Artificial Intelligence Versus Doctors

Dr. Bassam Mahboub Leader of Innovation, Dubai Health Authority
Agenda

• Innovation & AI outside Healthcare
• AI in Healthcare
• AI
  • & Digital Imaging
  • & Digital Pathology
  • In Genetics & Prometric
  • & Algorithmics Management

• To Trust AI ??
• What is next?
• Our Aim
Though rich, Gulf oil producers score poorly on key measures of innovation.
What has been the path to acceptance for AI outside of Healthcare?

Perhaps the amazing progress in the science of AI?

ImageNet Large Scale Challenge (1,000 Category and 1.2 Million Image Subset of 15 Million Image Dataset)
Artificial intelligence ‘won’t solve all healthcare problems’, new report warns

The NHS needs a new breed of innovator for the information age

Kevin Fong

Technology is never going to replace doctors - or make healthcare cheaper. But data and artificial intelligence are the future.
AI and predictive analytics lead to improved delivery of healthcare services
Summary
As we embark on a new era of digital medicine, there will be rapid innovation and transformation. Healthcare is fertile ground for artificial intelligence and emerging advanced analytics technologies to help CIOs improve outcomes, cut costs and increase engagement.

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Analysis
Emerging Use Cases of AI for Healthcare Providers
AI Healthcare Advisors
Virtual Health Assistants
AI for Healthcare Operations and Administration
2018 Proof Points

Diagnosing Pneumonia

Daily News
Algorithm Can Diagnosis Pneumonia Better Than Radiologists

Detecting Skin Cancer

Computer learns to detect skin cancer more accurately than doctors

Reducing ER Errors On Fractures

Deep neural network improves fracture detection by clinicians
Value-based Validation of AI in Medical Imaging

19 MEDICAL FITNESS CENTERS
2,000,000 VISITORS
1,000,000 CHEST X-RAY EXAMS EACH YEAR
1 AI ALGORITHM ACROSS ALL SITES

AGFA HealthCare

GOVERNMENT OF DUBAI
DUBAI HEALTH AUTHORITY
TB (Tuberculosis) challenge

Roughly one-third of the world’s population has been infected with M. tuberculosis

Global figures released last year by the WHO showed that in 2015, some 1.8 million people died from TB.
Dubai Health Authority & AGFA HealthCare Collaboration

Chest X-Ray (TB Detection)

Workflow Automation powered by AI

*The Augmented Intelligence (AI) validation in the United Arab Emirates (UAE) based on Chest X-Rays described in these slides is a works in progress.
AI & Digital Pathology

Digital pathology: Sometimes AI can outperform experts

Machine learning is adding a new dimension to pathology and already outperforming experts during some tasks, according to several speakers at the 14th European Congress on Digital Pathology (ECDP) who revealed up-to-date developments.

Report: Mark Nicholls

Image courtesy of Dmitriy Bystrov, FMI, University of Helsinki

The First Frontier for Medical AI Is the Pathology Lab

But before adopting startup PathAI’s tools, doctors must see if they are worth the cost

By Elie Dolgin
Click click snap: One look at patient's face, and AI can identify rare genetic diseases

Named DeepGesture, the AI identifies genetic disorders using a patient's photograph.

The Wonderful Ways Artificial Intelligence Is Transforming Genomics and Gene Editing

By 2021, consultant firm Frost & Sullivan expects that artificial intelligence (AI) systems will generate $6.7 billion in revenue from healthcare globally. One area that machine learning is significantly evolving is genomics—the study of the complete set of genes within an organism. While much attention has been paid to the implications for
AI In Algorithmic Management

Artificial intelligence, machine learning and health systems

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Harnessing the full potential of Artificial Intelligence and machine learning and mitigating their risks will require, among others, availability of curated data, an enabling regulatory environment, legal provisions to safeguard citizens’ rights, clear rules on accountability, and capacity to manage strategic change.

AI AND DECISION MAKING IN HEALTH SYSTEMS

Effective management of health systems, like the provision of public health or health care, is in essence a number of information processing tasks. Policy makers modify health system functions of organisations and governance, financing and resource management to achieve health system outputs (health care services and public health) and system goals [8].
To Trust AI?
“Continuing to argue for digital exceptionalism and failing to robustly evaluate digital health interventions presents the greatest risk for patients and health systems.”

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**Ethical concerns around healthcare data exploitation demand legislative action**

By Stuart Lauchlan January 4, 2019

**SUMMARY:** Could your activity tracker and health app be making your privacy rights sick?
To Trust AI...

- How it Learned it?
- Transparency
- Verification

Do I trust the AI?

How do the algorithms get verified?
Digital health: meeting the ethical and policy challenges

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³ Health Ethics and Policy Lab, Department of Health Sciences and Technology (D-HEST), ETH Zurich, Switzerland
² Department of Sociology, University of Cambridge, UK

Figure 1: Conditions of innovation in digital health. This graph describes the conditions for innovation in digital health, for both licensed and non-licensed products and applications. Along the continuum from data generation to health impact, several conditions need to be fulfilled for digital health applications to have a tangible effect on individual and public health. To begin with, sufficient amounts of health data about individuals, as well as other types of data helpful to the detection, treatment and monitoring of health conditions in peoples and populations, need to be accessible to developers. Secondly, digital health products need to comply with data protection and privacy requirements in the countries in which they operate. Third, accountability mechanisms should be in place to trace responsibility for data uses and their consequences on individuals, families and communities. Accountability also ensures transparent communication of health-relevant information to data subjects. Fourth, solid evidence of safety and efficacy should back medical claims of digital health products. More rigidly enforced evidentiary standards – including cost-effectiveness requirements – will foreseeably apply to digital health products seeking license from national regulatory agencies (such as the FDA or EMA). Yet, also non-licensed products can and should have sufficient evidentiary bases. Only the fulfillment of all such conditions creates trust in developers and regulators of digital health products and is conducive to fair benefit sharing of digital health innovation.
Guidance

Code of conduct for data-driven health and care technology

Updated 19 February 2019

Introduction

Today we have some truly remarkable data-driven innovations, apps, clinical decision

What is next??

“We always overestimate the change that will occur in the next two years and underestimate that change that will occur in the next 10 years”
OUR AIM

- Earlier and more disease detection
- More accurate diagnosis
- Improved decision-making
- Better adjusted treatment plans
The Roadmap of Future Healthcare

- <2 years
- 2 to 5 years
- 5- to 10 years
The Roadmap of Future Healthcare

- **<2 years**
  - AI Healthcare Advisors
  - Critical Condition Surveillance
  - Pop. Health Management
  - EHR Support for Virtual Care

- **2 to 5 years**
  - Consumer Wearables for Monitoring
  - Genomics Medicine
  - Algorithmic Medicine
  - Enlarged Virtual Care Platforms
  - PHR Consent Management

- **5- to 10 years**
  - Remote Patient Monitoring
  - Stand-Alone Telehealth
  - External Clinical Decision Support

**Integration Foundation**

**Era 3: Helper**

**Era 4: Colleague**
Designing a Future Medicine Module for Medical Students

- From Stethoscope usage to Digital Healthcare Innovation and Design Thinking skills:
  - Design Thinking
  - Innovation & Entrepreneurship
  - Medical Informatics & Technology
  - Patient-centricity and behavioral change
  - Project Management

- Elective module for 3rd Year students of University of Sharjah Medical College Students
- 2-hours per week + lab sessions
- Conveners include 2 Physicians and 1 eHealth expert
As a physician my prospective is AI will not replace physicians, but those who know how to use it will replace with those who don’t.