



LEADERSHIP FOR IT SECURITY & PRIVACY ACROSS HHS

# HHS CYBERSECURITY PROGRAM

OFFICE OF INFORMATION SECURITY



## Lessons Learned from the HSE Cyber Attack

02/03/2022



- Background on the HSE Cyber Attack
- Threat Profile for Conti Ransomware
- HC3 Observations for Conti Ransomware
- Timeline of the Incident
- Key Findings
- General Takeaways for Healthcare Organizations

## Slides Key:



**Non-Technical:** Managerial, strategic and high-level (general audience)



**Technical:** Tactical / IOCs; requiring in-depth knowledge (sysadmins, IRT)



- The Health Service Executive (HSE) of Ireland is the country's publicly funded healthcare system under the Irish Department of Health, consisting of 54 public hospitals directly under HSE authority, and voluntary hospitals which utilize national IT infrastructure.
- On May 14, 2021, HSE suffered a major ransomware cyberattack that caused all its IT systems nationwide to be shut down.
- It became the most significant cyberattack on an Irish state agency, as well as the largest known attack against a health service computer system in history, occurring during the COVID-19 pandemic.
- It took four months to completely recover from the attack, with HSE sustaining numerous impacts to healthcare delivery during this timeframe (discussed in the next slide).
- Conti ransomware was responsible for the incident.
- On December 3, 2021, HSE published an Independent Post Incident Review consisting of a 157-page redacted report, which is the foundation of this brief.
- Full report of the Conti Cyber Attack on the HSE: <https://www.hse.ie/eng/services/publications/conti-cyber-attack-on-the-hse-full-report.pdf>



Feidhmeannacht na Seirbhíse Sláinte  
Health Service Executive





- Hospital staff were forced to revert to pen and paper
- 80% of the HSE IT environment was encrypted, severely disrupting healthcare services throughout the country
- Prevented access to diagnostics and medical records
- Exposed the private information of thousands who received the COVID-19 vaccine
- National vaccination program was not affected
- Exfiltrated 700 GB of unencrypted data including protected health information (PHI)
- Specialists tracked stolen HSE data to a commercial server in the U.S.
- Lawsuits from patients over interrupted patient care
- Large financial cost to respond to the incident
- And more...





## Malware

- **First Surfaced:** December 2019
- **Suspected Predecessor(s):** Ryuk
- **Malware Capabilities:** Ransomware written in C/C++ that mainly encrypts local files
- **Targeted Systems:** All versions of Windows known to be affected
- **Associated Malware/Tools:** TrickBot, IcedID, Cobalt Strike, BazarLoader, Zloader, Rclone, LaZagne, Sidoh, etc.
- **Infection Vectors:** Spear phishing; Remote Desktop Protocol (RDP); phone calls; fake software; other malware; common vulnerabilities in external assets (i.e., Log4j)

## Group

- **Origin:** Eastern Europe, Russian Federation
- **Industry Names:** Wizard Spider
- **Associated Actors:** UNC1878, TEMP.MixMaster, Grim Spider, UNC2633, UNC2727
- **Forum Presence:** Public and Private Forums
- **Targeted Countries:** United States, France, Germany, Canada, UK, Italy, Australia, Spain, Netherlands
- **Targeted Industries:** Manufacturing, construction, retail, legal, financial, technology, automotive, hospitality, transportation, energy, healthcare
- **Status:** Conti became the first professional-grade, sophisticated ransomware group to weaponize Log4j2 with a full attack chain in December 2021
- **Classification:** Highly-sophisticated, financially-motivated cybercriminal ransomware-as-a-service (RaaS) program; human-operated
- **Threat to HPH Sector:** Elevated Risk





- HC3 tracked at least **40 ransomware incidents** involving Conti ransomware in 2021
- Targeted countries within the healthcare industry included Australia, Colombia, France, Germany, India, Italy, Netherlands, the United Kingdom, and the United States
- HPH entities in at least **20 U.S. states** experienced Conti ransomware incidents or appeared on the Conti ransomware extortion blog
- **Sub-industries** within healthcare impacted included Biotechnology, Health or Medical Clinic, Healthcare Industry Services, Home Health Care Services, Hospice or Elderly Care, Hospital, Pharmaceutical Industry, and Public Health entities

Industry Breakdown: Conti Ransomware Incidents (2021)

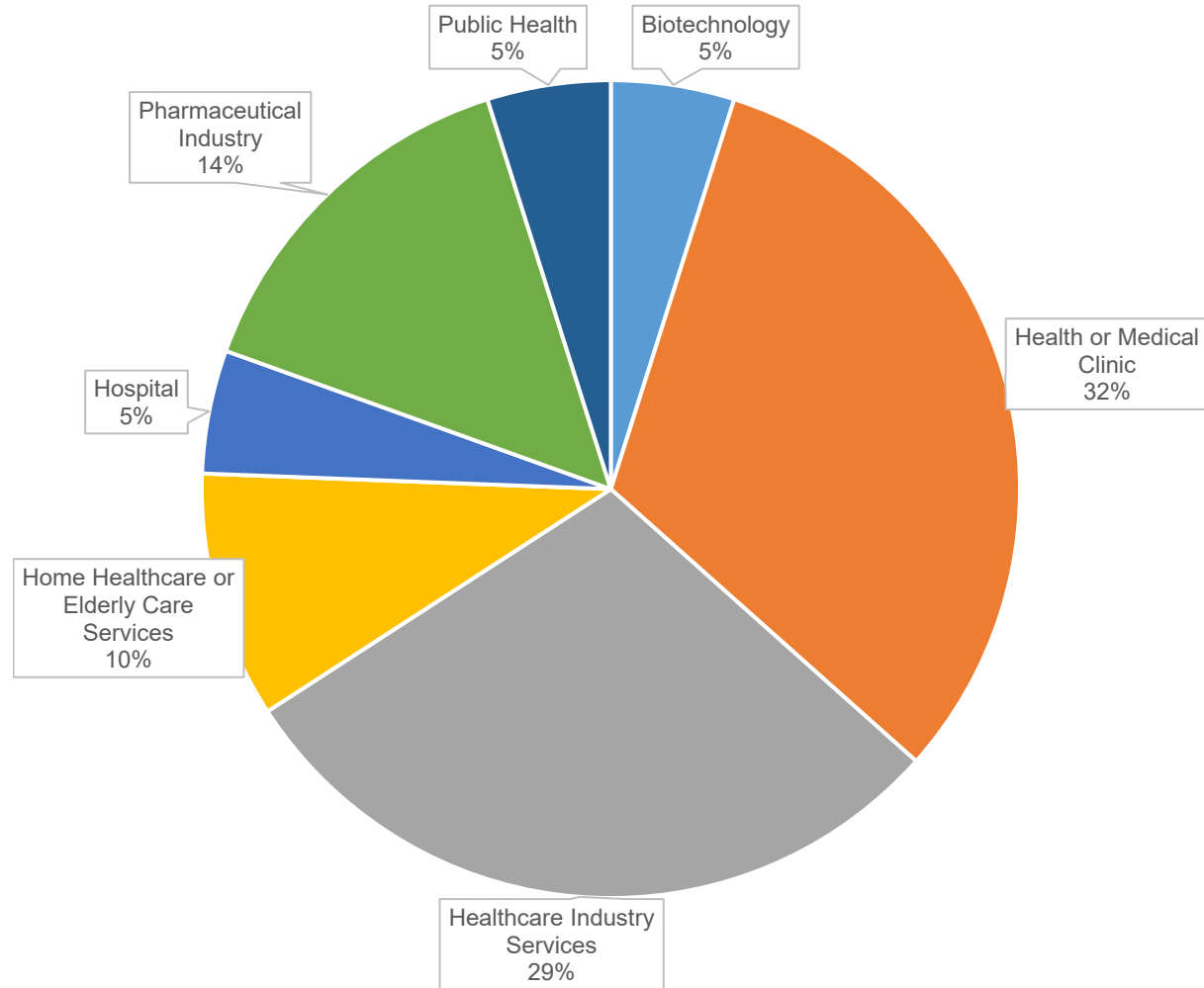
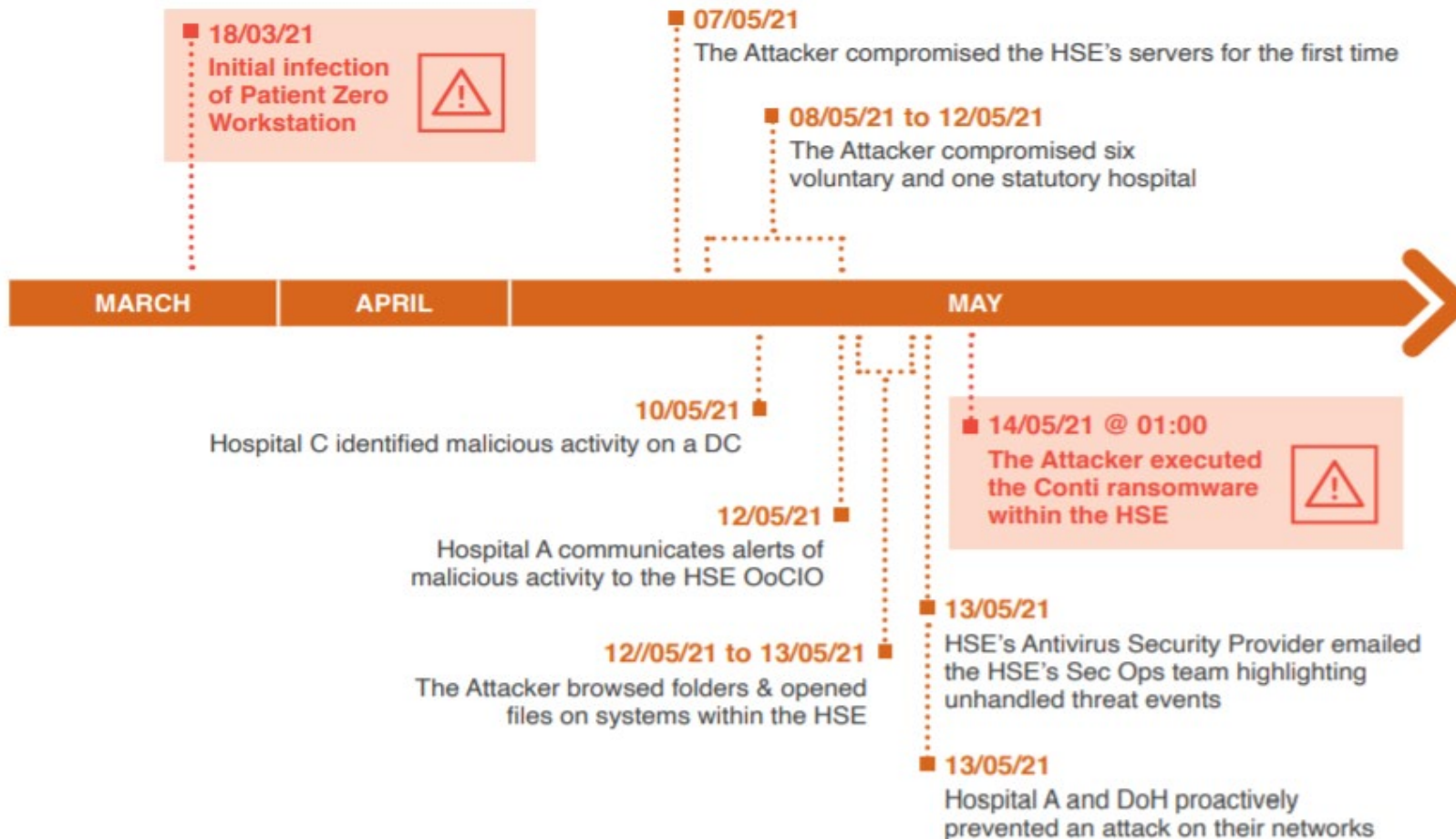




Figure 1: Summary Timeline 18 March - 14 May 2021

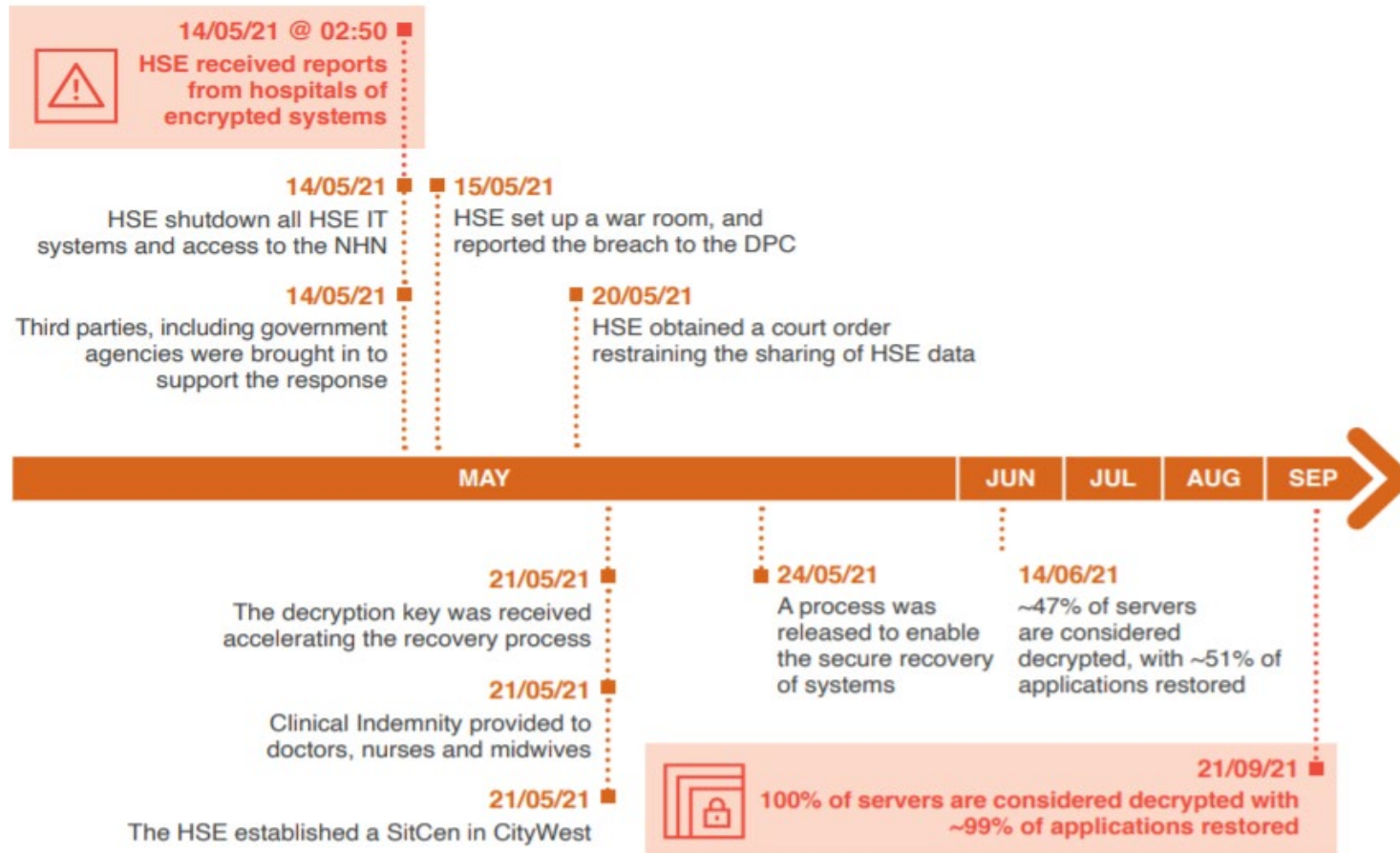


Source: HSE/PwC





**Figure 2: Summary Timeline 14 May - 21 September 2021**



Source: HSE/PwC







- The HSE did not have a single responsible owner for cybersecurity, at senior executive or management level at the time of the incident.
- There was no dedicated committee that provided direction and oversight of cybersecurity and the activities required to reduce the HSE's cyber risk exposure.
- There were known weaknesses and gaps in key cybersecurity controls.
- The lack of a cybersecurity forum in the HSE hindered the discussion and documentation of granular cyber risks, as well as the abilities to identify and deliver mitigating controls.
- The HSE did not have a centralized cybersecurity function that managed cybersecurity risk and controls.
- It was a known issue that the teams with cybersecurity responsibilities were under-resourced.



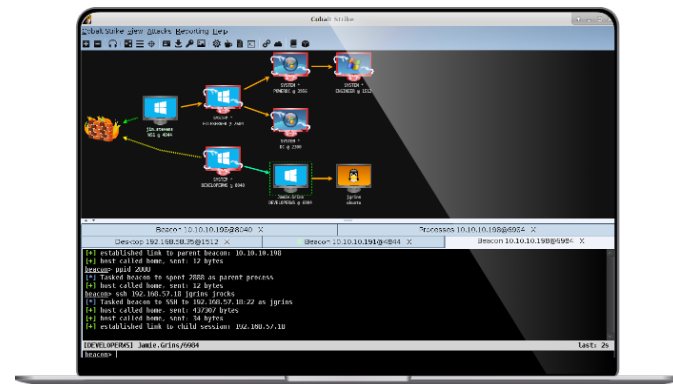


- The HSE's technology has grown organically and is consequently overly complex, increasing the vulnerability of the HSE to cyber attacks.
- The HSE had a large and unclear security boundary that encompassed many of the organizations connected to the National Healthcare Network (NHN).
- The HSE's effective security boundary did not align with its ability to mandate cybersecurity controls.
- There was no effective security monitoring capability that was able to detect, investigate and respond to security alerts across the HSE's IT environment.
- The antivirus tool was over-relied upon to detect and prevent threats on endpoints.
- The IT environment had high-risk gaps relating to 25 out of 28 of the cybersecurity controls that are most effective at detecting and preventing human-operated ransomware attacks.
- The HSE did not have a documented cyber incident response plan and had not performed typical preparatory activities, such as exercising the technical response.





- The cyber attack was not actively identified nor contained prior to the ransomware execution, despite the attacker performing noisy and ‘unstealthy’ actions.
- The HSE’s antivirus identified a tool commonly used by ransomware groups (Cobalt Strike) on six servers on May 7, 2021 (and several more servers in the following days) but these alerts were not appropriately actioned.
- Two voluntary hospitals identified suspicious activity prior to the execution of ransomware, but a HSE centralized response was not initiated.
- Two organizations successfully acted on detections of the attacker, preventing the deployment of ransomware within their estates.
- The HSE, with the help of third parties, mobilized a response to the ransomware attack and overcame many of the significant challenges the ransomware attack presented, drawing on their experience responding to crises including COVID-19.
- The HSE was reliant on third parties in the early weeks of the incident to provide structure to the response activities.
- Time was lost during the response due to a lack of pre-planning for high impact technology events.







- The impact of the ransomware on the IT environment was reported by the HSE's management to lead to 80% encryption.
- The impact of the ransomware attack on communications was severe, as the HSE almost exclusively used on-premise email systems (including Exchange) that were encrypted, and therefore unavailable, during the attack.
- The HSE took action to contain the ransomware attack by powering down systems and disconnecting the NHN from the internet.
- It is unclear how much data would have been lost if a decryption key had not become available.
- Without the decryption key, it is unknown how long it would have taken to recover systems from backups, but it would have likely taken considerably longer.
- The HSE missed opportunities for efficiencies in the recovery of systems and applications due to a lack of preparedness.





## Governance and cybersecurity leadership

1. Understanding of technology dependency and governance of technology risk
2. Cybersecurity strategy and leadership
3. Ransomware-specific assessment
4. Effective cybersecurity monitoring and response
5. Testing of cybersecurity capability through simulated attacks

## Preparedness to respond and recover

1. Cybersecurity-specific incident response and crisis management plans
2. Business continuity planning and IT disaster recovery planning for a ransomware scenario
3. Retained incident and crisis support





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**Questions**



## Upcoming Briefs

- EMR in Healthcare (2/17)
- Healthcare Cybersecurity: 2021 Year-in-Review (3/3)
- As-a-Service Model of Cybercrime (3/17)

## Product Evaluations

Recipients of this and other Healthcare Sector Cybersecurity Coordination Center (HC3) Threat Intelligence products are highly encouraged to provide feedback. If you wish to provide feedback, please complete the [HC3 Customer Feedback Survey](#).

## Requests for Information

Need information on a specific cybersecurity topic? Send your request for information (RFI) to [HC3@HHS.GOV](mailto:HC3@HHS.GOV).

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*HC3 works with private and public sector partners to improve cybersecurity throughout the Healthcare and Public Health (HPH) Sector*

### Products



#### Sector & Victim Notifications

Direct communications to victims or potential victims of compromises, vulnerable equipment or PII/PHI theft, as well as general notifications to the HPH about current impacting threats via the HHS OIG.



#### White Papers

Document that provides in-depth information on a cybersecurity topic to increase comprehensive situational awareness and provide risk recommendations to a wide audience.



#### Threat Briefings & Webinar

Briefing presentations that provide actionable information on health sector cybersecurity threats and mitigations. Analysts present current cybersecurity topics, engage in discussions with participants on current threats, and highlight best practices and mitigation tactics.

Need information on a specific cybersecurity topic, or want to join our Listserv? Send your request for information (RFI) to [HC3@HHS.GOV](mailto:HC3@HHS.GOV), or visit us at [www.HHS.Gov/HC3](http://www.HHS.Gov/HC3).



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