The Experience of a Paediatric Radiology Department during a Cyber Attack on the National Healthcare System

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#### No Disclosures

- I will name hardware and software products
- No financial affiliation with these companies

# CHI @ Crumlin, Dublin

- Largest paediatric hospital in Ireland
- Tertiary referral centre
  - Oncology / Neuro-oncology
  - Gastro-enterology/ Hepatology
  - All-Ireland Cardiology / Cardiac Surgery
- 52,000+ examinations per year CR, CT, MR, US, NM, PIR
- National PACS system





# Health Service Executive (HSE)



- Publicly funded organization responsible for healthcare provision in Republic of Ireland
- 67,000+ employees, €16 billion per annum
- National IT Systems



# Cyber Attack, 14<sup>th</sup> May 2021

- Ransomware cyber attack on HSE IT System
  - Denial of service, bitcoin ransom
- All HSE IT systems shut down
- Largest known attack against healthcare service computer system
- Core Patient and Radiology systems out of action
- Local level all IT systems shut down
- No PACS, RIS (Radiology Information System), HIS (Hospital Information System), laboratory data, emails, Internet

#### Immediate Response, 0 – 72 hrs

- No access to patient data or previous imaging
- Continue to function as acute imaging dept?
- Patient safety, minimise risk
- Immediately develop alternative imaging pathways in department

### Immediate Response, 0 – 72 hrs

- Paper requests from all referrers
  - Charts available for GA
  - New Medical Record Numbers
- Hand written reports by Radiologists
  - Digital dictation, Printers, GDPR (EU Data Protection Directive)
- US, CT, MRI, Fluoroscopy
  - Review at work stations
  - Local storage



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#### Immediate Response, 0 – 72 hrs

- Plain radiographs
- Did not return to film processing
- Keep imaging digital
- Review and reporting more difficult
  - Non-portable radiographs reviewed in x-ray rooms
  - 1 workstation for portable radiographs in dept.
- Mini PACS PC, first 24 hrs





#### Status Quo / Limbo Phase

- Resolution would take several weeks
- All PCs considered infected (...30,000)
- MiniPACS / review in dept unsatisfactory
  - High volumes traffic
  - PICU, Emergency Dept.
- Needed a better system



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# Status Quo / Limbo Phase

- 6 iMacs<sup>®</sup> in key areas
  - Radiology, US
  - Emergency, PICU x2 (Cardiac Sx), Theatre
- Horos<sup>®</sup> DICOM freeware
- Radiographers as "Runners"
  - Copying onto USB, uploading imaging data in key areas
- Radiologists Reporting
  - Communication of unexpected, critical findings
- Administration
  - Triplicate copy of reports, distribution





#### Horos<sup>®</sup> and iMac<sup>®</sup>

- Excellent screen resolution of iMac (2019), 21", 4K retina display
- Horos<sup>®</sup> freeware
- Intuitive ease of use, search, image manipulation





# US / CT / MR Imaging Pathway



# Radiographic Imaging Pathway / Mini PACS



#### Preparation to reboot of services

- All PCs considered infected (30,000)
- Clean back up data, rebuild servers
- IT, Radiographers
- Irish Army
- Back online 19 days later



Source: Irish Defence Forces

#### Phase 4 - Returning to "Normal"

- Pre cyber attack levels of service provision
- Matching of imaging data with actual patient data
  - Old vs new record numbers
  - "Baby Murphy", Mac/Mc, O'Reilly, O Reilly
- Re-reporting of backlog
  - Matching to Radiologists
- Discrepancy reports

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		No		
Notes (optional)				

#### Discrepancies + Errors

- Colleague currently reviewing data
  - Illegible / incomplete forms
  - History (2%)
  - Missing forms
- Different dates between acquisition and importing to PACS
- No major discrepancy /critical miss





During cyber attack



#### Previous Imaging

Missing report





Intra-op US Prevention of wrong site Sx



#### Take Home Messages 1 of 3

- Back up your files / folders on work PC
- Maintain / increase vigilance of spam emails
- Prepare for possibility of a cyber attack

#### Take Home Messages 2 of 3

- Consider developing local guidelines (major disaster plan)
  - Alternative systems of communication
  - Consider innovative solutions
  - Ongoing analysis + review
- Run simulations
  - Imaging pathways of urgent vs non-urgent examinations

#### Take Home Message, 3 of 3

- Multidisciplinary approach
  - Administration, Radiographers, Radiologists, Nursing
  - IT Dept., Senior Management
  - Non-Radiologists
- Major stressor!

# Thank you!





