Relevance Of Cybersecurity And Artificial Intelligence to Endovascular Treatments

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Introduction

- Ongoing technological developments may modify substantially the way we work in the cath laboratory.
- Most likely, artificial intelligence (AI) will be a decisive element in future cath lab workflow.
- In this presentation we review how AI and ancillary techniques may modify our practice and the cath.
- Hacking to medical devices is already here
- Most vulnerable implantable devices

Artificial intelligence: mastering the game of Go

Artificial Intelligence, Machine Learning, Deep Learning

Intelligence amplification (IA) (cognitive augmentation and machine augmented intelligence) refers to the effective use of information technology in augmenting human intelligence.
The era of deep learning, decision analytics and compassion collide in Medicine

- A computer can read 20,000 chest CT’s in two minutes, augmented by a training set of millions of similar CT’s
- 250 stress echo’s in 5 minutes...
- CPU interpretation of pathology slides exceeds manual reading by 1:100,000

Clinical Diagnosis and Treatment Strategy

- AI = “Augmented Intelligence”
  - $10^{11}$ calculations/sec (laptop)
  - $10^{16}$ calculations/sec (human)
  - $10^{26}$ calculations/sec (2021)

Internet on things market in healthcare is booming

IOT Healthcare Market

- $32.47$ Billion
- CAGR of 36.1%
- $117$ Billion

$200B$ cost cutting

Remote monitoring and management improves patients’ outcome

CONNECTED HEALTHCARE REVOLUTION

What can go wrong?

- Parsing user input
- Communicating with insecure source
- 3rd party vulnerabilities
- Encryption / Authentication misuses
- Chip level vulnerabilities

IoT transforms our live

BUT

there is also another side
...we are becoming uniquely characterized with our digital exhaust and footprints…

Ten’s of millions records stolen… report “so far”
- Social security number (tax returns)
- Medical records (Medicare billing)
- Pharmacy History (Renew scripts)

Cyber Security: It’s All About Nodes

Dick Cheney feared assassination by shock to implanted heart defibrillator

Cybersecurity….an real emerging need
Warning systems in aviation and interventional cardiology

Revascularisation based on physiological vessel analysis

Robotics in interventional cardiology

Augmented reality holographic display for PCI guidance
Remote Endovascular Procedures & Stroke Intervention

Artificial intelligence in Endovascular revascularisation

How will these developments influence our practice?

- Better stratification of patients
- Better planning of interventions
- Increased precision of procedures
- Prediction of final results
- Procedural assistance and warning systems
- Decreased inter-and intraoperator variability
- Time saving and improved cath lab workflow
Thank you for your attention