Health Industry Cybersecurity Practices

Managing Threats and Protecting Patients

24th Annual Compliance Institute

1

HACKERS CONVENTION

black hat®

DEFCON®

2


50,000 Hackers in Attendance

3


Social-Engineer
Village
Brought to you by
the team at
Social-Engineer.Org

4

5

6


IoT
VILLAGE
&
DEF CON BIOHACKING VILLAGE
@DC_BHV
I Am The Cavalry
@iamthecavalry
Medical Device Hackathon
Take part in finding vulnerabilities in these connected medical devices.
Simply ask the staff to help you with a device and start working on it.
Any vulnerabilities found should be disclosed to the vendor.

7


HACKING
KITS.
DEVICES.
LABS. TOOLS.
VIDEOS.
AND MORE.

8

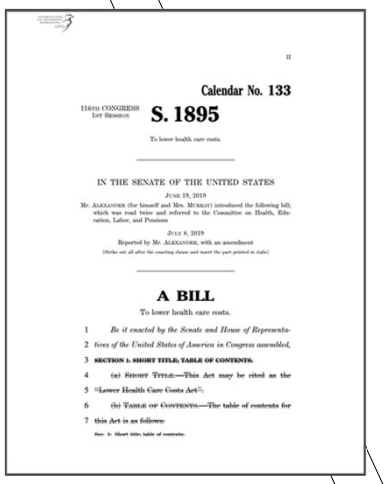
2017

- Windows Vulnerability
- 300,000 computers shut down
- One fifth of the UK Health System Shut Down

2020

- Urgent 11 – Sept 2019 (CVSS 9.8)
- BlueKeep – Wormable like Wannacry
- 49 Windows Vulnerabilities – Jan 2020
- Many more…….
- COVID 19 – Healthcare Industry (Critical)

9



Calendar No. 133

116TH CONGRESS 1ST SESSION **S. 1895**

To lower health care costs.

IN THE SENATE OF THE UNITED STATES

JUNE 19, 2019

Mr. ALEXANDER (for himself and Mrs. MURRAY) introduced the following bill, which was read twice and referred to the Committee on Health, Education, Labor, and Pensions

JULY 8, 2019

Reported by Mr. ALEXANDER, with an amendment

[Strike out all after the enacting clause and insert the part printed in italic]

A BILL

To lower health care costs.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the ''Lower Health Care Costs Act''.

(b) TABLE OF CONTENTS.—The table of contents for this Act is as follows:

Sec. 1. Short title; table of contents.

Lower Health Care Costs Act – Section 502

- Senate Bill 1895
- Recognition of Security Practices
  - ***Approaches promulgated under section 405(d) of the Cybersecurity Act 2015***
- Reduce Breach Exposure
  - Mitigate fines
  - Early favorable termination of an audit
  - Limit remedies from HHS
- Documentation for 12 months

10

10

Healthcare – #1 Target

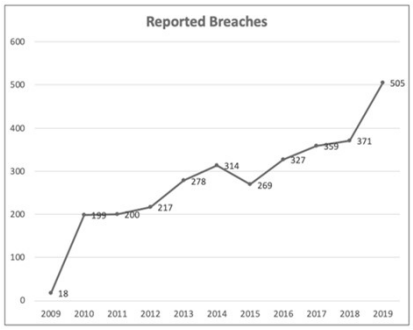
"FULLZ"

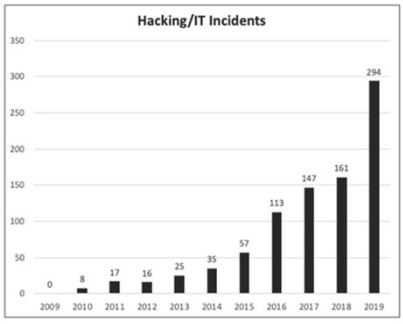
A compilation or package of information on a prospective fraud or identity theft victim.

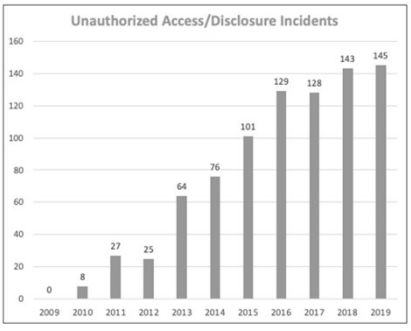
- Most costly across industry - $408
- Most valuable record for hackers - $500
- Highest "Churn Rate" due to breach
- Longest "Identify and Contain" times – 358 days
- Records breached in 2019 increased 300% - 41 million
- Fines and Fees hit $28m in 2019
- Least investment in cybersecurity
- Medical Devices Security = Patient Safety

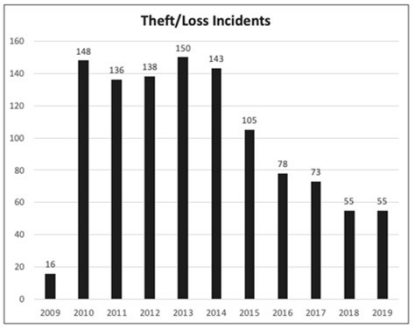
11

11



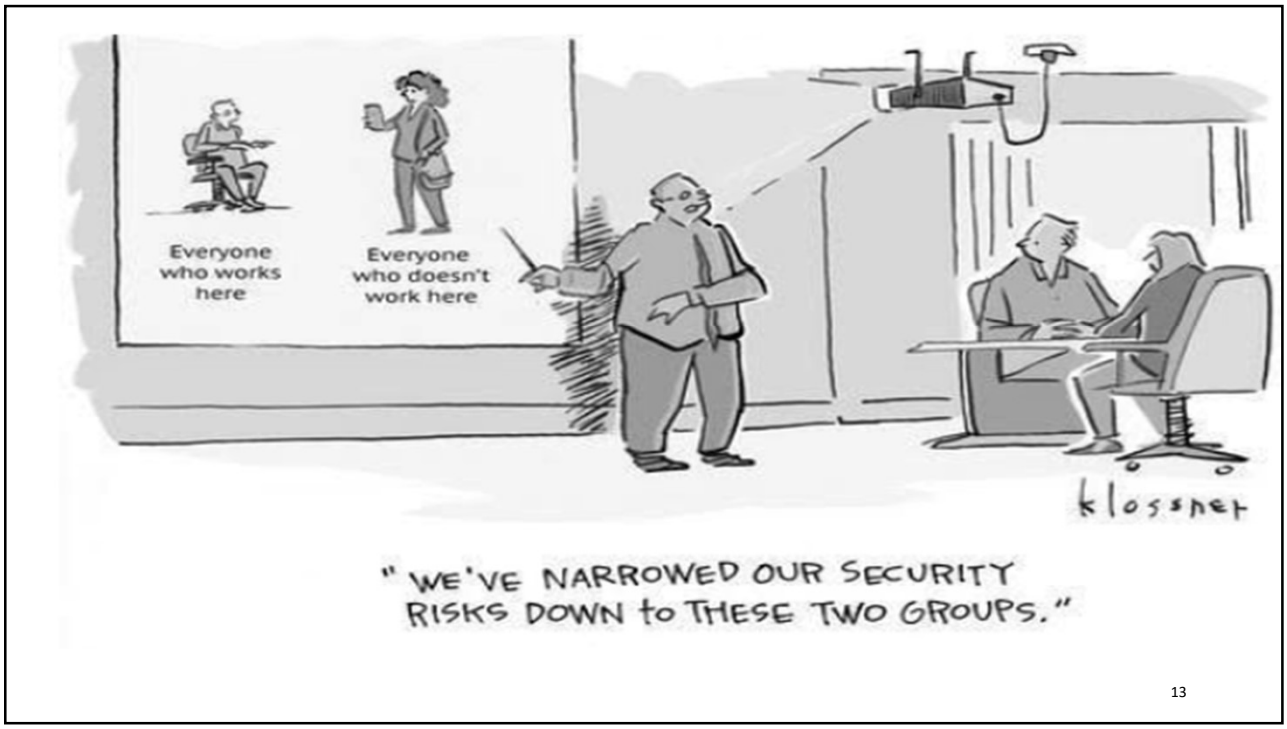






2

12


Everyone who works here
Everyone who doesn't work here
klossner
" WE'VE NARROWED OUR SECURITY RISKS DOWN to THESE TWO GROUPS."
13

13


14

14

HHS 405(d)
Aligning Health Care Industry Security Approaches

Healthcare & Public Health Sector Coordinating Council
PUBLIC PRIVATE PARTNERSHIP

Health Industry Cybersecurity Practices:

Managing Threats and Protecting Patients

"HICP"

2019 Winner FedHealthIT Innovation Awards

15

Ty Greenhalgh
ty@cybertygr.com

- Co-founder Cyber Tygr
- 30 years experience in HIM
- Henry Ford Health System – Most Innovative Technology of the Year
- Healthcare Information Systems & Privacy Practitioner (HCISPP) ISC^2
- HHS Joint Cybersecurity Workgroup
- NCHICA Biomedical Security Taskforce
- HHS led CISA 405(d) task group member

PROUD MEMBER

16

16

Director, Governance, Risk and Compliance
U.S. Department of Health and Human Services

- Office of Information Security (OIS), within the Department of Health and Human Services (DHHS) Office of the Chief Information Officer (OCIO)
- Federal Lead for the implementation of the Cybersecurity Act (CISA) of 2015, Section 405(d)

Julie Chua, PMP, CAP, CISSP
cisa405d@hhs.gov

17

17

Agenda

- Top 5 Current Threats
- 10 Mitigation Practices
- Traveling the 405
- Resources and Templates
- Where is the 405 going
- Questions

18

18

Cybersecurity Act (CSA) 2015

CSA Section 405

Improving Cybersecurity in the Health Care Industry

Section 405(b): Health care industry preparedness report

Section 405(c): Health Care Industry Cybersecurity Task Force

Section 405(d): Aligning Health Care Industry Security Approaches

19

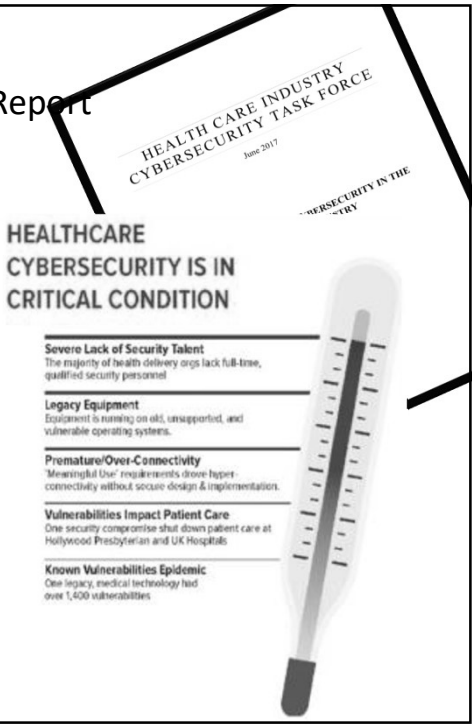
19

CSA 405(c)

Health Care Industry Cybersecurity Task Force Report

6 IMPERATIVES

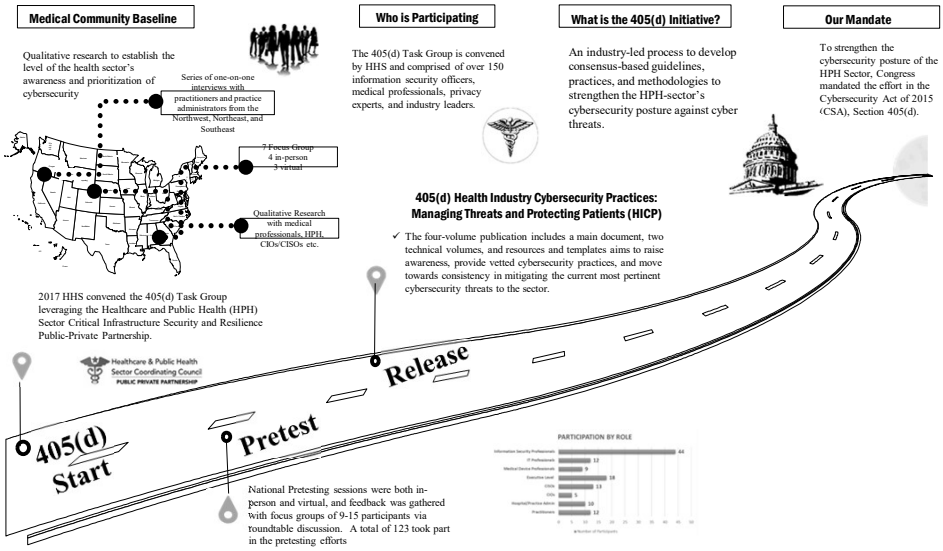
1. NIST CSF for leadership and governance
2. Security and resilience increased
   - *medical devices & Health IT*
3. Improve information sharing
4. Cybersecurity training & awareness
5. Develop workforce
6. Protect R&D and Intellectual Property



20

CSA 405(d)

Aligning Health Care Industry Security Approaches



21

21

- **HICP - Main Document**
  - Industry cybersecurity threats and vulnerabilities
  - Explores five (5) current threats
  - Presents ten (10) practices to mitigate those threats
- **HICP - Technical Volume 1**
  - Small healthcare organization
  - Ten (10) detailed cybersecurity mitigation practices
  - Nineteen (19) detailed sub-practices
- **HICP - Technical Volume 2**
  - Medium and Large healthcare organizations
  - Ten (10) detailed cybersecurity mitigation practices
  - Seventy (70) detailed sub-practices
- ***HICP - Resources and Templates***
  - Mappings to the NIST Cybersecurity Framework
  - An HICP assessment process
  - Sample Templates

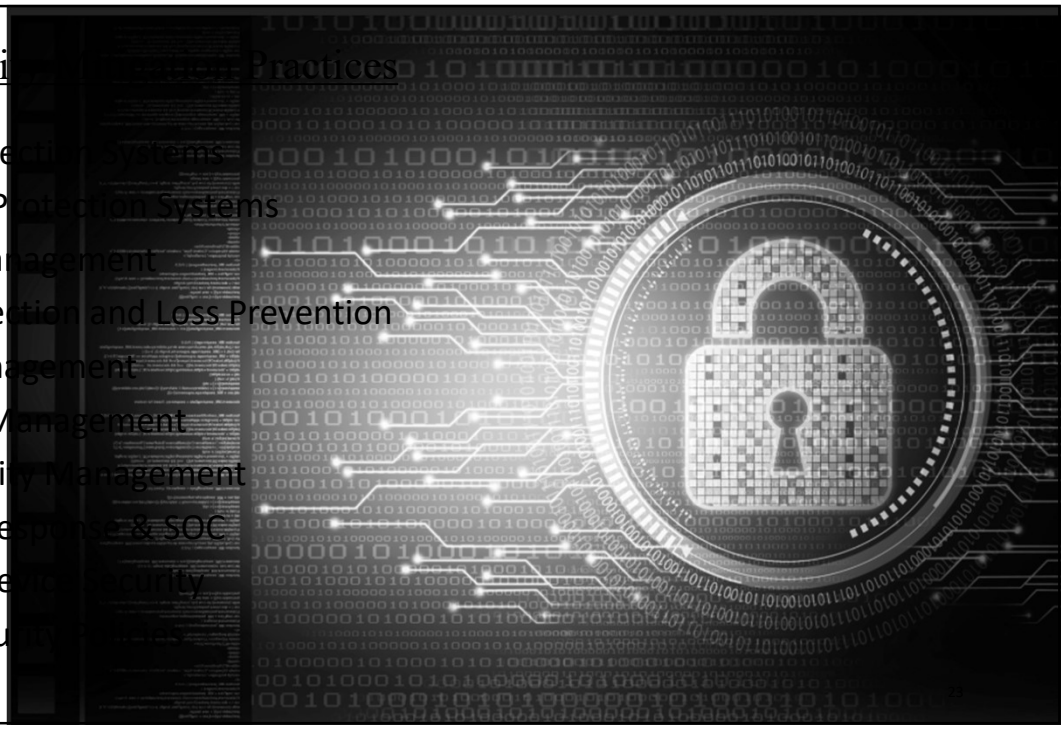
Top 5 Threats

1. **Email Phishing Attacks**
2. **Ransomware Attacks**
3. **Loss or Theft of Equipment or Data**
4. **Internal, Accidental, or Intentional Data Loss**
5. **Attacks Against Connected Medical Devices that May Affect Patient Safety**

22

Cybersecurity Protection Practices

1. Email Protection Systems
2. Endpoint Protection Systems
3. Access Management
4. Data Protection and Loss Prevention
5. Asset Management
6. Network Management
7. Vulnerability Management
8. Incident Response & SOC
9. Medical Device Security
10. Cybersecurity Training



23

Top 5 Threats

24

24

#1 Threat

Email Phishing Attack

CURRENT ATTACK VECTOR:
COVID 19

- Spear Phishing
- Executive Whaling
- Social Engineering
- Malvertising

25

25

#2 Threat

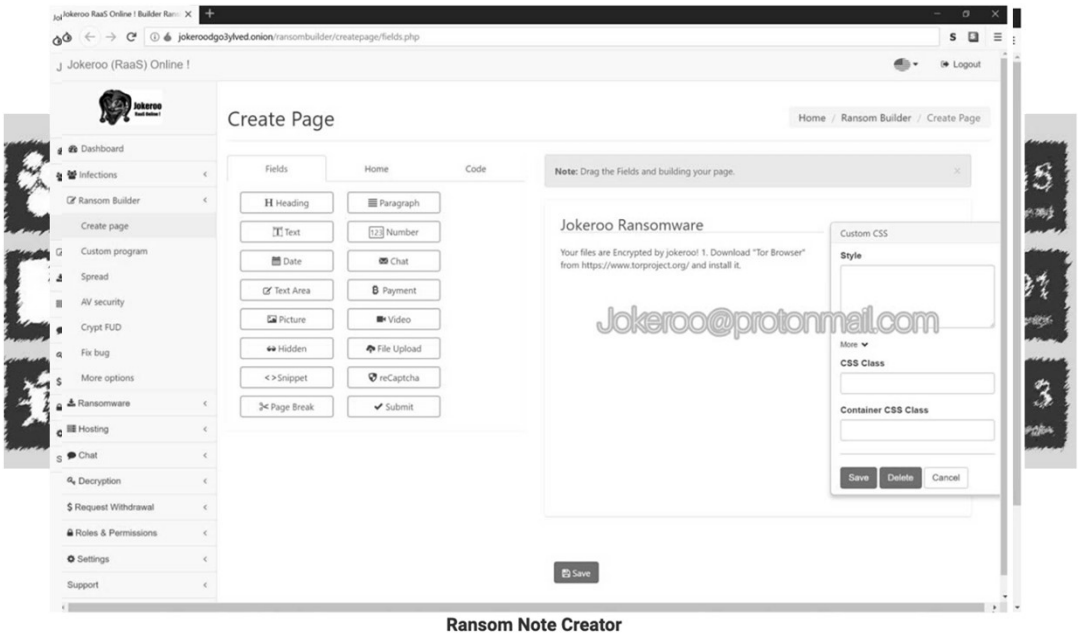
Ransomware

- Email
- Drive by Download
- Free Software
- Remote Desktop Protocol (RDP)
- Ransom - Bitcoin
- Held Hostage

26

26

Ransomware-As-A-Service



Ransom Note Creator

27

#3 Threat

Loss or Theft of Equipment or Data

- Laptops, drives, etc.
- Data sensitivity
- Business disruption

28

28

#4 Threat

Insider – Accidental or Intentional Data Loss

- Accidental Insider
  - Honest mistakes
  - Procedural errors
  - Emailing sensitive data
- Intentional Insider
  - Personal gain
  - Inflict harm
  - Impersonating staff
  - Disgruntled employee

29

29

#5 Threat

Medical Device Security: Patient Safety

- Inventory control
- Software patches
- Device monitoring
- Remote access
- Anti-malware
- Urgent 11 – VxWorks OS

30

30

Top 10 Cybersecurity Practices

31

31

Top 10 Cybersecurity Practices

Doctors and nurses know that hand sanitizing is critical to prevent the spread of germs. That does not mean healthcare workers wash up as often as they should.

Similarly, cybersecurity practices reduce the risk of cyber-attacks and data breaches. Just as we are able to protect our patients from infection, we should all work towards protecting patient data to allow physicians and caregivers to trust the data and systems that enable delivery of quality health care.

32

32

Email Protection Systems

#1 Practice

- Education
- Phishing Simulation
- E-mail Protection Controls
- Domain Key Identified Mail (DKIM)
- E-mail Encryption

33

33

Endpoint Protection Systems

- Micro-segmentation
- Mobile Device Management
- Host Based Intrusion Detection/Prevention Systems
- Endpoint Detection and Response
- Application Whitelisting

#2 Practice

34

34

Access Management

- Identity
- Automate Provisioning
- Authentication
- Multifactor Authentication for Remote Access
- Single-Sign On

#3 Practice

35

35

Data Protection and Loss Prevention

- Policies & Procedures
- Classification of Data
- Data Use Procedures
- Data Security
- Backup Strategies
- Data Loss Prevention
- Mapping of Data Flows

#4 Practice

36

36

Asset Management

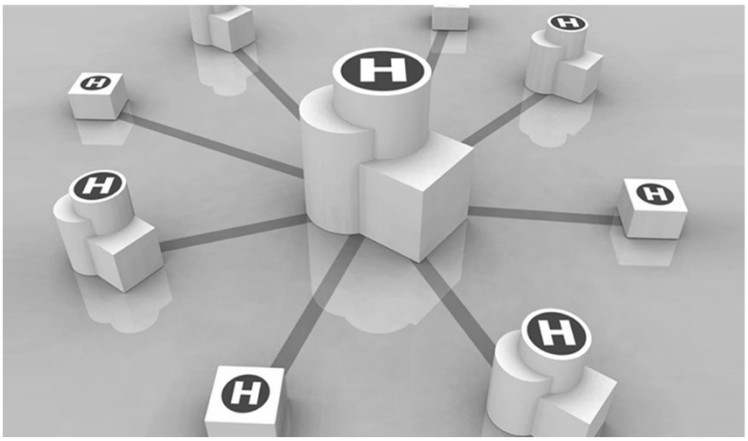
- Inventory Details
- Decommissioning
- Automated Discovery and Maintenance
- Procurement – HIC-SCRiM

https://healthsectorcouncil.org/hic-scrim/

#5 Practice

37

37



Network Management

#6 Practice

- Network Segmentation
- Physical Security
- Intrusion Prevention
- Network Profiles and Firewalls
- Network Access Control

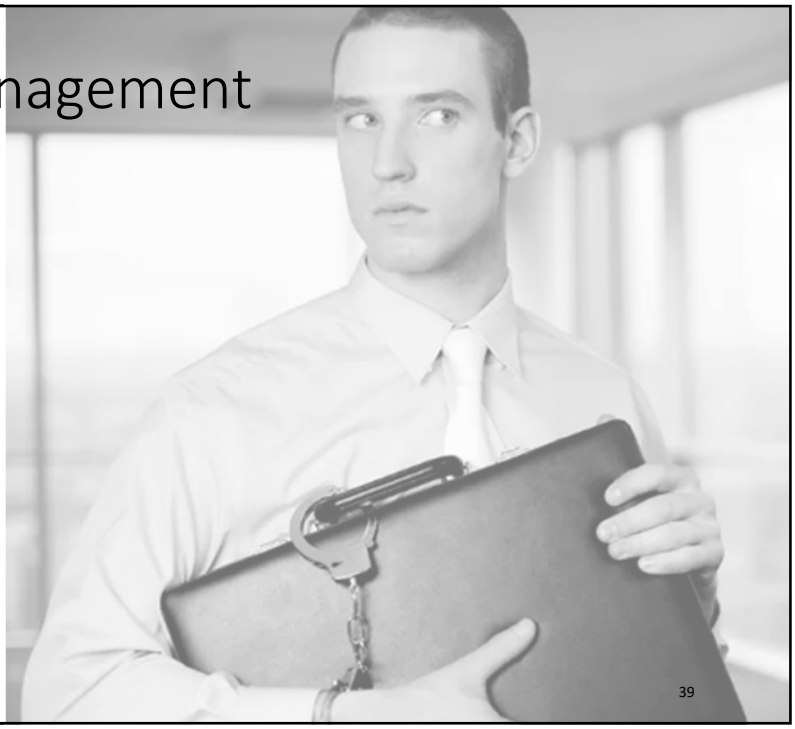
38

38

Vulnerability Management

- Scanning
- Data Classification
- Patch Management
- Configuration Management
- Penetration Testing

#6 Practice



39

39

Incident Response

- Incident Response
- ISAC/ISAO Participation
- Security Operations Center (SOC)
- Baseline Network Traffic
- User Behavior Analytics
- Deception Technologies

#8 Practice

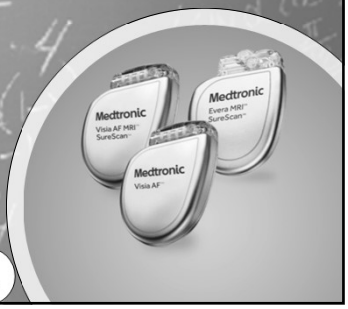
40

40

Medical Device Security

- Procurement and Security Evaluations
- Practice #2
- Practice #3
- Practice #5
- Practice #6
- Practice #7
- Practice #8
- Practice #10
- Contacting the FDA

#9 Practice



41

41

Cybersecurity Policies

- Policies

42

#10 Practice

42

So You Want A Recipe For Cybersecurity?

Mitigating Email Phishing Recipe

1. 5 oz Basic E-Mail Protection Controls (1.M.A)
2. A dash of Multi-Factor Authentication (1.M.B)
3. 1 cup of Incident Response plays (8.M.B)
4. 1 tsp of Digital Signatures for authenticity (1.L.B)
5. Advanced and Next General Tooling to taste (1.L.A)
6. 2 cups of Workforce Education (1.M.D)

Preheat your email system with some basic email protection controls, building a foundation for your dish. Mix in MFA for remote access, protecting against potential credential theft. Place in oven at high temp for incident response plan testing.

When finished baking sprinkle with additional tooling to provide next level protection to taste. Let cool several hours while providing the workforce training on reporting phishing attacks in the new system. Garnish with education on how digital signatures demonstrate authenticity of the sender.

Just like with any cookbook the recipes provide the basic ingredients to making a meal. It does not instruct you how to cook, instruct you on what recipes to use or limit your ability for substitutions. The skill of the cook is what makes the dish!

43

HICP is…

- A call to action to manage real cyber threats
- Written for multiple audiences (clinicians, executives, and technical)
- Designed to account for organizational size and complexity (small, medium and large)
- A reference to "get you started" while linking to other existing knowledge
- Aligned to the NIST Cybersecurity Framework
- Voluntary

HICP is **not**…

- A new regulation
- An expectation of minimum baseline practices to be implemented in all organizations
- The definition of "reasonable security measures" in the legal system
- An exhaustive evaluation of all methods and manners to manage the threats identified
  - You might have other practices in place that are more effective than what was outlined!
- Your guide to HIPAA, GDPR, State Law, PCI, or any other compliance framework

44

What Size is My Organization?

Factors Determining Size:

- Health Information Exchanges
- IT Capability
- Cybersecurity Investment
- Size (provider)
- Size (acute/post-acute)
- Size (hospital)
- Complexity

Main Document – page 11

Best Fit		Small	Medium	Large
Common Attributes	Health information exchange partners	One or two partners	Several exchange partners	Significant number of partners or partners with less rigorous standards or requirements Global data exchange
	IT capability	No dedicated IT professionals on staff, IT may be outsourced on a break/fix or project-by project-basis	Dedicated IT resources on staff No or limited dedicated security resources on staff	Dedicated IT resources with dedicated budget CISO or dedicated security leader with dedicated security staff
	Cybersecurity investment	Nonexistent or limited funding	Funding allocated for specific initiatives Potentially limited future funding allocations Cybersecurity and IT budgets are blended	Dedicated budget with strategic roadmap specific to cybersecurity
Provider Attributes	Size (provider)	1–10 physicians	11–50 physicians	Over 50 physicians
	Size (acute / post-acute)	1–25 providers	26–500 providers	Over 500 providers
	Size (hospital)[15]	1–50 beds	51–299 beds	Over 300 beds
	Complexity	Single practice or care site	Multiple sites in extended geographic area	Integrated delivery networks Participate in accountable care organization or clinically integrated network
Other Org Types			Practice Management Organization Managed Service Organization Smaller device manufacturers Smaller pharmaceutical companies	Health Plan Large Device Manufacturer Large pharmaceutical organization

45

45

Self Assessment - Practices & Sub Practices

FULL LISTING OF CYBERSECURITY SUB-PRACTICES BASED ON ORGANIZATION SIZE SELECTED			Self Assessment		
	Cybersecurity Sub-Practice Title	Short Description	Current State	Gaps	Action Plan
1.A	Basic Endpoint Protection Controls	Basic endpoint security controls to enable	*Encryption at 80%, AV in place, baseline image, all users with admin rights*	*Encryption gaps and admin rights*	*Finish encryption, remove rights*
1.A	Identity	Establish a unique identifier for all users, leveraging systems of record	*All users provided accounts, not tied to ERP*	*No identity, can allow for orphaned accounts and failure to term*	*Establish identity program*
1.B	Provisioning, Transfers, and De-provisioning Procedures	Provision user accounts based on identity; ensure de-provisioning upon termination	*User accounts created directly into Active Directory manually, when requested*	*Access rights might cumulate and administrators might fail to terminate access*	*Establish accounts based on identity, automate provisioning and de-provisioning*
1.C	Authentication	Implement and monitor secure authentication for users and privileged accounts	*Authentication bound to central authentication service*	*No gaps*	*No gaps*
1.D	Multi-Factor Authentication for Remote Access	Implement multi-factor authentication for remote access to resources	*VPN access available, no MFA*	*VPN enabled, which can allow for a theft of credentials to access sensitive data*	*Implement MFA*
1.A	Security Operations Center	Establish a SOC to prevent, discover and respond to cyber attacks	*Dedicated team to manage and respond to cyber incidents*	*No gaps*	*No Gaps*
1.B	Incident Response	Establish formal incident response playbooks for responding to cyber attacks	*Playbooks exist, but no playbook for lost/stolen device*	*In the case of a stolen device teams might not execute investigation properly*	*Establish playbook for stolen devices, get approval from leadership*
1.C	Information Sharing and ISACs/ISAOs	Join security communities to share best practices and threat information	*Not a current member of an ISAC/ISAO*	*By not participating in ISAC/ISAOs cyber teams might be missing out on leading practices*	*Join ISAC/ISAO*

Cybersecurity Practices Assessment Toolkit

46

46

Prioritization Tool

- Approach
  - Threat - apply combination of Practices and Sub-Practices
  - Practice - applicable to multiple Threats

Factor		
Select your organizations size		Medium
Prioritize the threats (5 being highest priority, 1 being lowest priority)		
A	Email Phishing Attack	1
B	Ransomware Attack	4
C	Loss or Theft of Equipment or Data	5
D	Insider, Accidental or Intentional Data Loss	3
E	Attacks Against Connected Medical Devices that may affect Patient Safety	2

CP #	Cybersecurity Practices	Priority Rank Based on Threat Model Inputs
8	Incident Response	28
3	Access Management	23
2	Endpoint Protection Systems	23
5	Asset Management	20
6	Network Management	16
7	Vulnerability Management	16
10	Cybersecurity Policies	15
1	Email Protection Systems	13
9	Medical Device Security	11
4	Data Protection and Loss Prevention	11

47

47

Templates

- Glossary of Terms
- NIST Cybersecurity Framework Crosswalk
- Assessment Methodology
- Toolkits

- Examples
  - Portable devices policy
  - Incident response policy
  - Access control procedure
  - Security incident report sample
  - Onboarding and Offboarding policy
  - TECFA Do's and Don'ts

48

48

405(d) Awareness Materials

The 405(d) Program periodically creates awareness materials that can be utilized in any size organization! These 5 threat posters were created in support of Cybersecurity Awareness Month in October 2019 to be used in hospitals, doctor's offices and even in email threads!

405(d) Outreach

The 405(d) Program produces Bi-monthly Newsletters and Spotlight Webinars to increase cybersecurity awareness. They also present on new emerging cybersecurity news and topics, to include highlighting the HICP Publication!

405(d) Social Media

The 405(d) Program is now live on Twitter, Instagram, and Facebook at @ask405d. Follow us to receive up to date 405(d) News and cybersecurity tips and practices!

Request materials – cisa405d@hhs.gov

49

HHS 405(d) Group

- Collaboration center for HHS Office of the CIO
- HICP
  - Update current information
  - Add additional detail
- 405(d) Communications
  - Videos
  - Newsletter
  - How to guides (S,M,L)
- Executive Leadership's role
- Impactful metrics

50

50

Thank you

Resources and Solutions

HICP Documents - https://cybertygr.com/resource.html or https://www.phe.gov/Preparedness/planning/405d/Pages/hic-practices.aspx

Business Case for Medical Device Security

Free Medical Device Security ROI
https://cybertygr.com/connectedmd.html

Automatically Document Security Efforts

Governance, Risk & Compliance Software
https://cybertygr.com/hipaamanage.html

Ty Greenhalgh – Ty@CyberTygr.com

Julie Chua – cisa405d@hhs.gov

51