-based physician groups, the continuous exposure among all physicians to antibiotics through daily antibiotic selection, dosing, and duration conversations gives an entrée into the affective world of antibiotics. Merrill Singer (2015) has said that infections are “good to communicate with,” in that they have social utility that can guide actions towards certain disease-carrying individuals. These types of metaphors and underlying fears are pervasive in the hospital setting. Though they are often more cautious in their use of antibiotics, even physicians who are highly qualified in infectious diseases practice utilize the metaphors and affective language of microbes and warfare, demonstrating how pervasive these conceptual framings are. However, while the infectious diseases physician and pharmacist criticize other physicians’ tendencies to “throw in everything but the kitchen sink” to combat antibiotic-resistant infections,

35 Though these logics, Singer (2015) notes, go back to Claude Lévi-Strauss (1974 [1958]) and the styles of symbolic communication.
I argue that the actions of non-infectious diseases physicians are not irrational as they are framed by antibiotic stewardship policy (see Chapter 4).

As I will describe further below, fearful affects construe the perception of infectious diseases threats in the hospital setting and make additional and unnecessary prescription of antibiotics an attempt at combating antibiotic resistance. Indeed, overuse and misuse of antibiotics does not happen because the physician is actively thinking through the logistics of a planned, strategic “war on antibiotic resistance.” Rather, the overlay of being against the “enemy” and doing whatever is fastest and most potent in the moment suggests that affective infrastructures color physicians understandings of the hospital space and the patient in front of them. In many ways, we are in an era of indiscriminate use of the antibiotic “weapon,” much akin to the proliferation of talk related to the use of nuclear weapons at the end of World War II, and subsequent use of nuclear weapons ending the war (Masco 2014). I first describe what the media’s representation of antibiotic resistance is before moving on to American societal understandings related to the fear of contagion. By giving a history of what I call a fearful national affect, I am able to explain how the practice of hospital-physicians at my fieldsite is inflected with affective infrastructures (Street 2012) that highlight the fear and tension surrounding antibiotic-resistant infections.

**Antibiotic Resistance in the Public Eye**

_The time may come when penicillin can be bought by anyone in the shops. Then there is the danger that the ignorant man may easily underdose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant._

_-Alexander Fleming, 1945 Nobel Prize Acceptance Speech_

In 1969, a major report on the use of antibiotics in animal husbandry and veterinary medicine was published in the New York Times (Swann et al 1969). The focus in the media was later
reinvigorated at the turn of the century (Wilson 2004). In this more recent era, the representation of the antibiotic resistance problem has expanded to include a plethora of books written for popular consumption, such as:

- Superbug: The Fatal Menace of MRSA by Maryn McKenna (2010)
- Missing Microbes: How the Overuse of Antibiotics is Fueling our Modern Plagues by Martin Blaser (2014)
- Superbugs: The Race to Stop an Epidemic by Matt McCarthy (2019)

There is the language and metaphor of antibiotic resistance that hospital-based physicians and pharmacists utilize in everyday practice. But capturing physician and pharmacist shop talk is only part of the picture. In fact, the language of contagious threats and the fear of germs (Tomes 1998) can also be found represented in the media coverage of infectious diseases outbreaks. The fearful affects are still present, but are simultaneously simplified and clarified. Simplified because one “target,” one “enemy,” is identified: microbes. Clarified because links that cannot be made in the medical setting (i.e., person encounters “superbug” and ends up in the hospital for treatment) are made visible in newspaper articles. Antibiotic resistance, as it is represented in the media, is a disaster waiting to happen. But when it comes to specifics, media representations often do not go further than conveying that a “threat” looms. As Brian Massumi (2005) has described, threats have a certain indeterminacy that leads to apparent causalities in the present:

A threat is unknowable. If it were known in its specifics, it wouldn’t be a threat. It would be a situation – as when they say on television police shows, “we have a situation” – and a situation can be handled. A threat is only a threat if it retains an indeterminacy. If it has a form, it is not a substantial form, but a time form: a futurity. The threat as such is nothing yet – just a looming. It is a form of futurity yet has the capacity to fill the present without presenting itself. Its future looming
casts a present shadow, and that shadow is fear...Threat is a futurity with a virtual power to affect the present quasicausally.

For example, the newspaper headline “Dirty endoscopes36 blamed for “superbug” outbreak” (NBC, 2014) clearly links the exposure to the infection. This level of clarity is rarely found in everyday practice at medical institutions, and can lead to some physicians underselling the problem of antibiotic resistance because of the complicated pathways that infectious diseases take. The message is clear in terms of placing blame (i.e., dirty endoscopes), and it communicates to individuals what the “appropriate” pathways are to avoid infection (i.e., be clean). However, blaming endoscopes for “superbug” outbreaks is missing a key piece of the picture. The “superbug” wouldn’t even be on the endoscope if it weren’t for the overuse and misuse of antibiotics. Through a clarified retelling of outbreaks in media outlets, antibiotic resistance is eschewed and the threat, while it might appear clear, is actually obfuscated. It is the language of threat that suggests swaths of germs are out there, aggressively waiting to “attack.” The specifics of what made the endoscopes dirty, where the “superbugs” came from, keep the media’s representation at the level of threat, an indeterminacy.

The media coverage of antibiotic resistance does not lead to balanced and thoughtful acknowledgement of the responsible parties in the crisis of antibiotic resistance (cf. Collins, Jaspal and Nerlich 2018). Beyond what the impact of the media coverage is on our cultural consciousness, crisis sells in coverage of the problem of antibiotic resistance. Post-apocalyptic futures (cf. Cohen 1992, post-antibiotic era). Fear. This is not a new phenomenon. Alexander

36 A plastic tube used to perform endoscopy, an examination of the digestive tract.
Fleming and various other scientists warned of the dangers of antibiotic resistance (Podolsky 2015).

Additionally, and in response to these concerns from the scientific and medical community, newspapers published extensive warnings regarding the rise of “superbugs” in the mid- and late-20th century (Garrett 1994; see Figure 13). The figure reflects increasing overlap in crisis talk surrounding antibiotic-resistant infections and a pre-existing and related fear of contagion. In the case of “superbugs,” the menace becomes not only pathogenic but aggressive, dominant, and unstoppable, representing an out-of-control version of infectious disease that threatens to overpower and eradicate. The history of media coverage of antibiotic-resistant infections shows the ubiquity of the language of threat, the use of metaphors, and the cultivation of a fearful affect surrounding contagion.
Finally, unlike any time in recent history, there is much opportunity today for the public to be exposed to talk about microbes and the microbiome. What was once invisible is now being highlighted in museums, films, and alternate forms of media. The Micropia Museum in Amsterdam, Netherlands, is an example. Micropia, the Museum of Microbes, opened in 2014. Visitors to the museum website are greeted with the following poem:

You can’t see them, but they’re here.
They are on you. In you. And you’ve got more than a hundred thousand billion of them.
They’re with you when you eat, when you breathe, when you kiss.
They are everywhere. On your hands. And in your belly.
And they meddle in everything.
They shape your world:
what you smell, and what you taste;
whether you get sick, or get better.
They can save us or destroy us.
Microbes: the smallest and most powerful organisms on our planet.
We know very little about them,
but can learn so much from them.
About our health, alternative energy sources, and much more.
When you look from really close,
a new world is revealed to you.
More beautiful and spectacular than you could ever have imagined.

https://www.micropia.nl/en/visit/what-is-micropia/museum-microbes/

Micropia promises a new view of microbes while acknowledging the power and destructive potential of organisms. “You can’t see them, but they’re there” suggests an appreciation and underlying fear of the tiny microbe. The perspective presented at Micropia may represent a new direction for media coverage of antibiotic resistance. Indeed, research on the microbiome is increasingly discussed both in the scientific and medical community and the broader public. However, it is clear from the focus of the national public health agencies and government direction on the subject that obsession and fear over contagion and “superbugs” is not going away. Recent policies and interventions suggest that the war against antibiotic resistance is accelerating in light of the expanding list of urgent threats proposed by the CDC.

Fear of Contagion in the United States

Mary Douglas, in her seminal text *Purity and Danger* (1966), describes dirt as “matter out of place.” Dirt is cultural, to be dirty is a judgement and a problem to be remedied. In contrast with the recent scientific assertions claiming dirt and germs are good for microbiomes, there is a long history of fearing contagion as it has been thought to represent immorality and misconduct (see Johnson 2006, for example). The linkages between destitute communities and infectious diseases relate to the inability to ensure clean surroundings and secure access to healthcare should
exposures arise. Certainly, exposure to dirt and germs can happen anywhere. After all, we are made up of microbes. However, because microbial geographies (Wald 2008) introduce an imprecise link between neighborhoods or groups of individuals and outbreaks of disease, the fear of contagion begets separation for the purpose of protection.

By not living, working, or traveling near poor neighborhoods, an individual could presumably avoid contagion according to societal understandings of the spread of germs. Therefore, the movement of peoples becomes of interest in relation to the presumed dangers of contact with poor or underclass individuals. Thus, people believe that avoiding those individuals ensures purity, health, and vitality. It is in this way that actions of the state such as immigration policy and war are connected to the cultural foundations of infectious disease risk, acquisition, and treatment. Speaking about the classic case of Typhoid Mary, Priscilla Wald writes,

“Characteristic of all of these papers are the allegations concerning the nature of immigrants’ (unfamiliar) microbes, their mobility, the squalor in which they lived and their irresponsible

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37 Colonial anxieties over the freedom and movements of “Others” quite literally colors the landscape thought to be risky and dangerous (see Said 1978 on imagined geography). Therefore, not only is fear related to the colonizing microbe (the “bug”), it is extended to racialized “Others” who should not be colonizing based on pervasive, colonial stereotypes (see Ahmed 2004 on bodies that fear). In the United States, there are numerous examples of infectious diseases outbreaks that became associated with a particular race, ethnicity, gender, sexual orientation, profession, or country of origin (for example, see Tomes 1998), falling along commonplace societal divides.

38 Mary Mallon, commonly referred to as “Typhoid Mary,” was an Irish domestic servant living in New York in the 1880s. In an example of early investigations in epidemiology, Mary was found to be tied to typhoid outbreaks affecting several wealthy families along the East Coast of the United States. Mary was submitted to testing for the bacterial illness, which she was found to be a carrier for, and subsequently was sentenced to live in quarantine at Riverside Hospital near Riker’s Island. The hospital was were Mary eventually died in 1938, surrounded by lepers, drug addicts, and immigrants with diagnosed illness. For additional details, see: Singer 2015, Leavitt 1996, and Wald 2008.
habits, all of which, as the story of Typhoid Mary demonstrates, contributed to new theories about social responsibility, social interactions, and social spaces” (2008: 128). Central to the conceptual linkages here is the idea of communicability, that through contact, conversation, or engagement, an individual could become contaminated with disease.

The fear of the “other” greatly contributes to the milieu of disease risk. Disease and war have always gone hand in hand, and the fear of contamination becomes palpable in national policies of immigration (Wald 2008). The American public live in a cultural context full of fear and surrounded by dangerous futures, the threat of a future, as yet to be determined, pandemic (Caduff 2008). Antibiotic resistance provides crisis scenarios including a post-antibiotic era (Cohen 1992) or the end of antibiotic effectiveness and the beginning of the reign of “superbugs.” Mimicking the widespread panic at the outset of disease epidemics, the public awareness of “superbugs” rests with the sometimes correct assumption that the “superbug” is lurking around the corner, ready to attack. National leaders have utilized this rhetoric over time (Reimers 1998, see Figure 14), a most recent example in the suggestion that asylum seekers were bringing infectious diseases like tuberculosis and hepatitis C into the United States.

Former Maine Governor, Republican Paul LePage, warned that asylum seekers brought with them “ziki (sic.) flies,” (Bell 2016) a reference to the international Zika outbreak spread through mosquito bites. Between the national leaders spewing hateful stereotypes over immigrants and asylum seekers, and outdated cultural notions of how diseases spread, a fear of the “other” is born. It is out of this context that we have the emergence of the “superbug.”
Figure 14. Frank Beard, “The Stranger at our Gate.” Credit: Daniel Okrent (2019: vi). Originally published as The Stranger at our Gate. 1890. *The Ram’s Horn*. Chicago, IL: Ram’s Horn Press.
Viral pandemics (Caduff 2015; MacPhail 2014) such as the numerous strains and subtypes of influenza (e.g., H1N1, swine flu; H5N1, bird flu) are what many think of in relation to contagious outbreaks of infectious diseases, (e.g., viral panic, Herring and Lockerbie 2009: 179). Even metaphors related to infectious diseases outbreaks tend to highlight viral pathogens (e.g., going viral). Though there is overlap in the media coverage of viruses and bacteria, “superbugs” tend to be bacteria, not viruses. The problem of antibiotic resistance is therefore closely related to the overuse and misuse of antibiotics that would be effective in cases of infection caused by bacteria, not viruses. Bacteria being as significant as it is to the global spread of “superbugs,” epidemiologists have traced the spread of specific strains and subtypes venturing into the United States. Three antibiotic-resistant threats provide an example of the continued adaptation of resistant strains of infectious diseases.

First, *Neisseria gonorrhoeae* is one of the most common sexually transmitted diseases in the world today (CDC 2019b; Unemo et al. 2014). Previously *Neisseria gonorrhoeae* was susceptible to fluoroquinolone antibiotics (e.g., ciprofloxacin, levofloxacin). The CDC no longer recommends the use of fluoroquinolones for *Neisseria gonorrhoeae* (MMWR 2007) due to widespread resistance. Currently *Neisseria gonorrhoeae* is showing resistance to cephalosporins (e.g., cefixime, cefuroxime axetil) as well as isolated reports of resistance to the last-resort antibiotic colistin (CDC 2019c). *Neisseria gonorrhoeae* is also one member of the syndemic (Singer 2009) sexually transmitted diseases that include syphilis, chlamydia, and HIV/AIDS (CDC 2019b). As such, highly resistant *Neisseria gonorrhoeae* has been confirmed by healthcare leaders internationally, who have called the situation their “greatest fear” (Bever 2019).
Second, carbapenem-resistant Enterobacteriaceae (CRE) are a family of germs (CDC 2019c) that are becoming resistant to the class of antibiotics called carbapenems (e.g., meropenem, imipenem). New Delhi metallo-beta-lactamase 1 (NDM-1) is a protein product that allows bacteria to produce enzymes (carbapenemases) that limit the activity of carbapenem antibiotics (Moellering 2010). In 2008, NDM-1 was first discovered in a Swedish patient of Indian origin who had traveled to the Indian subcontinent and there contracted a urinary tract infection (ibid.). In this first discovery, NDM-1 was found to be resistant to all known antibiotics except colistin (Kumarasamy et al. 2010). Since 2008, NDM-1 has spread across the world. It took less than two years for NDM-1 to be isolated in the United States (MMWR 2010). In response to news of an outbreak of NDM-1 at a Rhode Island hospital that sickened two individuals (MMWR 2012, see Appendix A for full report), journalist Maryn McKenna posed a question at the end of a post on her Wired blog series (2012):

These grave antibiotic-resistance factors are continuing to come across US (United States) borders (when they don’t arise here to start with). If we can’t detect them and stop them, then hospitals are going to have to be more reliably rigorous in containing them. Any hospital will tell you that they already take infection prevention seriously. What else will they have to do – and how much more will it cost?

CRE have since been added to the list of urgent (microbial) threats on the CDC website (2019c), and former director of the CDC Tom Frieden has called the CRE “superbug,” in particular, “nightmare bacteria” (NPR 2013). In the midst of infectious diseases outbreaks, specialists (e.g., infection control, infectious diseases) are grappling for ways to prevent the demonstrably rapid spread of “superbugs” like CRE (for example, Won et al. 2011). Still, action at the national level guides the distribution of resources for the study of antibiotic resistance in all its forms. The assemblage of public fear of contagion and media coverage of outbreaks and “superbug” risk
filters both into national policymaking on the topic and down through to everyday practice at the individual institutional level.

Third, *Mycobacterium tuberculosis* (TB) is a bacteria discovered by Robert Koch in 1882 (Daniel 2006). The Bacille Calmette-Guérin vaccine is given to infants and small children in countries where TB is common, and left untreated TB results in severe lung complications and eventual death. As of the discovery of streptomycin (1944) and isoniazid (1952), there is a treatment regimen for TB (Daniel 2006). However, TB is a classic case of a re-emergent disease (Barrett et al 1998) that was historically significant and due to the effects of global inequality on antibiotic resistance has returned again. There has been a rampant increase of prevalence where testing and treatment have fallen behind, as Erin Koch (2013) demonstrates in her ethnography of TB in post-soviet Georgia. In an age prior to TB therapy, afflicted individuals would be quarantined to sanatorium along with polio sufferers and the mentally ill (Singer 2015).

Quarantine is still an important measure in stopping the spread of TB, a primarily airborne disease (Daniel 2006). Particularly in the United States where children are not vaccinated against TB because it is not endemic, cases of TB are treated with extreme caution including public health notification measures for any active case. The CDC (2016b) describes two levels of antibiotic resistance to TB therapy, multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB).

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39 At Frontier City Medical Complex I witnessed ten suspected cases of TB and three confirmed cases. Each case was linked to either homelessness in the United States or recent international travel. Whether suspected or confirmed, each case was treated with extreme caution. Dr. Han, an infection control leader at University Medical Center, regularly monitored the gowning and gloving procedure of every team member. This included instances when he instructed a resident to clamp down the nose strips on the respirator mask and when he quickly reminded a physician fellow to wait for every team member to have their mask fully administered before opening the door to the patient room.
resistant TB (XDR-TB). Antibiotic-resistant TB is variably resistant to most therapeutic options, including isoniazid, rifampin, fluoroquinolones (class), amikacin, kanamycin, and capreomycin.

Of special concern is TB infection in an individual already immune-compromised, such as an HIV-infected individual (CDC 2016b). The World Health Organization (WHO) has published a yearly report in TB since 1997, recently doubling down on the message to #EndTB (WHO 2019). TB is continually referred to as a “global threat” in the scientific community (Pace 1999; Nachega and Chaisson 2003), with no clear end in sight to the pandemic.

The Imagined Future

Imagined futures guide the everyday, present conditions of practice for physicians such that their actions and decisions exist in temporal imbalance. Anthropologist Cheryl Mattingly (2014) describes the relationship between imagined futures and hope in her research on the families surrounding an ill patient and their encounters with the medical system. Mattingly argues that hope is a paradoxical border practice, that families who hope when the prognosis is grim are engaged in multiple contradictory narratives. Thus, the imagined future is both hopeful (i.e., that the family member might survive) and hopeless (i.e., that the illness takes over). The continuous threat of antibiotic resistance presents to physicians a similar struggle. The post-antibiotic era (Cohen 1992) has already arrived in the sense that some antibiotic-resistant infections do not respond to even the last-resort antibiotics (e.g., colistin, tigecycline). However, physicians imagine a future that provides a counterbalance to the everyday reality of fewer options for antibiotic therapy. The physician, imbued with the hope that they can make a difference, that they can rely on antibiotics, envisions a future in which they might be able to “fight off infection” and “save the patient.” The pushing off of a post-apocalypse in the hopes that more
can be done to save the patient entails a physician’s reliance on their hopeful feelings about protecting themselves and their patients from the present and future threat of antibiotic resistance.

It is this hopeful practice that guides physician engagement with the policies and behaviors related to antibiotic resistance. In an effort to garner control over the chaos of antibiotic-resistant “superbugs,” physicians advocate for a rationalization of practice such that better communication, better diagnostic tools, and better antibiotic prescribing behavior (see Chapter 4) would give a leg up on the threat of “superbug” proliferation. The very real departments and researchers who study and enact policy that protects the United States from invasions of the microbial kind guide practice in the direction of being hopeful that “superbugs” can be kept out of hospitals and individual patients, while simultaneously playing off of the fear of contagion to garner more control over physician actions in their work environment. Andrew Lakoff and Stephen Collier (2008) state:

…“biosecurity” does not refer exclusively – or even primarily – to practices and policies associated with “national security,” that is, to military defense against enemy attack. Rather, we refer to the various technical and political interventions – efforts to “secure health” – that have been formulated in response to new or newly perceived pathogenic threats.

40 Fisher and Monahan argue that the rationalization of healthcare organizations can be understood as a “desire to impose order and logic on the chaos inherent in disaster situations” (2011: 551). Using their term biosecuritization, they describe how security and preparedness’ overt intention of protection and disaster response overshadow other effects such as oversight of movement and work patterns among practitioners. The national-level investment in information and communication technology thus impacts not only our understandings of what threats exist, but an increasingly surveilled population of practitioners.
Lakoff and Collier (ibid.) emphasize that there is overlap between the activities of national agencies such as the CDC, National Institutes of Health, and government officials and the local researchers and practitioners (e.g., in epidemiology, public health, medicine). At Frontier City Medical Complex, select infectious diseases physicians had taken on national level responsibilities in professional societies as well as national councils and policymaking organizations. As such, there is a tangible tie between the practitioner and the policymaker. Biosecurity thus reaches down to the local level, engaging individuals from all areas of practice.

Going further, Joseph Masco (2014) argues that a national security affect has become an infrastructure that is “historically produced, shared, and officially constituted as a necessary background condition of everyday life.” While Masco is referring to security in the sense of terrorist alert warnings and the nuclear war program, his description of the affect associated with national security is apropos to the world of biosecurity and protection from infectious diseases threats. In particular, the fear of the outsider can signify multiple individuals and groups or specific formations of microbial life (see above). Additionally, suggesting that national security affect is an infrastructure entails recognizing the affect-laden ways in which people live day-to-day life (Street 2012).

The fearful affect can be triggered with the slightest suggestion at a threat coming to life. For example, Masco writes “certain kinds of fear are now coded into social life as potentials that can be triggered by small events – fear of the unattended suitcase at the airport, for example – or directly recruited by official statements, such as terrorist alert warnings” (2014).

The national security affect of antibiotic resistance appears in the everyday practice of physicians in a heightened awareness that their prescribed therapies may not work against an all-powerful
antibiotic-resistant infection. Thus, regardless of whether or not an infection is antibiotic-resistant, many physicians begin broad-spectrum therapy to avoid the threat that if the infection has not been taken care of (i.e., the bacteria killed), the physician and hospital at large will have a situation on their hands.

At Frontier City Medical Complex, the indeterminant threat affects the present “quasicausally” (Massumi 2005). Day-to-day, physicians in the surgical intensive care unit (SICU) operated with the awareness that an infectious diseases outbreak could shut down their unit, even though such a situation is extremely rare. Though SICU patients were very sick, and often did have antibiotic-resistant infections, only twice during my fieldwork did infection control conduct a study of an outbreak that contaminated multiple patients (e.g., with NDM-1 and with Clostridium difficile). Still, these rare situations were taken to signal the vulnerability of a dark future that physicians (and their patients) are susceptible to given continued growth of antibiotic-resistant “superbugs.” Physicians lose grounding as to whether we are already in that future or even whether it is likely, and consequently, underlying fearful affects rise to importance like bubbles racing up to the surface (cf. Stewart 2007).

During my participant observation in the surgical intensive care unit (SICU), I made note of the following interaction that demonstrates 1) an awareness among physicians of the threat of antibiotic resistance, and 2) an infectious threat unfolding in the midst of underlying fearful affects that heighten the response to infection control measures.
8am. Waiting in the work room for Dr. Novak. The rounding team was now familiar with Dr. Novak, if they weren’t before. This is a physician who interrupted a physician’s assistant student attempt at presenting a patient to tell him that he was wasting the entire team’s time by not getting the details correct. Not only that, she gave the student estimates of just how much time she was wasting when she counted out loud each medical professional who was listening to her screw up this presentation. Dr. Novak was a difficult personality. But she was also a woman surgeon in a male-dominated profession. She was extremely qualified and respected by her peers. Today, Dr. Novak was in the work room less than a minute. “Let’s go, let’s go!” she motioned to the door. We had started rounds by 8:05am.

I had been rounding with this team the entire week. I knew that I would have to have read the list before rounds to understand what was happening, this team just got things done. We breeze through the first three patient rooms, quick checks and Dr. Novak’s approval of the recommendations. We stop at Mr. Taylor’s room. Mr. Taylor is a 48 year old male in the SICU for 1 day after a hip disarticulation and amputation. He has almost every infection you can name that has a common acronym associated with it: MRSA, Vancomycin-resistant Enterococcus (VRE), Extended-spectrum beta-lactamase-positive Escherichia coli (ESBL E.coli), Multi-drug resistant (MDR) Acinetobacter, and CRE. Consequently, Mr. Taylor is under the most stringent of infection control measures known as contact precautions (i.e., gowns, gloves, and special handwashing requirements). The resident moves their computer-on-wheels to be facing the group, she is prepared to give the presentation for this patient. But she doesn’t get a chance to start her presentation.
Dr. Novak looks at her notes briefly and then almost jumps into the center of the circle. “Listen to me,” she says. “This is a societal threat. If I see any of you go into that room without full (contact) precautions on, I WILL report you to infection control. This is serious. If I see that happening, I will take down names.” She looks around, conveys the seriousness of the matter. “Because this patient can take us down. He can take us all down, this whole unit. I’m serious.”

The residents are sufficiently taken aback. The resident gives a quick introduction to the patient and we all begin silently to put contact precautions on for going in the patient room. Dr. Novak threatens them again, “If you (she points at a resident) go in without a gown, if you forget to take your gown off, if you don’t wash your hands, any of that happens and we’ll have a situation on our hands.”

The interaction I observed with Dr. Novak is rare, yet it brings to the fore affects surrounding the threat of antibiotic-resistant “superbugs” that impact physician practice and occasionally reveal themselves in instances where a threat is at risk of becoming a situation. As such, it is Mr. Taylor’s role as a border case that makes it interesting ethnographically. Mr. Taylor was infected, like a multitude of other patients in the SICU. However, Mr. Taylor was infected with multiple MDROs, which made the likelihood that a threat would turn into a situation increase exponentially. Dr. Novak’s fear of an outbreak of multi-drug resistant organisms (MDROs) in her SICU was manifest in her hearty and altogether unusual (in content but not in character) outburst of warning.

Typically, physicians at Frontier City Medical Complex might give a bleak warning, or even consider that their notes in the chart of which MDROs are present would be enough to engage
properly wary behavior from residents. In other words, the acknowledgement that the threat exists is present in infection control measures, note-taking in the electronic medical record, and significantly, it can be seen in the overuse of broad-spectrum antibiotics as a first line of defense in patient cases. Physicians’ actions thus operate with the indeterminate threat in mind, and in the case of a situation arising, their affects overwhelm to heighten the fearful context in which Dr. Novak is operating. Here, the structure of surveillance and population monitoring put in place at the national level filters down to local practice such that Dr. Novak’s fearful affect becomes visible through her emphasis on isolating Mr. Taylor and protecting other patients from “superbugs.” In a setting where securing health not only signals preserving but also restoring health, “superbugs” are a particular form of menace that prevents and complicates patient health trajectories. In the SICU at Frontier City Medical Complex, such is the case: fragile patients out of surgery but not yet healthy enough to be transferred to the main floor are at risk of being invaded by MDROs. Dr. Novak was acutely aware of the frontier that is the SICU. Through her actions, Dr. Novak connected with her residents in a kind of affective infrastructure (Street 2012) being inculcated in the passing on of information on what constitutes “appropriate” medical practice.

**Exposing Vulnerability**

During my research at Frontier City Medical Complex, hospital-based physicians overused and misused antibiotics daily. Fear-based prescribing (Broom and Broom 2018, Szymczak and Newland 2018), along with other social dynamics (see Chapter 3), guides hospital-based physicians such that their felt vulnerabilities rise to the surface. For infectious diseases physicians, specialists in antibiotic use who sometimes also perpetuate shop talk that displays a
fearful national affect, the effects of the affective infrastructure (Street 2012) are time-consuming and annoying. The following scene is commonplace:

Dr. Rivia, an infectious diseases physician, was talking to the fellow, Jennifer. Dr. Rivia did not understand why a patient was on vancomycin and Zosyn for a third day. The patient had other medical issues leading to their admission to the intensive care unit, the concern for infection was added to the end of an already long list. She runs through some questions with Jennifer:

Dr. Rivia: Have they drawn cultures?
Jennifer: No.

Dr. Rivia: Why did they start the antibiotics?
Jennifer: They were worried about infection. They said lungs.

Dr. Rivia: When do they plan to stop?
Jennifer: They didn’t give me an answer. It doesn’t seem like there is a plan in place.

Dr. Rivia was flustered. They decided to call the attending physician. Jennifer handled the communication, asking questions about the indication for antibiotics and the plan for continued therapy. The physician listens as Jennifer suggests making sure cultures were taken so that the need for antibiotics can be properly assessed. The physician listened, then asked, “Can we just leave it on for one more day?” The physician was uncomfortable with not having the antibiotic
on board for the patient despite no proof that an antibiotic-resistant infection was present.

Jennifer looks at Dr. Rivia, then reluctantly nods, “One more day.”

Anthropologists have pointed out that the actual risks of exposure to catastrophic infection are low in comparison with the high levels of fear felt and reflected in a national biosecurity affect (Ahuja 2016; Chen and Sharp 2015; Masco 2014). Even with antibiotic resistance, the chance of acquiring an antibiotic-resistant infection that is not responsive to any antibiotic is low. Yet, as Chen and Sharp (ibid.) have argued, the immense media coverage and corresponding national security measures (e.g., departments, reports, surveillance) regarding infectious diseases and the risk of infection inevitably alter the landscape of global health and disease. Dr. Novak and her team of resident physicians demonstrate the motivated action and intense vulnerability that individuals can have given uncertain exposure to “superbugs.” In this case, simply the awareness of extra infection control measures put in place to protect the hospital and other patients leaves the patient, Mr. Taylor, less likely to be visited frequently by his caretakers. Similarly, Dr. Rivia’s patient was put on broad-spectrum antibiotics for several days without evidence that the patient needed such broad coverage. In fact, there were no cultures taken to demonstrate that an infection was present. The physician who prescribed antibiotics was comfortable utilizing antibiotics “just in case” the patient had an infection.

While biosecurity speaks to attempts to try to keep antibiotic-resistant infections away, out of sight, as I am utilizing it here bioinsecurity speaks to the shudders felt by physicians when antibiotic-resistant infections are close, possibly right in front of them. In terms of impacting the practice of hospital-based physicians, bioinsecurity represents their need for surveillance and
control mixed with underlying fearful national affects harkening back to our societal fear of germs.

Drawing inspiration from Ulrick Beck’s *Risk Societies* (1992), Chen and Sharp (2015; cf. Ahuja 2016) call the effect of the proliferation of biosecurity measures and mentalities bioinsecurity. Focused on the institutionalized consequences and everyday impact of the “imaginative work that informs anxiety and fear,” (ibid.) bioinsecurity can be found in those neglected, ignored, or treated differently because of underlying fears and assumptions made about a catastrophic future. In the case of antibiotic resistance, I argue that heightened scenes of infection control and “superbug” outbreaks influence the practice of individual physicians such that patients are treated based on the level of risk associated with their infection or exposure to microbes. By altering the perception of physicians, the threat of “superbugs” forces physicians to operate as if every MDRO is highly contagious and is actively trying to be spread to other patients and practitioners.

In heightened retellings, a “superbug” lurks just behind the corner, or in the next patient’s room. By shifting understandings of the looming threat of “superbug” invasion, fearful affects may, in fact, lead to increased antibiotic use. Physicians may think: Why not engage in a preemptive strike (Masco 2014)? Why not try to protect everyone from the threat of an antibiotic-resistant infection? As I did observe countless examples of overuse and misuse of antibiotics during my research, I suggest that an overestimation of the problem and an affective infrastructure representative of the combative American response to threats may lead physicians to be quick to draw and nervous to peel back antibiotics.

**Conclusion**
This chapter started with a description of how physicians talk about antibiotics, antibiotic resistance, and infection. I use their descriptions as a basis for discussing the representations of “superbugs” and antibiotic resistance in the public eye. Overall, I show the metaphors and affects surrounding antibiotic-resistant infections and make the argument that how physicians talk about antibiotics and what they worry about in terms of infection shines through in their professional practice. I argue that our fearful national affects inform how physicians prescribe antibiotics, and specifically how physicians prescribe antibiotics in cases where no infection has been confirmed present. Drawing on the concepts of affective infrastructure (Street 2012) and national security affect (Masco 2014), I make a space for discussing how the local, personal, and national coalesce to form a backdrop operating within the hospital setting in the United States. I show how underlying fears of contagion force the physician’s hand in measuring up the patient case. The warfare metaphor is particularly useful here in explaining why using (more) antibiotics might be framed as a winning strategy by the physician. “One more day” is a plea for continued coverage aimed at constituting protection against contagion, even though the overarching problem of antibiotic resistance has been linked time and again to the overuse and misuse of antibiotics.

The relationship between biosecurity and bioinsecurity highlights what is complicated about the problem of overuse and misuse of antibiotics in human populations. The national concern over biosecurity situates our perception of germs, infection, and antibiotics. We identify threats based on what our understanding of the “other” happens to be at the moment, and in a contentious present involving “superbugs,” the threat becomes microbial. This organized latticework of fear colors physician’s practice such that even the potentiality of risk motivates action. Operating with an imagined future in mind guides physicians towards using antibiotics as “weapons of warfare,” and in this “war against microbes” the more destruction that can be caused the better.
Using antibiotics in a “preemptive strike” is an example of the transformation of fearful national affects, just lying under the surface, into knee-jerk reactions that come out as “war cries.” In line with scholars of bioinsecurity (Ahuja 2016; Chen and Sharp 2015), it becomes clear that there are consequences of living in a risk society. Neel Ahuja (2016) argues that the consequences might be intensified entanglements between species (e.g., bacteria and humans) that leave some vulnerable and mistreated while pouring great care into others. An “atomic bomb” approach to antibiotic use ends up leaving a whole host of consequences in its wake.

Sometimes, a “big gun” antibiotic is warranted. For example, in the rare case that a patient has an infection resistant to most antibiotics. This is the scenario that the fear of antibiotic-resistant “superbugs” is based on since the assumption is that all infection is a looming threat. Certainly, an antibiotic-resistant infection is a threat to the patient’s life as well as to the population the patient exchanges their microbes with (e.g., the patient next door, the nurse, the person sitting next to them on the bus). However, we also know that antibiotics are grossly misused and overused. Not every patient who receives an antibiotic has been colonized with or infected with a microorganism warranting antibiotics. Yet, the felt vulnerabilities and potential catastrophic futures push hospital-based physicians towards antibiotic use. Consequently, the patient who arrives in the emergency room wheezing with a fever is given several “big gun” antibiotics for the potentiality that they have an antibiotic-resistant pneumonia. This overreaction to patient symptoms arises from the fearful national affects described in this chapter.

So who is left neglected, mistreated, and vulnerable with antibiotic resistance? One might think it is the individuals who have highly-resistant infections. But I argue that an individual with a demonstrated antibiotic-resistant infection is a justifiable recipient of antibiotics. Where
vulnerability and fear come into play is with individuals who physicians think are infected (without proof). An individual with a presumed antibiotic-resistant infection (that they do not have) are given courses of multiple antibiotics in attempts to “combat” bacteria that are not present. These individuals suffer twice: not only are they recipients of courses of antibiotics that they do not need and that make them susceptible to the negative short-term side effects of antibiotic use (e.g., antibiotic-related diarrhea) without added benefit, they are also exposed to additional unnecessary antibiotics that put them at long-term risk of acquiring a “superbug” due to the drastic changes that antibiotics have on their gut microbiome. Antibiotic use is not insignificant in the individual, in addition to the impact that it has when antibiotics proliferate in the population. In conclusion, I point out what is at stake to suggest that actions engaged in for the sake of avoiding, protecting from, and fighting off antibiotic-resistant infections can have the exact opposite effect.
Afterword

Post-Ethnography Reflections

The hospital-based physicians at my field site wanted scientific progress. They wanted better testing, better information, and better antibiotics. Better testing would presumably give physicians the resources with which to pull back on antibiotic prescriptions when no infection is present. Better information could be used to create a staff of educated physicians who behaved how antimicrobial stewards wanted them to. Better antibiotics would eliminate the problem of having to use toxic last resort antibiotics thus giving humans a leg up in the fight against antibiotic resistance. However, a focus on better systems never seemed to include the possibility that even with outstanding tests, information, and antibiotics, antibiotic use might remain excessive.

There came a point during my research when I realized that every finding I had shared with the research group was framed to fit into existing models of practice. For example, I found that internal medicine resident physicians were in general underestimating their contribution to the problem of antibiotic resistance when inter-provider communication delayed antibiotic switches. Rather than address the structural barriers in place that inhibited fast and effective communication across teams, my conversations with physicians tended to lean towards education interventions. Again the message was: If only the physicians were better educated about antibiotics they could make better choices.

My impression is that these logics of better science improving medical practice overestimate the power of the individual and in doing so place additional unresolvable burden on physicians. The fact that physicians were complicit in inhibiting alternate understandings of barriers to
“appropriate” antibiotic prescribing just adds to potential reasons for physician burnout. On the other hand, what would structural change look like in the American hospital setting regarding antibiotic use? I’ve been asked this question in many different ways by many different people. Yet, my answer is still brewing but in the following pages I’ll attempt some initial suggestions.

First, the expectations inherent in research studies in the medical sciences have to change. Testing interventions and making recommendations for change are what is expected with funded research. However, I would like to suggest that the expectations inherent in research in the medical sciences disregard opportunities for investigational social science research. Social science that more accurately points to factors influencing medical practice has the potential to save millions by obviating the failure of change-focused research that starts out by asking the wrong questions. For example, so many times during my research a problem was pointed out to me (e.g., the overuse of fluoroquinolones). The research directed at this problem assumed existing conditions which were not true socially (i.e., that physicians did not realize that they were overusing fluoroquinolones). Attempted interventions focused on educating the physician so that they could then realize that they were overusing fluoroquinolones. From my perspective, this is all wrong. A basic question: Why do physicians overuse fluoroquinolones? Yet, this question was not asked and was not answered prior to research studies being started to solve the problem. I propose that there are structural foundations in medical practice that make it difficult for physicians to utilize antibiotics in a way that would seem “appropriate.” Funding agencies can help redirect this type of research by 1) encouraging the engagement of the social sciences as a part of medical sciences research and 2) relaxing requirements for outcomes and/or interventions.
Second, besides jumping past establishing shared understandings of the research problem, I propose that education as a solution to “cultural barriers” to “appropriate” antibiotic use is overblown. This focus detracts from the myriad social dynamics involved in antibiotic use which demonstrate that what is considered “inappropriate” antibiotic use cannot simply be attributed to a lack of education. Importantly, there is a difference in the meaning of a lack of education versus lack of knowledge or information. What do we mean when we say resident physicians are uneducated about antibiotic use? Do we mean that they weren’t told how to “appropriately” use antibiotics? Do we mean that they were told but that it didn’t sink in? Do we mean that they haven’t yet rotated to infectious diseases? I suggest that “education” is a black box that needs to be unpacked in order to move forward with solutions to the problem of antibiotic overuse and misuse. I have argued that it is ill-advised to have medical students make their way through to the end of their degree without engaging antibiotic resistance as a population health issue. Medical students I sat with during research frequently said that if their textbooks talked about antibiotic resistance (and by extension, antibiotic use) it was a pull out or section of a larger chapter. While this may not be true to all medical schools, and certainly it is increasingly the case that medical schools do include antimicrobial stewardship in the curriculum, it is deeply concerning that it has taken this long to be addressed as an important issue that every physician should know about. Waiting until physicians are already in residency, fellowship, or attending physicians is irresponsible given that every physician can prescribe antibiotics.

Third, many physicians do not get background education in the use of antibiotics and end up learning how to use antibiotics via the socialization of physicians during residency and fellowship. Given this systemic downplaying of the importance of understanding the harm of antibiotic overuse and misuse, I propose that physician use of antibiotics can and should be
further regulated. Though additional review and/or restriction of antibiotic use would be time consuming, I suggest that this time spent up front can both 1) provide better individual patient outcomes, and 2) reduce the overall burden of antibiotic resistance. Since I know that infectious diseases physicians might be in favor of this idea if they had extra workers on hand, I suggest that this is an issue that hospital management, rather than individual departments and divisions, should take on. Pharmacy and therapeutics committees might take this issue more seriously given the state of affairs globally in regards to antibiotic resistance. While I am not immune to the resource constraints of individual hospitals, particularly those that are community-oriented, I do think that the severity of antibiotic resistance is a known entity and more needs to be done to address our continued failures at reducing antibiotic use.

Fourth, antibiotic resistance is a demonstrably complex issue that touches every aspect of modern life. Yet, we rarely unite efforts across industries and specialties to combat the problem. If antibiotic resistance is to be taken seriously, we cannot address antibiotic overuse and misuse in human populations in a vacuum separate from the issues of animal husbandry and veterinary medicine. I suggest that leaders in the infectious diseases community could be doing more to engage in multidisciplinary and bench science research to address the regional and national spread of antibiotic resistance genes. While this effort would require collaborations across funding entities and practitioner industries, I offer the World Health Organization’s proposal of One Health as a model that might be implemented locally. I support the inclusion of social science research in this critique, and would like to argue that anthropologists could be better utilized as “cultural brokers” across various disciplines and styles of research. Understanding how to communicate and document regarding the worldwide effects of antibiotic resistance
could be a powerful tool to target the blatant disregard for population health given an individual incentive for antibiotic use.

Finally, as an anthropologist, I recommend changes to method and theory as they current exist in the discipline of anthropology. As a method, ethnography is in-depth, nuanced, dynamic, and handles complexity deftly. However, for a multifaceted and multi-sited problem with antibiotic resistance, I find that ethnography is too rigid. For example, patients coming into the intensive care unit from a long-term acute care facility often carry with them antibiotic-resistant “superbugs.” Yet physicians, and myself as an observer, never get to hear or see the full story about the acquisition of their “superbug.” Networks and spreads of antibiotic resistance do not respect the boundaries of our selected methodologies. How can we better manage sprawling research problems like antibiotic resistance within the discipline? I argue that multi-sited ethnography is not the answer. Antibiotic resistance doesn’t just exist in multiple locations, it shifts and moves on a whim. Thus, anthropological methods need to address the fast movements of antibiotic resistance genes and should be prepared to adapt to the subject of study switching from a person to a microbe to an environment.

Theory in anthropology has yet to distinguish in a meaningful way viruses and bacteria. Anthropological understandings of contagion and disease spread tend to follow the logics of a viral outbreak such as we are currently experiencing with the novel coronavirus (COVID-19). Systems critiques and terms like “outbreak narrative” needs to be probed for the potential applicability to the problem of antibiotic resistance. Because most antibiotic-resistant “superbugs” are bacterial, our understandings of “microbial time” should distinguish between types of microbes, pathogens, and infectious diseases if we are to make arguments that “stick.” I
suggest that while anthropologists tend to be savvy in their understandings of the politics of industry and economic markets, the anthropological study of the medical sciences could more thoughtfully approach expert practice and expert subjects.
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