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HIM5065

**Issue Title:** Monkeypox as an Emerging Public Health Challenge

**Issue Description:** Monkeypox is a viral zoonotic disease that re-emerged as a global public health concern in 2022 affecting tens of thousands of individuals across more than 100 countries. The virus spreads primarily through direct skin-to-skin contact with rashes or scabs from an infected person. It may also be transmitted through saliva, respiratory secretions, bodily fluids, or lesions which makes early detection and rapid response critical. In the United States, cases were concentrated in certain social and sexual communities, but affected people across diverse communities, particularly those with limited access to testing, vaccines, and timely medical care. This issue is important because monkeypox represents both an emerging infectious disease and a test of public health preparedness. The outbreak revealed gaps in surveillance, data integration, and the distribution of vaccines and therapeutics. According to the CDC, over 30,000 U.S. cases were documented by late 2022, with hospitalizations more common among individuals with underlying conditions. Monkeypox shows how diseases connect to bigger public health issues, like whether people can get healthcare, their income level, or where they live. Since those things affect who is more likely to get sick and how well they recover.

**Data Requirements Analysis**

**Data Type #1:** Lab Test Results and Patient Records

**Data Category:** Clinical/Patient-Level Data

**Description:** Includes electronic health record data such as lab test results, ICD-10 codes for monkeypox, vaccination status, and hospitalization records.

**Data Source(s):** Electronic health records, hospital labs, CDC case reports, and state health department databases.

**DIKW Level:** Raw lab results will be the data, which must be processed into a confirmed case count for information and combined with other datasets to create knowledge about outbreak patterns.

**Collection Challenges:** Not all facilities report consistently. Diagnostic capacity varies by location. Interoperability issues limit data sharing. The stigma may discourage patients to seek testing.

**Course Connection:** Relates directly to our discussions of clinical data in EHR systems and how they support disease tracking and population health.

**Data Type #2: Case Counts and Outbreak Reports**

**Data Category:** Public Health Surveillance Data

**Description:** Includes case numbers and outbreak trends reported through CDC’s National Notifiable Diseases Surveillance System, WHO dashboards, and state/local health departments.

**Data Source(s):** CDC’s National Notifiable Diseases Surveillance System, World Health Organization (WHO) outbreak dashboards, state and local health departments.

**DIKW Level:** This moves information to knowledge by analyzing surveillance data and mapping it against demographic data to reveal where the disease is most prevalent.

**Collection Challenges:** Reporting delays, underreporting, and inconsistent case definitions across states and countries.

**Course Connection:** Connects to public health informatics concepts and surveillance systems that monitor / track emerging infectious diseases.

**Data Type #3:** Demographic Characteristics of Cases

**Data Category:** Population-level/Demographic Data

**Description:** Age, sex, race/ethnicity, location, and underlying health conditions of individuals affected by monkeypox. This identifies vulnerable populations and helps with intervention.

**Data Source(s):** U.S. Census Bureau, hospital records, community health assessments, and CDC outbreak reports.

**DIKW Level:** This moves information to knowledge by analyzing demographic details such as age, sex, race/ethnicity, location, and health status. When these details are compared with case counts, they reveal which groups and areas are most affected by monkeypox.

**Collection Challenges:** Demographic fields that are missing or incomplete and privacy concerns when connecting the health data to population-level data.

**Course Connection:** Relates to the Social Determinants of Health framework, specifically the domains of healthcare access and economic stability discussed in class.

**Data Type #4: Community Health Surveys and Behavioral Data**

**Data Category:** Social Determinants of Health (SDOH) Data

**Description:** Factors such as access to healthcare, health literacy, socioeconomic status, stigma, and healthcare-seeking behavior that influence infection risk, and treatment outcomes.

**Data Source(s):** Community health surveys, social services data, academic research studies, CDC behavioral health data systems.

**DIKW Level:** This moves information to knowledge by analyzing survey and community data to identify patterns, such as how low healthcare access, stigma, or income levels influence infection rates and treatment outcomes.

**Collection Challenges:** Social and behavioral data are difficult to capture consistently across populations, and stigma may discourage people from reporting accurately. Data is often fragmented across agencies, and privacy concerns can restrict the ability to connect the data with clinical and surveillance records.

**Course Connection:** This relates directly to the Social Determinants of Health framework we discussed in class, showing how non-clinical factors like socioeconomic status and access to care play a key role in shaping public health outcomes and disparities during an infectious disease outbreak.

**Health Informatics Solutions**

**Systems and Tools:**

1. **Electronic Health Records (EHRs):** Capture structured clinical data such as lab results, vaccination status, and case documentation for monkeypox patients.
2. **Public Health Information Network (PHIN) and Surveillance Systems:** Collect and share real time data between hospitals, labs, and health departments to detect emerging outbreaks quickly.
3. **Geographic Information Systems (GIS):** With population analytics, map cases, demographics, and healthcare access to identify hotspots and direct resources.

**Implementation Approach:** Integrating EHRs with public health surveillance systems ensures that lab confirmed cases are automatically reported. GIS overlays demographic and social data to identify vulnerable populations. Public health officials can then use analytics to prioritize vaccination sites and allocate resources. Mobile health applications could also support patient education and self-reporting symptoms

**Expected Outcomes:** Implementing these informatics tools would support earlier detection of monkeypox clusters, improve coordination between healthcare providers and public health agencies, and lead to more equitable vaccine distribution. Together these improvements would reduce transmission through targeted outreach and faster response times.

**Challenges and Considerations:** Interoperability issues across EHR systems may delay case reporting. Privacy concerns arise when linking behavioral and social data with clinical data. Stigma may limit patient willingness to self-report. Additionally, resource limitations could affect the rollout of mobile and GIS based tools in underfunded communities.

**Reflection and Course Connections**

**DIKW Framework Application:** This analysis shows how raw clinical and surveillance data (Data) can be processed into confirmed case counts and trends (information). When combined with demographic and social data, these patterns provide knowledge about which groups and areas are most affected. Finally, using this knowledge to guide vaccination campaigns and outreach represents wisdom since it applies insights to real world decision-making.

**Population vs. Public Health:** Monkeypox is primarily a public health concern because it requires coordinated surveillance, testing, vaccination and education efforts across communities. However, it also intersects with population health since outcomes vary by age, geography, socioeconomic status, and other demographic factors. Together, this highlights the need for collaboration between public health agencies and healthcare providers.

**Health Equity Considerations:** The outbreak demonstrated how disparities in access to healthcare, testing, and vaccination left certain groups more vulnerable. Individuals in lower income areas, those with limited insurance coverage, and communities facing stigma experienced barriers to timely care. Addressing these inequities is essential to preventing worse outcomes and reducing the burden of disease.

**Future Implications:** Emerging technologies such as real-time surveillance, mobile health applications, and predictive analytics can improve future outbreak response. Policy changes that support stronger data sharing and interoperability between EHRs and public health systems will be critical. Strengthening these connections will result in faster detection, more equitable interventions, and greater preparedness for future emerging infectious diseases.

**References**

Zhou, L. (n.d.). *Introduction to healthcare informatics*. AM Health Publishing.ISBN: 978158426878

HIM 5065 Course Notes. (2025). *Health informatics foundations: Week 1 comprehensive course notes.* Florida International University.

HIM 5065 Lecture Slides. (2025*). Introduction to health informatics: Weeks 1 and 2*. Florida International University.

Centers for Disease Control and Prevention. (2023, January). *Monkeypox (mpox): 2022 outbreak global case data.* Retrieved September 5, 2025, from https://www.cdc.gov/poxvirus/monkeypox/index.html

World Health Organization. (2023). *Multi-country outbreak of monkeypox, 2022–2023.* Retrieved September 5, 2025, from https://www.who.int/emergencies/situations/monkeypox-2022

Thornhill, J. P., Barkati, S., Walmsley, S., Rockstroh, J., Antinori, A., Harrison, L. B., … Orkin, C. (2022). *Monkeypox virus infection in humans across 16 countries. New England Journal of Medicine,* 387(8), 679–691.