Reflection of Didactic Learning and Shadowing Experiences in the Biomedical Science Program

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Introduction

The MMSc, in Biomedical Science program has provided me with the opportunity and guidance to develop important skills and knowledge applicable to my future as a physician. These aspects of my education were provided through both clinical shadowing experience and didactic learning. In this paper, I will touch on four areas where this program has developed my understanding of and impacted my views on healthcare. The first section will describe a specific topic I have learned about in the didactic section of the program and connect it with the clinical experiences from the program. This section will bridge the gap between the classroom and the clinic by providing application of classroom learning to real world scenarios. The second section involves framing a clinical question and delving into the medical literature to answer this question. The third section will explore the intricacies of effective communication in the clinical setting. It will cover both communication between physicians and other health professionals and communication between physicians and patients. The fourth section will discuss the social factors that affect health outcomes. This section will employ specific instances seen during the shadowing portion of the program. In the final section of this paper, I will describe how this program has affected my views toward the healthcare system. This paper will demonstrate the viewpoints and knowledge I have gained as a result of participating in the Biomedical Science program.

Clinical Application of Didactic Learning

There were multiple courses in the program that discussed the importance of hormones in regulating bodily functions. One such hormonal system that was touched upon several times was the renin-angiotensin-aldosterone system (RAAS). The RAAS is a hormonal system that acts on the kidney and systemic vasculature to regulate blood pressure and vascular tone. It regulates blood pressure by controlling sodium and water retention in the kidneys which, in turn, contributes to blood volume. Further, it regulates vascular tone through hormonal control since angiotensin II binds to smooth muscle cells in vascular walls, causing them to constrict. This system has great clinical significance due to the high prevalence of hypertension and its contribution to adverse health outcomes. It is particularly important for patients with heart failure since the worsening of heart failure can be slowed by managing blood pressure.

Heart failure is a serious lifelong condition that has a poor prognosis in many cases. Approximately 50% of people diagnosed with heart failure die within 5 years of their diagnosis. However, this timeline is affected by numerous factors. For example, the prognosis for a patient improves if their blood pressure is appropriately managed, if the condition is diagnosed early, and if they have no other medical conditions that will exacerbate the heart failure.[1, 2] Heart failure can be divided into subcategories called heart failure with preserved ejection fracture (HFpEF) and heart failure with reduced ejection fracture (HFrEF). The prognosis of HFrEF is generally worse for patients, meaning that treatment for this category of heart failure may be more aggressive to prevent adverse outcomes. Since the management of blood pressure is integral to the treatment of heart failure, the use of angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), and aldosterone receptor-neprilysin inhibitors (ARNIs) are important assets to physicians.

Medications affecting the RAAS are among the first-line options for treatment of heart failure and are highly effective. In the treatment of HFrEF, ARNIs have been found to be the most effective of the three types of medications acting on the RAAS.[3] This medication class is different from both ACEIs and ARBs in that it not only works as an angiotensin receptor blocker, but also as a neprilysin inhibitor. Neprilysin is a protein that breaks down a number of peptides that impact both fluid status by promoting natriuresis, such as B-type natriuretic peptide, as well as vascular tone, such as substance p and bradykinins. The inhibition of neprilysin, then, leads to increased fluid excretion by the kidneys as well as decreased vascular tone. Because neprilysin also breaks down angiotensin II, the inhibition of neprilysin leads to an increase in angiotensin II levels. Given the increased vascular tone that results from an increase in angiotensin II, neprilysin inhibitors are combined with angiotensin receptor blockers (administered to patients as combination pills called ARNIs) to yield a net effect of natriuresis and decreased vascular tone.

During my shadowing experience, I have seen instances of both HFpEF and HFrEF. While both cases are treated similarly, there are other factors that need to be considered when formulating a treatment plan. For example, the presence of comorbidities greatly changes how aggressively the patient is treated for heart failure. In one case, a patient had HFpEF with no other comorbidities and very few symptoms. The patient worked diligently on their diet and began to exercise after being diagnosed. In this case, this patient's requirements for pharmacotherapy were minimal. In a separate case, a patient had HFrEF with chronic hypertension caused by obstructive sleep apnea and smoking cigarettes. This patient's hypertension was worsened further by not adhering to strict diet and exercise. In this case, the physician was much more concerned about the prognosis of this patient due to the many factors

that were likely exacerbating the heart failure. Because of this, the providers chose to be more aggressive in treating the HFrEF with medications. In both scenarios, each patient was prescribed a medication that affects the RAAS if they were not already on one. While all classes of medications that impact the RAAS are effective when treating heart failure, there are still preferences on which medications should be prioritized due to differences in patient health outcomes.

According to a 2024 prospective study, ARNIs have been shown to have marginally better health outcomes compared to ACEIs when treating HFrEF.[4] This cohort study followed patients in the ICU that had HFrEF with a left ventricular ejection fraction (LVEF) of less than 50% that did not have major comorbidities like chronic obstructive pulmonary disease, severe valvular heart disease, congenital heart disease, or chronic kidney disease. The efficacy of each medication was determined by their ability to enhance quality of life (as assessed by the Kansas City Cardiomyopathy Questionnaire), improve left ventricular ejection fraction, and reduce the occurrence of major adverse cardiac events (MACEs). This study found that both ARNIs and ACEIs were reliable and effective medication for treating HFrEF. However, ARNIs had marginally better improvements in patients when it came to their quality of life and LVEF. There were no significant differences between each medication's ability to decrease MACEs. Overall, both ACEIs and ARNIs are effective when treating HFrEF and improving the prognosis of patients in the ICU.

Consulting Literature on a Clinical Question

Heart failure (HF) is a complex diagnosis that affects an estimated 56.2 million people worldwide in 2019.[5] It is a serious condition that has generally poor prognosis, however, different lifestyle factors and treatment can change the outcomes for many people. HF was a common condition that I saw many times while shadowing and I learned about many of the different types of treatment to help slow the debilitating effects that come from it. There are many medications that are useful in the treatment of HF, however, there are a handful that are considered first-line that most patients with HF will have incorporated into their treatment. Two of these first-line medications are ACEIs and ARBs. These medications work to treat heart failure by lowering the patient's blood pressure and thus load against which the heart must work ("afterload"). Chronic elevation of blood pressure forces the heart to pump against a higher gradient and subsequently causes the muscles in the heart to thicken and enlarge. If this phenomenon persists for a prolonged period of time, it can lead to HFpEF by limiting the filling time and volume ("preload") of the left ventricle due to ventricular wall thickening and stiffness. Ultimately, it can also lead to HFrEF as continued exposure to increased afterload leads to dilation of the left ventricle and decreased contractility of the left ventricular musculature.

ACEIs and ARBs work on the same hormonal system to reduce blood pressure and lower the strain on the heart. Because they both work on the RAAS, I was curious to know which one, if either, was more effective at treating patients with heart failure. I therefore designed a PICO (population, intervention, comparison, outcome) style question to answer by consulting the literature: "Among individuals with either HFpEF or HFrEF, does the use of ACEIs as compared to ARBs lead to improvement in mortality and morbidity rates?" To conduct the search, I used PubMed along with the search terms "ACE Inhibitors," "ARBs," and "Heart Failure."

In the search I found a meta-analysis that compared how well ACEIs and ARBs prevented cardiovascular mortality due to heart disease (including HF), as well as stroke, myocardial infarction, and end-stage renal disease.[6] The disadvantages were also explored for each class to gain a more holistic understanding of both medication types. The analysis found that both ACEIs and ARBs were highly effective at reducing mortality from heart failure with some studies achieving a 16% reduction in mortality with just one medication. While both ACEIs and ARBs were found to be highly effective, their outcomes were extremely similar, giving no clear evidence that one is more efficacious than the other at improving health outcomes for patients with HF. The same pattern occurred for treatment of the other prominent diseases studied. ACEIs and ARBs had nearly identical decreases in mortality for myocardial infarction, stroke, and end-stage renal disease. Because both classes of medication were so similar, the study looked at the relative disadvantages to decide which medication was a better first choice when treating patients with HF.

ACEIs generally have more adverse effects than ARBs. A primary reason for this is due to the more common common side effect of ACEIs. Angiotensin converting enzyme not only converts angiotensin I to angiotensin II, but it is also responsible for the breakdown of a compound called bradykinin. When bradykinin builds up in the body, it can lead to uncontrolled coughing, a symptom which can be frustrating for patients. Since ACEIs inhibits angiotensin converting enzyme, they are more likely to cause a buildup of bradykinin and a chronic cough. While it is less common, the buildup of bradykinin can also lead to angioedema, a potentially life-threatening swelling of the upper airway. ARBs, however, only act on receptors for the angiotensin II hormone and will not stop angiotensin converting enzyme from breaking down bradykinin. ACEIs also cause several other potential adverse effects like hypotension (low blood

pressure), dizziness, hyperkaliemia (high serum potassium levels), and increased serum creatinine levels.[7] These side effects are less important when comparing ACEIs and ARBs, however, since ARBs can also cause dizziness, hypotension, and hyperkalemia.

The comparison between ACEIs and ARBs in the first referenced meta-analysis also compared the withdrawal rates resulting from adverse events (WDAEs).[6] WDAEs occur when the medication causes injury to the patient and they must be removed from the medication. Analysis between the medication classes found that there was a statistically significant reduction in WDAEs when comparing ARBs to placebo, 32% (Relative risk of 0.68; 95% Confidence Interval of 0.54 to 0.87). Conversely, there was no statistically significant difference in WDAEs when comparing ACEIs to placebo (Relative risk of 0.85; 95% Confidence Interval of 0.67 to 1.07). This means that ACEIs were more likely than ARBs to result in complications leading to termination of the drug. Because a medication can only be helpful if they lead to a high long-term compliance rate, this comparison suggests that ARBs a better choice of first line medication compared to ACEIs, even with their nearly identical ability to decrease mortality of patients with HF.

Effective Communication in Healthcare

The efficacy of provider-patient interactions is heavily dependent on the communication skills utilized by the provider. If these skills are not properly developed, it is unlikely that a provider will be able to conduct a visit that is patient-centric and meaningful so that the patient engages in the decision making process pertaining to their own health. Without these aspects of

the visit, a physician will be less able to understand the perspective of their patient and health outcomes (especially those related to behavioral changes) will be adversely impacted.

An interaction that I experienced during my time shadowing exhibited qualities that incorporated the patient-centric model. In this visit, the patient was unwilling to receive any vaccines for respiratory illnesses like influenza, respiratory syncytial virus (RSV), pneumonia, or SARS-COVID-19. The primary care physician was worried about this decision since this patient had a history of chronic obstructive pulmonary disorder (COPD) due to their past smoking habits. This combination of risk factors meant that this patient could have much more severe outcomes compared to the average person if they were to contract one of these respiratory illnesses.

Because the physician knew that the patient was at an elevated risk for adverse health outcomes in the setting of lower respiratory infections, they decided to have a lengthier conversation about vaccines. They began by asking the patient if they usually received vaccines. The patient replied that they did not trust vaccines since every time that they got a yearly influenza vaccine in the past, they got sick, but every year that they had not received the vaccine, they did not get sick. In this instance, the physician let the patient describe their thoughts and experiences without interrupting since they wanted to have a full understanding of the patient's hesitance. Once that patient explained their position, the physician asked them if they have ever heard of people having adverse reactions to vaccines. They prefaced this question by asking the patient if they knew the difference between an adverse reaction and an allergic reaction. When the patient said that they did not know the difference, the physician explained, and once the patient understood the difference, they continued with the consultation. In this instance, the

physician made sure that there was an adequate understanding of what was about to be discussed so that the patient could be completely involved in their own educated decision making.

After educating the patient on adverse reactions, the physician explained that it is common for people to have adverse reactions to vaccines that makes them feel ill, even if they are not sick with a virus. The physician then asked if the symptoms of the patient aligned with the common symptoms that come with adverse vaccine reactions. The patient agreed that they did. The physician then went on to talk about the patient's COPD in relation to their unvaccinated status. The physician asked them what they knew about COPD and how it might be adversely impacted by illnesses like influenza and COVID-19. The patient admitted that they were not aware of this correlation and went on to inquire about how they were related. This question from the patient was followed by the physician explaining that with their COPD status, they were at a higher risk for adverse health outcomes compared to others without COPD. The physician then asked what the patient thought about that information and if it changed the way they thought about vaccines. This was especially effective because the patient was educated on their health issues in a conversational way and then nudged by the physician to think about how it changed their viewpoints. The interaction made the patient reconsider their unvaccinated status and opt to get the pneumonia vaccine, though they were still reluctant to get any other vaccines at that time.

This provider-patient interaction was successful because the physician took the time to help educate their patient and let them make their own decisions about their health without imposing their own opinions on the patient in a paternalistic way. The physician made the patient feel heard and understood by asking what their experiences were. Furthermore, they simply functioned as a guide by providing the patient with the information they needed while gently

encouraging the patient to think about the potential health outcomes they may have based on their current behavior. Overall, it was due to this approach that the patient became amenable to receiving a vaccine that is critical for protecting the patient's health.

Poor provider-patient interactions are also possible and often lead to worse health outcomes for patients.[8] An example of a negative provider-patient interaction that I witnessed in clinic involved a patient who had severe depression. The provider was unable to pre-chart this patient due to it being an acute visit, so they did not know that the patient was depressed. In this interaction, the patient became agitated after the physician was unable to fulfill one of their requests and walked out of the room and slammed the door. The physician, who already had a busy schedule, became slightly impatient, which could be seen when the patient returned a few minutes later. The patient then became further upset with the physician and stated that they did not mean to "storm out" but felt that they were being treated unfairly. It was at this point that the patient revealed that they were having extreme depression symptoms combined with social issues within their family. The patient claimed that their outbursts were from built-up frustration about her situation that she was having difficulty controlling.

Once the physician understood the gravity of the situation, they were able to help the patient relax as well as to understand that they were there to help. The physician then administered a Patient Health Questionnaire-9 (PHQ-9) assessment to quantify the extent of the patient's depression, with the patient scoring a 20 on the scale, consistent with severe depression. At this point, the physician was able to explain the courses of action that they thought may be best for the patient and what each of those entailed. They then asked the patient what they thought about their options. At this point in the visit, the patient was extremely vulnerable and was becoming frustrated again. They were happy to try different treatment plans, but they also

expressed feelings of hopelessness. Toward the end of the visit, the physician was able to calm the patient again and convince them to be hopeful about their future.

I did not believe that this provider-patient interaction went as well as it could have since the patient did not feel like they were being taken seriously or being heard for a sizable part of the visit. While this can partially be attributed to the physicians inability to pre-chart the patient and the frustration that came from the patient's depression symptoms, it was also due to the physician's demeanor upon the patient's return to the room. Because the physician did not remain calm throughout the entirety of the consultation, it made it seem like they did not care, and thus the trust between the patient and the physician was damaged. Fortunately, the physician was able to apologize and steer the visit back to a more productive interaction after they better understood the situation. The physician should not have let their busy schedule and the patient's behavior affect their attitude and should have been more receptive to the patient's demeanor. If these qualities were implemented into the conversation, I believe that the consultation would have gone more smoothly and that the patient would have had more trust in her treatment.

Provider professionalism is an integral aspect of the healthcare system since it allows for all interactions within the scope of healthcare to be more effective and respectful. Not all interactions, however, are professional, which, at the bare minimum, might have a negative impact on patient outcomes.[9] Further, such conduct might also cause other healthcare staff to be affected. Providers that exhibit unprofessional behavior should be called out in a supportive manner so that they are aware that such conduct is not acceptable for a work environment and to prevent further unprofessional acts from occurring.

An instance where I observed an unprofessional act in the healthcare field was during my first shadowing experience. I was shadowing in an ophthalmology teaching clinic where several

residents take cases and precept them with a certified ophthalmologist. During this day, there was only one preceptor for all the residents. The visits with the residents were normal and productive for a time, however, once visits started to slow down, the attending preceptor decided to start watching professional sports. He watched them for an extended period and even kept them on while some of the residents came to staff with him. While he still talked with his residents about their patients, he also talked with them about the game that he was watching.

This interaction was unprofessional because the attending was distracted by recreational activities that should be kept separate from the workplace. This issue was compounded by him also distracting his residents from their work. Neither the residents nor the preceptor were able to give their full attention to patient care due to the preceptor's decision to watch sports in the precepting room. This most likely adversely impacted the quality of the patient's care since there were likely several aspects of the patients' conditions that were overlooked or mistreated because the full attention of the doctors was not given. The residents in this situation varied in their response to the distraction. Some of the residents tried to focus on their work with little interaction with their supervisor while others actively sought to talk about the game. Not a single resident spoke up to the attending about what was happening. This outcome likely came about for a few distinct reasons. The first potential reason is that the residents were afraid of speaking up to their supervisor since he had power in deciding if they graduated from residency. A second reason is due to the nature of the clinic at the time. Since there were few patients in the clinic while the attending was watching the game, they may have rationalized that it was acceptable for the attending to watch while the pace was slow. A third more disturbing reason could be that the residents did not care about the distracting behavior and actively wanted to participate in watching the game while they were working. In any of these cases, the attending was

unprofessional to both his colleagues and his patients, and his behavior warranted a reaction or intervention. Since attending physicians often act as models for their residents, this physician could be demonstrating unprofessional behavior that sets an inappropriate standard for the residents own actions.

If I were a resident physician in this situation, I would want to approach the attending privately and ask them if they could turn the game off while working so that we could give the patients our undivided attention. I would do this while emphasizing the importance of quality patient care so that the attending hopefully realizes that they are exhibiting a lapse in judgement. If this approach did not work, I would ask them to turn it off as a personal favor and label it as "distracting." Taking this approach could allow the attending to sympathize with me and make them more likely to fulfill the request. No matter what approach I use, the first thing I would try would be talking directly to the attending about the behavior. This would give the attending physician a chance to reflect on their own actions without the need for correction from an outside party. If the attending physician cares about having a workplace free from distractions, this interaction could help them realize that their conduct was not acceptable.

If the behavior continued after direct discourse with the physician, I would then ask other residents to weigh in on the issue. If multiple residents complained to the attending, it might be more likely that they decide to change their behavior so that there could be a greater focus on patient care. Conversing with other residents will also encourage those residents to stand up for their patients and themselves in this situation. Furthermore, if other residents who have been in the program longer have also noticed unprofessional behavior from this attending in the past, it could be grounds to take more serious action against this distracting and unprofessional behavior.

If all these approaches failed to change the behavior of the attending, I would then make a formal complaint to whoever oversees the residency program. I will explain the situation to the supervisor(s) and show my concern for the quality of patient care and distractions in the workplace. A formal complaint would at the least elicit a warning for the attending explaining that their behavior was making residents distracted and to not continue the behavior. Complaining to an authority figure would be a last resort as I would want to address the issue with the people involved first so that I would be more likely to maintain positive relationships with this healthcare professional. A formal complaint might make the attending feel slighted and resentful, so it would not be the first choice when dealing with this issue. Patient-centric communication and professionalism are both of paramount importance for healthcare providers to utilize when engaging with patients and other health professionals as they create conditions that can more easily lead to positive patient outcomes.

Health Outcomes and Social Factors

Social factors can heavily impact the health outcomes for patients as they can affect a large range of variables related to an individual's well-being. Some of the most important social factors related to health outcomes are socioeconomic status, employment, and education. Each of these areas are connected, but each has their own specific effects on the health outcomes of patients. Socioeconomic status has huge implications for health outcomes because of how many variables it can affect in the lives of patients, most notably, insurance status, access to transportation, access to quality healthcare, access to treatment, access to healthy food (or food in general), to name a few. Low socioeconomic status can further compound with employment and education barriers making maintenance of health even more difficult for many individuals.

Patients that I have observed while shadowing commonly have social factors that influence their health. A prime example is a patient who had low socioeconomic status and employment issues. This patient needed a hip replacement because they had severe osteoarthritis, and the patient was also unable to work because their job included large amounts of physical labor. This meant that the only income they were receiving was from disability, and they were running out of money for not only medical expenses but also everyday costs like rent and food. These issues started to compound when the patient was unable to undergo hip replacement surgery because of his obesity. The surgeons were concerned that he would be unable to appropriately rehabilitate post-operatively due to his excess weight. Because of his financial situation, he was unable to afford medication to help with his weight loss, nor food that was not processed and calorie dense.

The combination of low socioeconomic status and employment instability severely limited this patient's options, placing them in a seemingly endless loop. They were having immense difficulty losing weight due to their inability to exercise (due to the hip pain) and being unable to afford healthy food or weight loss medication. This difficulty in losing weight resulted in the patient being unable to receive the surgery that they needed to mitigate the intense pain that came with their osteoarthritis. The pain then led to the patient being unable to work, which circled back to the patient being unable to afford weight loss resources. While this patient was caught in a seemingly endless cycle, a patient with higher socioeconomic status might have been less likely to have issues affording weight loss resources and might have been able to receive the appropriate level of care.

In a study published in 2015, a comparison was made between the length of unemployment status and healthcare outcomes.[10] It was found that the longer a person remains

unemployed, the worse health outcomes they endure. This is not only because unemployment affects a person's financial status, but it also affects a person's mental health. Major depressive symptoms are more likely to occur in individuals when they are unemployed for longer periods of time. This can impact on the patient's outlook as this study found a decreased hope for the future in participants who were unemployed longer. The study found that a major source of issues from extended unemployment came from individuals receiving reduced benefits after one year of being unemployed. These findings exhibit the importance of policies that support consistent employment among those able to work.

Another patient I saw while shadowing in an internal medicine clinic provides an example of a patient who had only low socioeconomic status as a debilitating social factor. This patient had many chronic health problems, the most serious of which was advanced chronic kidney disease. This patient was unable to regularly afford food and received food from both the clinic and food banks in the area. She stated that she usually ate enough food during the beginning of the month, but when her food resources began to run low, she would be stretching her rations to make it through the month. This patient was likely not able to secure adequate foods that had nutritional value because she was focused on getting enough food to feed herself and her dependents, forcing her to obtain inexpensive food of poorer quality.

This patient's chronic kidney disease could easily be worsened by malnutrition. Because this patient is unable to obtain adequate food resources, they are putting themselves in a position where their chronic kidney disease will likely worsen due to malnutrition. This is a clear example of how socioeconomic status affects health outcomes since this patient could simply not afford the necessities of a healthy life.

Socioeconomic status heavily influences other social factors, which may magnify their respective effects on health outcomes. In a study published in 2003, the relationship between socioeconomic status and dissatisfaction with health care among African Americans was investigated.[11] The study found that African American patients with chronic illnesses had much poorer outlooks on the healthcare that they received. Attitudes of patients concerning their care are integral to the outcomes that the care provides with lower attitudes generally having poorer outcomes. The study also investigated how socioeconomic status affected insurance status. It was found that participants with low socioeconomic status were the only participants who had no insurance while most participants with middle to high socioeconomic status were most likely to have private insurance. Insurance status greatly affects the ability for individuals to receive the care they need.

While the patient mentioned above with chronic kidney disease did have insurance to cover the cost of her medications, she still had many of the debilitating issues that go hand-in-hand with low socioeconomic status. Employment status can also greatly affect the financial stability of patients as well as their access to insurance. The interaction of these variables makes patients with both low socioeconomic status and employment insecurity extremely unstable in their healthcare. Like the first patient example discussed above, patients can often feel stuck in a situation with seemingly no escape. Overall, social factors like the ones that affected these two patients can have extensive impacts on the health outcomes of individuals.

How the Biomedical Science MMS Program has Influenced My View on Healthcare

My interest in the healthcare field is a relatively new development in my life. I switched my career outlook from being a biochemist to being a physician during my junior year of my undergraduate degree. Since that time, my interest and dedication toward becoming a physician has grown substantially due to my interest in science and people oriented aspects of the career. This program has provided me with much more insight into what it means to be a physician and has strengthened my desire to pursue a career in medicine.

The shadowing aspect of the Biomedical Science program has given me insight into careers in the medical field. Being placed directly into an environment where multiple disciplines of healthcare professionals are interacting with each other, as well as patients, has allowed me to gain an in-depth understanding of how medical professionals give the highest quality of care. This insight has reinforced my aspirations of becoming a physician, since the person oriented aspect of healthcare aligns with the goals and values that I want to express in my career. One prominent professional goal of mine that I have seen implemented while shadowing in clinic is the desire to aid others in leading a healthier life. Helping others toward this achievement would be rewarding to both the patient and me as a provider.

A primary way that I have seen physicians help patients lead healthier lives lies in the communication that occurs between each party. Physicians should not consider themselves authoritarians when it comes to the health of their patients, but rather, as guides. They can give a foundation of information to their patients along with their expert opinion; however, it is in the hands of the patient to act upon the information. While many patients have a great deal of faith in their physician, sometimes patients will also have doubts about what has been recommended to them. Because of this dynamic, an integral part of the physicians job is to non-judgmentally

address doubts that the patient may have about the course of action that they have recommended. Doing so will make the patient feel heard as well as potentially move them to pursue the recommended plan.

Multiple times while shadowing, I have seen physicians addressing the doubts of a patient when they were urged to quit smoking. Patients often had many reservations about their ability to quit or believed that it was not worth the excruciating effort it would require. When patients first expressed their skepticism, the first thing the physician would ask is, "What are your hesitations when it comes to quitting?" This question is asked so that the physician can better understand the patient's mindset and potential barriers to success. It allows for a dialogue that shows that the physician is invested and does not dismiss the patient's apprehension as nonsensical. After understanding where the patient is coming from, the physician can then use this information to help dismantle these misgivings and reassure the patient.

A specific example of this interaction that I witnessed was with an elderly woman whose hypertension was being exacerbated by her smoking habits. After the physician asked her what her hesitations were about quitting, she told the physician that she did not think she could quit since it was so difficult. When the physician heard this, he had a down-to-earth conversation with her to show her all the good things that would come from her quitting smoking. Chatting with her about the money she could save each year, fun things she could do with her grandkids with the extra savings, and how she might live longer, helped her see that quitting smoking had too many advantages for her to not at least attempt it.

This interaction sticks out in my mind when I think about my career aspirations because it highlights key aspects of the career that I value. It shows me that I can help people lead healthier lives, build a relationship of trust and compassion with patients, and relieve patients of

the worry that they are unable to take their health into their own hands. These core values can and should be expressed during every patient consultation. An entire career implementing these values would be continuously gratifying, a realization that has greatly reinforced my decision to go to medical school and become a physician.

Before the Biomedical Science program, I saw the healthcare profession as a career path that consisted almost entirely of natural science. My experiences during this program have expanded my perception to include the art of medicine on top of the natural sciences. Communication and understanding between the physician and the patient are extremely important, but this aspect of patient care would be one that I would have put much less emphasis on without the teachings of this program. The program has given me a more holistic approach to medicine.

Not only has this program opened my eyes to the importance of patient-centric care and the art of medicine, but it has also shown me the vast importance of collaboration among healthcare professionals. I did not know how many people were necessary to make the world of healthcare function before this program. Shadowing and didactic learning introduced me to all the moving parts that make quality patient care possible. This knowledge has given me a greater understanding and appreciation of other healthcare workers which before this program I would have taken for granted. Overall, the Biomedical Science program has strengthened my appreciation for healthcare, as well as my drive to become a healthcare provider.

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