No Network? No Problem. Preparing for a Cyberattack in the Clinical Laboratory

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BACKGROUND

Between January 1, 2011, to December 31, 2021, there were 3,822 breaches of Protected Health Information (PHI) in the United States which affected 283,335,803 people[1]. Of those, 41.7% were hacking or Information Technology related, and 74% involved health care providers. In a national survey, 82.4% of hospitals included cybersecurity disasters in their Hazard Vulnerability Analyses (HVAs), but more than half did not have an Emergency Operations Plan in place related to cybersecurity[2].

OBJECTIVES

In alignment with continual readiness for emergency preparedness, Mayo Clinic requires its business units to develop response plans for a cyberattack. These response plans should guide continued delivery of life-saving and life-sustaining care while full network function is restored. Laboratory services are essential for continued delivery of safe patient care during a cyberattack, and effective continuity plans are required to support laboratory operations if one were to occur.

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PLANNING & IMPLEMENTATION METHODS

During the pandemic, work units established continuity plans that defined which services would be prioritized as staffing became constrained. These plans provide the framework for an orderly transition from conventional to contingency standards of care and outline triggers for modifying or reducing services and activities. In the clinical laboratories, the order in which testing would be discontinued is defined and reviewed annually. In a ransomware event, access to the intranet, internet, Electronic Health Record (EHR), and Laboratory Information System (LIS) will be immediately suspended. Ordering, resulting, and intermediate workflows will need to be performed manually and on paper. Laboratories with immediate patient care functions, such as the hospital lab, blood bank, and toxicology lab, were prioritized for initial planning efforts. These laboratories were tasked with evaluating network dependency for each testing platform (Table 1).

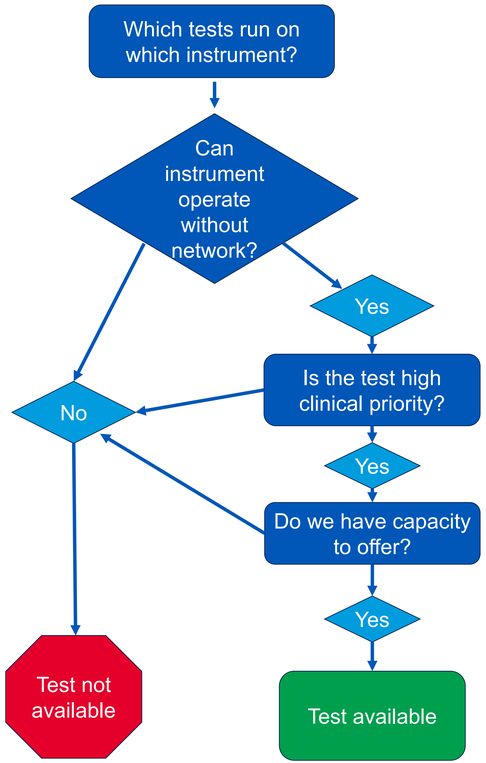
Instrument/ Kit Test	Is Network Required to Operate? Y/N	Result Printouts Available? Y/N	How long can instrument store results?	How many results can instrument store?	Result Form Doc ID	Comment
Liat	N	N	Indefinite - oldest results are deleted as new come in once the max number is reached	20,000 results (includes both patient and QC)	Adapt HCL form? F.64774 MC form for single use?	Would go to old school manual process. QC check after network up

Table 1. Network Dependency Assessment

Upon completion of the network dependency evaluations, platforms deemed network-dependent were identified and the tests performed on those instruments were flagged as being unavailable. For the remaining tests, laboratory supervisors assessed the number staff required to perform each test in an entirely manual manner. Based on that throughput, the testing that could be performed with typically scheduled staff on duty was defined.

To inform resource management and capacity prioritization, the test catalog was grouped into the following lists, and resource needs identified tests and tasks that:

- Would require additional specially trained laboratory staff
- Would require additional laboratory staff
- Could be performed by non-laboratory staff



RESULTS & LESSONS LEARNED

Most laboratory instruments can run without network connectivity; however, all required specimen information, reconciliation of results, and communication back to providers must be managed through manual processes. Nearly all lab testing procedures will require some modification, and lab throughput will be significantly decreased. The return to unfamiliar paper-based ordering and result communication will present significant patient safety risk through specimen or result misidentification. Staffing will need to be augmented by other trained lab professionals and non-lab personnel to handle the increased specimen and data management needs. Impairment of building control systems will impact air handling, air temperature, and potentially other essential utility services, which will further constrain lab operations. Collaborative planning with hospital leaders will need to occur to direct testing capacity to the highest priority patient care needs.

CONCLUSIONS

As part of emergency preparedness/continual readiness, Mayo Clinic has required a cyberattack plan for its business units. Through the process of planning a response for a cyberattack, there are key items that need to be considered in evaluating all operational needs associated with an effective response - patient care continuity, a triage and prioritization process, identifying all networking interdependencies, and outlining communication pathways.

Broader Considerations

- What clinical services will be provided during a downtime?
- How will your utility infrastructure operate without network access?
- Do you have established clinical and business continuity plans?

REFERENCES

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