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**Define Informatics and Health IT:**

In this paper, William Hersh addresses the confusion surrounding terminology in health information technology (HIT) and biomedical and health informatics. He emphasizes the need for clear definitions to prevent misunderstandings, especially after informatics' rising popularity after the American Recovery and Reinvestment Act (ARRA) of 2009. He defines informatics as the discipline focused on the acquisition, storage, and use of information in specific domains, differentiating it from information science and computer science by its domain-specific application. He also discusses various subfields, including bioinformatics, imaging informatics, and public health informatics, highlighting the importance of precise terminology in advancing the field.

Hersh also talks about the difference between informatics and other similar disciplines such as health information management (HIM) and information technology (IT). He notes that while HIM has traditionally focused on managing medical records, the transition to electronic records has led to overlaps with informatics. Additionally, he points out that IT generally refers to the application of computers and technology in operational settings, with computer science as its academic foundation. Overall, Hersh aims to define the major terminology used in biomedical and health informatics and health information technology while also realizing that these definitions may be disagreed upon and can be debated.

**To Err is Human 1999 Report Brief:**

The Institute of Medicine's November 1999 report, "To Err Is Human: Building a Safer Health System," revealed that preventable medical errors in U.S. hospitals cause between 44,000 and 98,000 deaths annually. In addition to loss of human life, the report also talked about the negative impact on total costs these errors also have. The report emphasized that these errors result from systemic issues such as faulty systems, processes, and conditions that lead people to make mistakes or fail to prevent them rather than individual negligence.

The report called for a 50% reduction in errors over five years, and provided 4 recommendations. The first was the establishment of a Center for Patient Safety. The second was expanding the reporting of adverse events. The third was to raise performance standards and expectations for improvements in safety. And lastly, the development of safety programs within healthcare organizations. The report also talked about current progress being made.

**Crossing the Quality Chasm 2001 Report Brief:**

The Institute of Medicine's March 2001 report, "Crossing the Quality Chasm: A New Health System for the 21st Century," talks about the significant gaps in the U.S. healthcare system, emphasizing inconsistent quality and failures to deliver effective care. The report advocates for a comprehensive redesign to bridge this quality gap, proposing six aims for improvement: safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity.

To achieve these goals, the report recommends establishing ten new rules to inform the redesign of the healthcare system. The report also includes the first steps for change, including a \$1 billion budget over the next 3-5 years and immediate attention on developing care processes for the common health conditions. And lastly, the report discusses how changes to the health system also require changing the structure of the healthcare environment. This includes aligning payment structures to reward quality care rather than service volume.

### **Preventing Medication Errors 2006 Report Brief:**

The report "Preventing Medication Errors" by the Institute of Medicine talks about the significant financial and human costs associated with adverse drug effects (ADEs). These errors are often preventable, and the report discusses a multi-pronged approach to reduce their occurrence. It mentions a paradigm shift toward a more collaborative patient-provider relationship, encouraging patients to actively participate in their care by understanding and monitoring their medications. It also mentions the need for healthcare providers to improve communication, educate patients on potential side effects, and foster transparency when errors occur.

The report also advocates for greater use of information technologies, such as e-prescriptions and point-of-care reference tools, to minimize errors related to prescribing and dispensing medications. It also recommends improved drug labeling, packaging, and nomenclature to reduce confusion. Lastly, the report recommends that various regulatory agencies should help encourage these practices to reduce ADEs.

### **Fulfilling Health IT Potential:**

This article outlines the disappointing results of health information technology (IT) as compared to the 2005 RAND Corporation study, which projected annual savings of over \$81 billion through widespread adoption of health IT. Despite increased adoption since then, the authors highlight problems with system interoperability, poor usability, and failure to reengineer care processes. Additionally, current health IT systems are fragmented and often difficult for clinicians to use, limiting their potential to improve patient care and safety.

To realize the full benefits of health IT, the authors argue for significant changes, including the development of interoperable, patient-centered, and user-friendly systems. The authors also mention that there is only so much the government and vendors can do if providers do not do their part, i.e. aligning healthcare payment models to prioritize value over volume. Lastly, the authors state that there were no shortcomings with the RAND study but rather there are shortcomings in the design, implementation, and use of health IT in the United States.

### **Engg a Learning Healthcare System - look at the future 2011:**

This reading was a summary of the Institute of Medicine workshop, "Engineering a Learning Healthcare System: A Look at the Future." The workshop aimed to explore how engineering principles could be applied to improve the effectiveness, safety, and overall quality of the U.S. healthcare system, thereby creating a learning healthcare system. A main point was that the healthcare system's processes must be centered on the right target, the patient. It also focused on the healthcare system's current weaknesses, some of which include the lack of data utilization, high variability, and inappropriate care.

Certain case studies were also mentioned to showcase the benefits of a learning healthcare system. Successful integration of engineering solutions transformed safety outcomes within the aviation industry. Alcoa Inc. advanced their business by using cycle-time reduction. Veteran Health Affairs (VA) radically re-engineering their program after complaints of providing bad healthcare to their patients. This greatly raised the quality of care within the VA and it's now known for providing some of the best care within the country. Ascension Health also used engineering principles to reform their care and were highly successful. The workshop ended with a discussion on how the U.S. healthcare system could be improved and many areas of innovation and collaborative action were identified.

### **Integrating Social Care in Healthcare Delivery:**

This reading was about a study on integrating social care into healthcare delivery. The study concluded that there were 5 complementary activities to facilitate the integration of social care into health care. These activities were awareness, adjustment, assistance, alignment, and advocacy. This report also states that there are 3 key necessities for successful integration: an appropriately staffed and trained workforce, health information technology innovations, and new financing models.

The study committee then identified 5 goals which would result in a better integration of social care into health care. The first was to design health care delivery to integrate social care into health care. The second was to create a dedicated workforce to integrate social care into health care. The third was to develop digital infrastructure to promote interoperability between health care and social care organizations. The fourth was to finance this integration, typically through the government. And the last goal was to continue research and evaluation on the effectiveness of social care in health care. Overall, this study says that the healthcare system has not effectively integrated social care into care delivery but that there are many ways we can fix this.

### **Eliminating Racial and Ethnic Healthcare Disparities:**

This document summarizes the findings and recommendations of the Institute of Medicine's 2003 report, "Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care." The document puts forward evidence to show that racial and ethnic minorities tend to receive a lower quality of care than non-minorities. It shows disparities in care within cardiovascular, cancer, and HIV care. The report also lists multiple reasons that may be the source of this disparity including, patient mistrust, language barriers, geography, and others.

The report then mentioned ways to lower these disparities. Many different areas of intervention were included like legal, regulatory, policy, health systems wide, patient education and empowerment, cross-cultural education in health professions, data collection, and completing required research. Overall, the general recommendations of this report were that increased awareness of disparities in healthcare is required and that there are quite a few routes to intervention that can be taken.

### **What to expect in US healthcare in 2024 and beyond McKinsey 2024:**

In this McKinsey report, they project a 7% compound annual growth rate (CAGR) in healthcare profit pools, increasing from \$583 billion in 2022 to \$819 billion by 2027. This growth is

anticipated to be driven by segments such as Medicare Advantage, outpatient care settings, healthcare services and technology (HST) businesses, and specialty pharmacy services. Conversely, areas like general acute care and Medicaid are expected to experience slower growth.

Key factors influencing these shifts include changes in payer mix, with a projected rise in Medicare Advantage enrollment and managed care participation among dual-eligible individuals, and the expansion of value-based care models, which are expected to cover 90 million lives by 2027, up from 43 million in 2022. Health systems are anticipated to see financial performance improvements due to transformation efforts, mergers and acquisitions, and revenue diversification. Additionally, the adoption of technology is expected to drive growth in HST businesses, particularly those offering measurable near-term improvements, while specialty pharmacy services are projected to continue their rapid expansion.

2. A major problem I saw was the disparity in healthcare due to our inefficient healthcare system as mentioned in the “Crossing the Quality Chasm” report. Given that the U.S. has some of the best scientific knowledge the health care system fails patients too often. The report also details how the healthcare system has not adapted to the current patient needs which is heavily skewed towards aging populations and chronic conditions. Instead, the current care approach is still on acute, episodic care needs. There are also issues with poor organization that lead to overly complex care and resource waste. Ultimately, all these problems combine into less than ideal care delivery for patients in the U.S.

3. I believe major challenges would include finding the exact pain points that are leading to inefficient care as well as training hospital staff to change their current operations in favor of more optimized processes. In terms of solutions, there are many aspects to address such as the current mindset towards care, improving technological tools, and involving the correct policy and provider stakeholders.

Some preliminary ideas for solutions would be to adopt a new payer-provider model with a heavier emphasis on care-based payment incentives. We could also look at designing better information systems that catch more errors whilst also helping improve efficiency within hospitals. I believe both these solutions would be aided by information, communication and/or decision technologies.

4. In the “Preventing Medication Errors” brief, the major patient safety issue mentioned is the prevalence of preventable adverse drug events (ADEs). ADEs can happen to anyone who takes any sort of medication. The Institute of Medicine estimates that there are at least 1.5 million preventable ADEs yearly within the United States. Additional research done by the Institute of Medicine found that a hospitalized patient could on average be subjected to at least one medication error each day of their stay. Errors could result from multiple causes. One of the most common is hospital workers making human errors during prescribing, dosing, administering, and monitoring the drug’s effects. The reason this is a significant issue is the high rate of it within the United States. This is particularly important as almost everyone will take

medication at some point in their lives and therefore the chances of ADEs are high for a large population.

5. In the “Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care,” the disparity in cardiovascular care is discussed. Evidence is produced that relative to whites, African Americans and sometimes Hispanics are less likely to receive appropriate cardiac medication, undergo coronary artery bypass surgery, or just receive proper medical attention. This disparity has been seen across a variety of factors including insurance status, income, age, comorbid conditions, and symptom expressions. This disparity is significant because it has been associated with a greater death rate for African-American patients.

6. In the “Integrating Social Care Into Healthcare Delivery,” report, issues with care for those with Medicare/Medicaid is discussed. The report states that patients with Medicare/Medicaid, i.e. the elderly, have the highest social needs but oftentimes these needs are unmet. This is due to the division of financing between the state and federal healthcare agencies which prevents comprehensive delivery of care. This issue is significant because the population of elderly people is rapidly increasing and they will soon become a large percentage of the patient population. This means our healthcare system will be under-serving an incredibly large portion of the population if we do not address the issues our elderly population faces.

Bio: I graduated with a Bachelor’s degree in Biomedical Engineering from Rutgers University in May 2022. After graduating, I worked at a mid-tier consulting firm, PA Consulting, in their operating model division servicing the healthcare and life sciences industry. My personal interests lie in learning about operational inefficiencies within healthcare systems and understanding how to minimize these through the use of data and information systems.