REFLECTIONS ON SHADOWING EXPERIENCES AND COMMUNICATION IN HEALTHCARE SETTINGS

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INTRODUCTION

The capstone project of the Miami University's Master of Medical Sciences in Biomedical Sciences (BMS) Graduate Program works to reflect on the intentional design of the program to bridge the chasm between didactic learning, theoretical discourse, and practical implementation in the clinical context. The aim of this report is to communicate the culminating experience of the BMS program through four different perspectives: "From the Classroom to the Clinic," "Framing a Clinical Question and Interrogating the Literature," "Reflection on Effective Communication in Healthcare," and "Reflection on Psychosocial Determinants of Health."

Through courses deliberately chosen for expanding upon the foundations set in my undergraduate education, I have been introduced to material that has provided me with the building blocks to ask stronger and highly thought-out questions. Outside of the classroom, the program's requirement in experiential learning has helped to contextualize concepts found in a textbook or PowerPoint presentation to the hospital and has exposed me to sides of medicine I had yet to witness. These include but are not limited to the importance of effective communication in the delivery of healthcare as well as critically considering each patient's psychosocial determinants of health.

This program represents more than just an academic milestone – it has become a formative experience of scholarly inquiry, clinical exploration, and professional growth. I have learned to embrace the challenges and expectations of the program to prepare me for becoming a competent healthcare provider as well as an empathetic and compassionate individual. Recognizing the paramount importance of these four core perspectives has

built my confidence in pursuing a career as a physician and which I hope to communicate through this reflection.

Contents

From the Classroom to the Clinic

The curriculum of the MMSc. in Biomedical Sciences graduate program has not only expanded my scientific knowledge as a student but has also built upon the foundations of my undergraduate education to be applicable in the clinical setting as an aspiring physician. The structure of BIO605, also known as Advanced Molecular Biology, is highly dependent on synthesizing information from recent research articles regarding macro- and micro-level genome organization, molecular mechanisms, and pertinent cellular and developmental biology. Each week is structured to be on a specific topic in molecular biology with one day being dedicated to introducing the topic and a relevant research paper of the student's choosing, and another day spent discussing the contents and methodology of that paper.

One of the first weeks of the semester was dedicated towards discussing gene and genome diversification. The research article "Three crocodilian genomes reveal ancestral patterns of evolution among archosaurs" was discussed during that week in which it was discovered that crocodilians display a distinct morphology and an abnormally slow evolutionary rate (Green *et al.*, 2014). Research methodologies such as RNA sequencing, homology-based analyses, CRISPR-Cas9 and the use of ultra-conserved region-anchored loci with transposable elements were not only introduced but also contextualized to the paper for understanding how the researchers created an accurate phylogenetic tree as well as what potential these techniques have based on the results found. One of the potential routes of research that was mentioned in the paper included the reconstruction of a genome of the ancestors of crocodiles and birds – archosaurs which are members of a subclass that includes dinosaurs. Naturally, it was then mentioned how with the progression of scientific methodology, the well-loved fictional movie -- Jurassic Park -- could become a reality.

The ethics of genetic modification is multifaceted, especially when brought into a clinical context. The argument of providing therapeutic treatments and alleviating genetic predispositions to harmful conditions tugs hard on one end while the temptation to "play God" and create idealized humans holds the argument at a stalemate. No longer is the question of the ethics of genetic modification simply theoretical but rather one that must consider how best to implement the tools that are currently and soon to be in hand.

Frequently during shadowing experiences, I have met physicians and healthcare providers who have patients with a genetic predisposition for a particular illness. Some of these conditions include Type 2 diabetes mellitus, hypertension, depression, sickle cell anemia, and cystic fibrosis, to name just a few. Given the frequency of conditions for which there is a genetic predisposition, many questions arise: "If we have the technology to reduce or eliminate genetic susceptibility to medical conditions, should we?" "Where, if at all, should such technology be limited?" "Who should have access to this technology, and how would priority of access be determined?" While there are no cut-and-dry answers to these questions, understanding how molecular biological techniques can be used in the clinic is vital to inform all sides of the argument.

One specific methodology discussed in BIO605 includes CRISPR, a form of prokaryotic immune system. Viruses contain genetic material and have the capability to inject their genetic material into cells. When the genetic material is inserted into cells, it must evade the host cell's immune defenses in order to hijack the host cell's machinery and direct it to transcribe, translate, and package the viral genetic material in order to create a large viral progeny. In response, bacteria have developed an immune response in which proteins Cas1 and Cas2 are able to recognize portions of the viral genome once it enters the cell and to cleave portions of the

genome. These portions are then able to serve as a template in the case that a virus with the same genetic information were to reinfect the same cell. These portions of viral genome are known as "spacers," and they are stitched in between palindromic repeats in DNA known as the CRISPR array or guide RNA (gRNA). The palindromic repeats contain internal complementarity which allows them to create stem-loop structures; this is in turn critical for when the CRISPR-array is transcribed into pre-CRISPR RNA (pre-crRNA) and then processed into small CRISPR RNAs (crRNA) (Yair & Gophna, 2018). The crRNAs are then able to come together with a Cas protein to form a complex in which the crRNA will act as a template to look for DNA that matches the sequence of the spacers – viral genetic material – and the Cas protein will be able to cut up the recognized viral DNA and prevent reinfection.

When considering how to apply this technology to eukaryotic cells – which includes human cells – the basic skeleton of the mechanism remains the same. However, the spacers are now engineered to detect specific sequences that are known to cause a genetically-related condition and the target moves from viral DNA to the host cell's DNA itself (Singh *et al.*, 2017). The customized gRNA complexes with Cas9, with this complex then initiating surveillance of cell's DNA, pinpointing the location where the condition-causing genetic segment is located, cleaving out this genetic segment, and then inserting new sequences or reattaching the sequence back together.

When considering cystic fibrosis, the gene cystic fibrosis transmembrane conductance regulator (CFTR) is mutated and causes reduction of expression of functional CFTR proteins (Da Silva Sanchez *et al.*, 2020). The use of CRISPR-Cas9 could help in genetically editing the defective CFTR gene out of the genome and replacing it through the insertion of a functional/wildtype (WT) CFTR gene. This modification could also be done through a delivery

of engineered mRNA to the cells through plasmids and viral vectors. However, the production of plasmids and viral vectors can often be difficult due to their size which can serve as a barrier; potential risks include off-target editing meaning that other genes might be disrupted in the process of trying to target CFTR (Da Silva Sanchez *et al.*, 2020). Despite these obstacles, researchers have found that using an adenovirus containing a gRNA engineered for recognition of the defective CFTR gene can successfully be used to create a recombinant DNA which could increase the amount of functional CFTR proteins thereby alleviating expression of cystic fibrosis (Da Silva Sanchez *et al.*, 2020). Genetically, this would essentially be achieving heterozygosity for the WT CFTR gene as opposed to the homozygous recessive mutant gene.

While the argument of the ethicality of gene editing and therapy remain to reach a consensus, understanding the mechanisms and methodology behind potential clinical treatments helps to inform the decisions made both from a general scientific perspective as well as in theoretical recommendations from provider to patient. This course has particularly taught me to look beyond the textbooks and into the questions that researchers are answering today so that I might better see the trajectory of how scientific revelations will manifest in medicine.

Framing a Clinical Question and Interrogating the Literature

Growth as a scientist is seen through the progression of their questioning and interaction with literature to answer specific questions. Where knowledge gaps are filled through lectures and content review, the level of questioning should grow in parallel as one develops as a learner. This is done through the transition from background questions, which are typically very general, and content focused, to foreground questions which aim to ask a specific question and requires often many primary sources for an evidence-based answer. The manner in which foreground questions are developed is through using the PICO format, which stands for patient or problem, intervention, comparison or control, and outcome. By using PICO, a question can be framed with a specific context which in the case of a clinical setting can help narrow the answers to fit a patient's clinical presentation while also considering their demographic and social circumstances.

In a specific shadowing experience, I was introduced to the idea of the glycosylated hemoglobin (HbA1c, or "A1c," test). An "A1c" is a common blood test that is used to diagnose and monitor type 1 and type 2 diabetes mellitus glycemic control over a 3-month period of time by measuring the level of glucose molecules attached hemoglobin (Hgb), the critical protein found in red blood cells. A normal "A1c" level is below 5.7%, meaning that all individuals have at least some glucose attached to their hemoglobin. Higher percentages, such as a level of 5.7% to 6.4%, indicates pre-diabetes, with further elevations greater than 6.5% being diagnostic of diabetes mellitus (Centers for Disease Control and Prevention, 2022).

Diabetes mellitus is a common condition that I have observed during shadowing experiences in multiple different clinics. Having been introduced to HbA1c tests, I was curious

about the efficacy of the test as a diagnostic tool for one of the patients I had met who had sickle cell anemia, a condition with one manifestation being a lower-than-normal level of hemoglobin.

To frame this question in the PICO format:

P: For patients with sickle cell anemia

I: What is the efficacy of a HbA1c test

C: As compared to its efficacy in patients with normal hemoglobin

O: In accurately diagnosing diabetes mellitus?

Through the use of PubMed, a database for searching medical literature, I was able to identify two articles that addressed different aspects of the question. Search words "HbA1c," "diabetes diagnosis," "sickle cell anemia," and "sickle cell trait" were used to narrow the literature output.

The article "Validity of HbA1c in Diagnosing Diabetes Among People with Sickle Cell Trait in Tanzania" provides insight into answering an aspect of this question (Kweka *et al.*, 2019). Sickle cell anemia and sickle cell trait (SCT) differ in that the former requires a homozygous recessive mutation of the hemoglobin gene while the latter is characterized with only one copy of the altered gene (Kweka *et al.*, 2019). Given this information, the article does not address the exact question but rather provides insight into how the HbA1c test will measure the blood glucose levels with regards to the altered gene in general. The article mentions that HbA1c is not recommended for individuals with SCT given that these individuals typically have shorter red blood cell (RBC) life spans than the typical 120 days. Because the HbA1c measures the average of the past three month's glucose concentration, it may underestimate the prevalence

of diabetes mellitus if used among individuals with shorter-than-average RBC lifespan. According to their study, participants with SCT were 88% less likely to be diagnosed with diabetes mellitus by HbA1c compared to those without SCT, indicating that HbA1c has low efficacy for accurately diagnosing diabetes mellitus with only one mutated gene (Kweka *et al*, 2019). Given this information, it can be inferred that for those patients with sickle cell anemia, their complete lack of a normal hemoglobin gene might create even greater inaccuracies, leading to more significant levels of underdiagnosis of individuals with diabetes mellitus (Kweka *et al.*, 2019).

In contrast to the prior article that looked at the impact of gene abnormalities, the article "The Effect of Anemia and Abnormalities of Erythrocyte Indices on HbA1c Analysis: A Systemic Review" focused specifically on anemic patients (English *et al.,* 2015). However, this article addresses patients with anemia due to iron deficiency rather than sickle cell anemia. Questions of "At what level of anemia should I not use HbA1c for diagnosis?" and "Should I routinely screen patients for anemia when using HbA1c for diagnosis and if so, what test should I use?" were addressed (English *et al.*, 2015). Iron-deficiency anemia is characterized by a reduced amount of ferritin, which is the storage form of iron. A reduction of ferritin has been found to be related to an increase in red cell life span and increased glycation of HbA1c, leading to an inaccurately high HbA1c percentage and an overdiagnoses of diabetes mellitus (Christy *et al.* 2014). While the result of diagnosing for diabetes mellitus in patients with iron-deficiency anemia is opposite to those discovered for patients with sickle cell anemia, it follows the line of logic that depending on the life span of red blood cells, the HbA1c levels will also be altered (English *et al.*, 2015) (Christy *et al.*, 2014).

While neither directly address the PICO question, they do demonstrate that HbA1c tests seem to be unreliable for patients with one mutated gene as well as for patients with anemia. No literature was found through the search terms used to directly answer the question at hand, which in the clinical setting, may often be the case given that the high specificity of PICO questions can often only be answered through the culmination of multiple studies to provide an evidence-based answer. Limitations in these studies include low sample numbers in the sickle cell study and the study design itself in the second, as systemic reviews may not be easily generalizable. However, using these articles could help inform my theoretical decision as a clinician to choose an alternative method for providing a more accurate diagnosis for this patient given her condition. Some alternate options include glycated serum proteins, serum fructosamine, and glycated albumin; determining which option would be best for the patient would require further literature review (Christy *et al.*, 2014).

Reflection on Effective Communication in Healthcare

In the intricate web of healthcare, medical knowledge, clinical and technical application, and research serve as the hard skills that are tangible in providing the physical needs of a patient. In contrast, soft skills such as communication have become emphasized as not merely just a desirable trait but as the cornerstone upon which quality patient care and patient-provider relationships rely on. Communication is all encompassing, meaning it isn't simply limited to verbalized speech but also includes body language, gestures, facial expression, written notes, tone, connotation, and more.

Many cases of ineffective treatment or even injury have been found to be the result of communication breakdown. In a study concerned with patient safety in the operating room as related to interactions between members of the surgical team, it was found that 72% of cases involved at least one miscommunication. In these miscommunication events, the attending surgeon was found to be the most common team member involved, and the most common communication breakdown occurred during attending-to-attending handoffs with a failure to mention important events during these handoffs (Copeland, 2008). With increasing awareness of the adverse impact on health outcomes of ineffective communication, medical schools and residency training programs have begun to incorporate communication training into their curricula.

While shadowing "Dr. Ashley Jones" in a clinic, I witnessed a provider-patient interaction that I feel had components that were both beneficial and harmful to their relationship and to the patient's care. "Evan," a middle-aged black man had come in for a follow-up appointment after having had imaging done on a suspicious lesion that the imaging had

determined to be a tumor. Though it wasn't his first time in this clinic, it was his first visit with "Dr. Jones" who initiated a list of questions to gain a better understanding of his medical history. She asked him if he was a smoker, to which he replied that he was, and she followed up by asking if he would be interested in quitting. "Evan" verbalized his confliction – he knew that it would be better for him to quit in the long run, especially considering his tumor, but he also was aware of the amount of willpower and effort that would be required of him to quit. "Dr. Jones" turned away from the screen where she had been recording his responses to face the patient. She introduced him to a smoking cessation program and walked him through the process while affirming how quitting could benefit his overall health but also expressing that it was his decision to make out of respect for his autonomy. They jointly created a plan to enroll him in the program and scheduled a few follow-up appointments to reassess the patient's progress and attitude before continuing to discuss treatment options for his original reason for the visit. "Dr. Jones" also informed him of contacts for mental health professionals and therapists to improve his chances of success in quitting.

After discussing his treatment options, "Dr. Jones" asked "Evan" if he wanted to receive an influenza vaccine. He thought about it but quickly brushed away the idea. I had expected that she would then gently encourage the patient to reconsider as I had seen in other patient-provider interactions, but I instead felt uncomfortable as she responded by telling him of her experience of working in a hospital and seeing patients with influenza become quite ill and even pass away. The firmness of "Dr. Jones's" tone and the content of her response alarmed not only me but "Evan" as well, as he seemed unsure of how to respond. "Evan" communicated that he would consider it for his next visit, noting that he usually reacts poorly to vaccines and could not afford to be sick for the next couple days due to a pending work project. This response seemed to

resolve some of the tension. In a single visit, I had a range of emotions towards "Dr. Jones's" communication style and witnessed the impact it had on the patient's level of trust and care.

In a qualitative study on patient perception of patient-provider communication after an adverse event directly resulting from provider error, it was found that, in general, patient perception of effective communication was the determining factor for whether the patient decided to continue their relationship with the provider (Duclos *et al.*, 2005). Themes found regarding effective communication included perceived honesty, reassurance, and perceived long-term personal support, whereas themes regarding poor communication included not "owning up", "talking down" to the patient, and lack of perceived care (Duclos *et al.*, 2005). This research helps to support the notion that patient-provider relationships are built on trust and that trust is built through effective communication.

To become successful communicators, physicians and other healthcare providers need to take into consideration a patient's current behaviors as well as their life goals to inform them of realistic and achievable health choices. In the review article *Motivational Interviewing: An Evidence-Based Approach for Use in Medical Practice,* the authors state that the consequences of not exploring potential patient's reaction to health recommendations is that "well-intentioned medical advice is perceived by patients as an assault to their freedom of choice, which, according to socio-psychological reactance theory, increases their motivation to restore their own subjective power to make a decision" (Bischof, Bischof & Rumpf, 2021). In the case where "Evan" did share his history with smoking, "Dr. Jones" had respected his autonomy, encouraged him in his competency to take measures for quitting, and demonstrated relationality by setting aside her charting to have a face-to-face conversation with him. However, when discussing his vaccination choices, the attributes that made the initial conversation a good model for effective

communication were not only absent but were replaced with an approach that opposed those qualities.

Motivational interviewing is meant to strengthen and encourage relationships between a provider and patient through establishing a partnership relationship rather than a hierarchical one, extending empathy and compassion, and expressing encouragement for making beneficial health choices no matter the magnitude (Bischof, Bischof & Rumpf, 2021). “Dr. Jones’s” response to “Evan’s” dismissal for a vaccine was a case in which the provider failed to consider the circumstances of the patient or ask the patient for their rationale before enforcing their medical advice – although meant to be for the benefit of the patient – leading to a strained interaction. Providers are not able to force patients to receive immunizations, and “Evan’s” initial declining of the vaccine should not have been met with harshness. Secondly, “Dr. Jones” should not have assumed “Evan” to be uninformed. “Dr. Jones” had presumed that he was not aware of the potential severity of influenza, leading to her frustration. Instead, she should have first elicited his knowledge and then filled in any information gaps regarding the potential benefits and side effects of the vaccine so that he might make an informed decision. Lastly, the authoritative nature of a patient-provider relationship should in some ways be minimized by being personable and relatable. “Dr. Jones” seemed to distance herself from “Evan” by enforcing her opinion on him and instead should have tried to understand his thought process, rationale, and circumstances.

Considering the elements of motivational interviewing, a potential alternative reaction to “Evan’s” initial decision would have been to have been to ask him if he had any concerns regarding the vaccine: “Was there anything about vaccine administration that would have caused him to worry or be fearful?” By keeping the interaction conversational, “Dr. Jones” could not

only have informed him of the common side effects but may have also been able to gently encourage him to consider his health after gaining an understanding of his circumstances, perspectives, and values.

My shadowing experience with “Dr. Jones” and the research performed on the regularity of miscommunication, the significance of communication in rebuilding trust between patients and providers, and the aspects of motivational interviewing have provided me with new insight into the humanistic and relational side of healthcare. Though the research was focused on a healthcare perspective, I’ve found that the concept of effective communication penetrates all relationships and careers, and it has informed how I relate to others.

Reflection on Psychosocial Determinants of Health

Psychosocial determinants of health play a significant role in every aspect of a patient's health and their interaction with the healthcare system. They are critical components of consideration for any healthcare provider in optimizing the patient-provider relationship. All people are subject to social stratification, which dictates the unequal distribution of resources and services. Building a patient-provider relationship requires clearly communicating and meeting patients not only in their needs but also with *where they're at.* Patient experiences collectively include scheduling appointments, attending appointments, understanding medical jargon, asking appropriate question, choosing from a multitude of treatment options, and then following through with treatment plans. All these stages are informed by past interactions with the healthcare system as well as current circumstances. Recognizing the nuance and underlying implications of social factors that play into an individual patient's decision-making processes – which may or may not be vocally communicated – is vital not only in creating trust and extending empathy but also in providing effective care.

During a particular shadowing experience, I met "Mr. Smith," an older black man whose family depended solely on him financially but who had recently lost his job. His unemployment had left him in the process of relocating himself out of state to provide for his family, and "Dr. Emma Anderson," a provider whom I was shadowing, had developed a longitudinal patient-provider relationship with him. The trust he had in her was clear, and the continuity of care with "Dr. Anderson" as his provider was a priority for him despite his relocation. She had asked to see him back in 2-3 months, and in checking his schedule, he

knew he wouldn't be able to meet this request. Moving to a new company, he was concerned with establishing a good rapport with his new supervisor, and without having built interpersonal connections with the company, he verbalized that he did not feel comfortable asking for a couple of days of leave to fly in for his appointment that early into his new job. In rescheduling, "Dr. Anderson" checked her calendar and found that the earliest they could schedule an appointment would be four-and-a-half months later. This delay in follow-up care due to the social factor of employment and necessitated geographic relocation might directly lead to adverse health outcomes for "Mr. Smith."

Before meeting "Mr. Smith," I had asked "Dr. Anderson" about the clinical progression of common conditions seen in her practice. She reviewed with me the chart of one of her patients whose condition had rapidly deteriorated despite reliably attending his appointments. During one visit, there was a suspicion of a tumor, and within a matter of weeks it had become metastatic. His CT scan had progressed from a singular nodule to a sudden constellation of lesions throughout his entire body. We turned our attention to "Mr. Smith's" previously discussed visit, and she informed me that upon discovering that he had recently been unemployed and was interviewing at multiple locations to secure a new job, it became clear that his appointments had been delayed for what he considered to be issues of higher priority. Though it was revealed during his appointment that his health was stabilizing, it nevertheless became apparent that the social factor of unemployment had directly influenced his decisions to make his healthcare follow up a lesser priority.

Based on this shadowing experience, I sought to better understand the current evidence regarding the impact of employment status on health outcomes. A study performed on the relationship between employment status, access to healthcare, and

health-related behaviors found that non-Hispanic blacks were most likely to be unemployed, and with an increase in unemployment duration, health outcomes tended to be more adverse (Silver *et al.*, 2018). When specifically considering "Mr. Smith's" demographic in the context of this study, he is among the racial group that is most likely to report being unemployed both short term and long term and is more likely to be unemployed considering his age (Silver *et al.*, 2018). Provided this information, it becomes apparent that it is difficult to consider a singular social factor in isolation, as social factors are often layered and influence one another. "Mr. Smith" was unemployed, a factor that was more likely to be present than among his counterparts who had a different racial and generational identity than him. According to the results of this study, his unemployment status may already be having implications on his health. Higher levels of poor mental health, depression, diabetes, hypertension, and other adverse health outcomes are correlated to unemployment, with increasing periods of unemployment leading to higher severity of those outcomes (Silver *et al.*, 2018). His health provider "Dr. Anderson" must be aware of these health risks while attending to the other specific reasons for his visit.

Another issue to consider when trying to understand how his employment status might impact his health is the rescheduling of his appointment. In having multiple interviews, at least one of which was out of state, the importance of his financial situation took priority for him as opposed to his health. His thought process isn't difficult to understand either – "If I'm feeling okay and during my last visit it seemed like we were trending towards better outcomes, why shouldn't I be more concerned about making sure I'm able to provide for my family?" It's a natural thought and one that seems likely inconsequential, but having just discussed with "Dr. Anderson" how one patient had such a

dramatic, unexpected decline in his health, it brought my attention to how detrimental it can be to have influences in one's life force a decision to deemphasize their health.

Rescheduling or missed appointments are a continuing concern in the healthcare field. According to a retrospective study done at a community health center in Massachusetts, it was found that within a 5-month period, 25.4% of scheduled appointments were rescheduled or cancelled and another 16.5% of those appointments were "no-shows" (Kaplan-Lewis & Percac-Lima, 2013). To understand the reasons why patients miss their outpatient appointments, a study was performed that discovered five themes including transportation issues, employer obligations, and financial problems (Ofei-Dodoo, 2019). Considering what I witnessed during my shadowing experience, "Mr. Smith" demonstrated these themes in rescheduling his current appointment and also in planning his next one. Since he now lives out of state, the regularity and convenience of his appointments is drastically reduced given the cost of flights and time taken out of his work schedule, a commitment that may have direct social and professional consequence with his employer. Whether or not awareness of these typical reasons of missed appointments would influence patient behaviors is unclear. However, it is important from the provider's standpoint to advocate for the importance of prioritizing patient health without being uninformed as to their social circumstances.

Ultimately, this shadowing experience with "Dr. Anderson" and "Mr. Smith" has shown me how the intersectionality of psychosocial determinants of health can result in both direct and indirect effects on a patient's health. While there were limitations to what "Dr. Anderson" could have done given her own busy schedule, her willingness to work with "Mr. Smith's" situation pointed to her competency and emotional intelligence as a

healthcare provider. As an aspiring healthcare provider, I found “Dr. Anderson’s” commitment to her patient’s health and her mindfulness of their lives outside of their clinical needs to be a great model for future patient care interactions.

Concluding Section: Impact of the Program on Your Views Towards Healthcare

Miami University's Master of Medical Sciences in Biomedical Sciences (BMS) degree program has not only furthered my scientific knowledge from my undergraduate degree but has exposed me to clinical applications of that knowledge, pushed me to ask informed questions, prompted my awareness to communication styles and reactions, and encouraged me to consider the external factors that influence a patient's decision-making process. The experiences provided both in the classroom and clinic have reinforced my interest and pursuit in a career of medicine by apprising me of the multiple facets that influence provider and the patient perspectives.

A particular instance that has galvanized my desire to become a physician came soon after a discussion about the subtle nuances in communication that can have a dramatic impact on the relationship between a patient and provider. A resident I was shadowing and I walked in on "Sarah" who sat with her Dexcom in hand, trembling in her seat. Her gestational diabetes had progressed into chronic diabetes, but her lack of health literacy made her insulin regimen confusing. The resident noticed that "Sarah" had become exasperated in trying to explain her frustration and her face had flushed. She turned to hold "Sarah's" hands, looked into her eyes, and said that she would walk her through the process in simplistic terms so she could walk away with confidence to manage her diabetes. As we closed the door, I found the resident beaming, and I was further encouraged knowing that I had the privilege of witnessing medicine in all its beauty, thereby cultivating a foundation of compassion I hope to emulate in the future.

Having recently discussed in class the importance of communication, I had been primed to look for the subtle gestures between providers and patients which I hadn't considered to have the magnitude of significance that it did in earning "Sarah's" trust – something no amount of scientific knowledge could replace. This experience has become evidence for the prowess of compassion in strengthening relationships and has encouraged me to have the propensity to form connections with patients based on their overt humanism.

Another aspect of the program that has been invaluable to me has been exposing me to careers in medicine that I hadn't considered before. Although my desire to become a physician remains the same, being able to talk through the decision-making process of how some of the providers landed on their career decisions or why they choses to switch out of fields has helped me to consider more deeply the importance of diversity of skillsets, personality types, and individual experiences in creating a well-rounded team. For instance, I asked a female provider why she had chosen a career in urology where the demographic of most of her patients were older men. She explained to me that she had once considered working in obstetrics and gynecology but had found in her rotations that she had consistently felt emotionally drained as a provider whose patient demographic was predominantly women who were highly anxious. She expressed that she believed that I could become a successful physician but encouraged me to keep an open mind in trying different fields and careers within medicine. From this program, I've also been able to meet with medical device specialists, surgeons, CEOs, and others who have their own specific niche but who ultimately are passionate about having a career in healthcare or adjacent to it.

Overall, the design of the program has better prepared me for my future endeavors both small and large. The expectations set before me in the classroom and the capstone have developed me professionally as well as interpersonally, making the application of the program not only relevant for directing my career but also in how I engage with people no matter the context. I continue to find fulfillment and worth in pursuing medicine knowing that I have the ability to foster those relationships and provide compassionate care as a physician myself.

Bibliography

Bischof G, Bischof A, Rumpf H-J. (2021). Motivational interviewing: An evidence-based approach for use in medical practice. *Deutsches Ärzteblatt International*. https://doi.org/10.3238/arztebl.m2021.0014

Centers for Disease Control and Prevention. (2022, September 30). *All about you're a1C*. Centers for Disease Control and Prevention. Available online at https://www.cdc.gov/diabetes/managing/managing-blood-sugar/a1c.html#:~:text=A%20normal%20A1C%20level%20is,for%20developing%20type

%202%20diabetes. Accessed on April 22, 2024 (or whatever date you last accessed it; the date is necessary, as occasionally this link will eventually be changed or lost, so you need a time stamp).

Copeland EM. (2008). Patterns of communication breakdowns resulting in injury to surgical patients. *Yearbook of Surgery*, *2008*, 12–13. https://doi.org/10.1016/s0090-3671(08)79008-6

Da Silva Sanchez A, Paunovska K, Cristian A, *et al*. (2020). Treating cystic fibrosis with mrna and CRISPR. *Human Gene Therapy*, *31*(17–18), 940–955. https://doi.org/10.1089/hum.2020.137

Duclos C, , Eichler M, Taylor, *et al.* (2005). Patient perspectives of patient–provider communication after adverse events. *International Journal for Quality in Health Care*, *17*(6), 479–486. https://doi.org/10.1093/intqhc/mzi065

English E, Idris I, Smith G, *et al*. (2015). The effect of anaemia and abnormalities of erythrocyte indices on HbA1c Analysis: A Systematic Review. *Diabetologia*, *58*(7), 1409–1421. https://doi.org/10.1007/s00125-015-3599-3

Green RE, Braun EL, Armstrong J, *et al*. (2014). Three crocodilian genomes reveal ancestral patterns of evolution among archosaurs. *Science*, *346*(6215). https://doi.org/10.1126/science.1254449

Kaplan-Lewis E, Percac-Lima S.(2013). No-show to primary care appointments. *Journal of Primary Care & Community Health*, *4*(4), 251–255. https://doi.org/10.1177/2150131913498513

Kweka B, Lyimo E, Kidola J, *et al*. (2019). Validity of hba1c in diagnosing diabetes among people with sickle cell trait in Tanzania. *Blood*, *134*(Supplement_1), 4852–4852. https://doi.org/10.1182/blood-2019-125326

Singh V, Braddick D, Dhar PK. (2017). Exploring the potential of genome editing CRISPR-Cas9 technology. *Gene*, *599*, 1–18. https://doi.org/10.1016/j.gene.2016.11.008

YairY, Gophna U. (2018). Repeat modularity as a beneficial property of multiple CRISPR-Cas Systems. *RNA Biology*, *16*(4), 585–587. https://doi.org/10.1080/15476286.2018.1474073