Deep Learning, AI and The Future of Clinical Care
New Tools and Challenges

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Disclosures and Disclaimers

AVIA is a network of 40 health systems collaborating on innovation. avia.health

Boards and advisory roles:

– Aetna, Inc. – health insurer, board member
– Multiple advisory board memberships with digital services
– Co-founder of nonprofit HealthTech4Medicaid http://healthtech4medicaid.org/

No financial relationships with any other products, services, or companies described here.
Purpose: To acquaint the Committee with emerging patterns of digitally-enabled care that will profoundly change the role and responsibilities of clinicians.

Begin with general description of the clinical functions that are changing as a result of AI / Deep Learning.

Follow with three examples of early stage AI-driven services that represent some of the most substantial changes.

- The services described here are intended to be illustrative only – 3-5 years from now we may face different versions, from different companies, but the trajectories and early estimates of impact are worth understanding.

- Introduce some potential implications for the future role of clinicians.
Implications for Clinical Care (1)

- Five years from now, market traction is likely to confirm the consumer preference and clinical resource efficiency of applications of AI.

- There are a multitude of unresolved questions, including bias, access, transparency, accountability, ownership of data and learnings, and others, which NAM and other leadership organizations are beginning to address.

- In planning for the wellbeing, effectiveness and fulfillment of the clinical professions, early evidence for potentially profound disruptions in roles and responsibilities should be considered.

- In many other settings, uncertain but credible trajectories such as those raised in this presentation are often addressed by scenario planning – not requiring a belief that a trajectory will evolve as described, but entertaining the possibility and accounting for it in organizing strategies and policies.
Focus Today: AI In Front-Line Clinical Care

- **NOT IN SCOPE**
- **GROWTH, TRIAGE**
  - Virtual triage for symptom checking, triage
  - Extends population covered, lowers capital requirements
  - Expands clinician panels – estimates from current ~2000 to 20,000+
- **ANALYTICS**
  - Predictive analytics identifies near-term high cost individuals, complex care management needs, rising risk populations
  - Iterative, rapid cycle testing of clinical and other interventions – population “precision medicine”
- **CARE MANAGEMENT**
  - Triage
  - Diagnosis
  - Treatment selection
  - Chronic care management
  - Optimize specialist resources
  - Diagnose, prescribe and manage SDOH
  - Behavioral economics
- **OPTIMIZE REVENUES, WORK PROCESSES**
  - RAF Scores
  - Optimize specialist referrals
  - Empower speech recognition, combine with NLP for transformed EHR processes

**SOCIAL DETERMINANTS OF HEALTH**
Patient Access To AI-Fueled Symptom Checkers Today

• Buoy – fastest growing, largest data base, direct to consumer
• Other entrants: Babylon (UK / NHS), Gyant, Mediktor
Clinical Validation (Buoy, Partners Primary Care)

Urgent Care
- Patients used the Buoy in the waiting room.
- Patients are seen by their physician.
- We compare the doctor’s note and Buoy’s output.

Chest Pain
- 100 standardized cases written by clinicians, focusing on chest pain.
- Cases vary in severity and incidence.
- Cases through Buoy versus competitors.

Headache
- 100 standardized cases written by clinicians, focusing on headache.
- Cases vary in severity and incidence.
- Cases through Buoy versus competitors.

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**500**
Urgent Care Patients

**90%**
Diagnostic Accuracy*

**92%**
Triage Accuracy*

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Diagnostic & Triage Accuracy

Buoy
Ada
Babylon
Your.MD
WebMD
Intermedica

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Diagnostic & Triage Accuracy

Buoy
WebMD
Mayo Clinic
Healthtime
Isabel
Most Health Systems, Clinicians, Researchers Unaware

Number of Unique Users of Buoy in 6/17-6/18 By Representative Health System Market Areas

- Health First (Florida) - 1.8M
- Henry Ford Health System (Michigan) - 800K
- MD Anderson (Texas) - 2.7M
- Memorial Hermann (Texas) - 2.7M
- Mercy Health (Ohio, Kentucky) - 1.1M
- Providence St. Joseph Health (Washington) - 572K
- OSF Healthcare (Illinois) - 1.22M
- Trinity Health (20+ states) - 16.95M
- BayCare (Florida) - 1.8M
- Froedtert & Medical College of Wisconsin (Wisconsin) - 374K
- Imperial College Health Partners (UK) - 8.2M
- Presbyterian (New Mexico) - 91K
- St. Luke’s University Health Network (Pennsylvania) - 1.1M
- University of Kansas Health System (Kansas) - 196K

“Startup Buoy Health partners with CVS Health on AI clinic referrals”

Healthcare startup Buoy Health [has] partnered with CVS Health to integrate its software with 1,100 MinuteClinic locations.
Completely Virtual Primary Care Today:

Service extends beyond episodic care, including answering medical questions, diagnosis and treatment, prescriptions, labs, referrals, follow-up, reminders and more. Available on iOS, Android and web platforms.
Automated Assistant, Physician-By-Text

Technology-Augmented Team of Physicians

- Massively extends the reach of care
- Time is focused on highest value activities
  - Review of findings, diagnosis, care plan
- Attracts forward-thinking physicians
- Improves reported physician quality of life
Early Learnings, Leading Indicators

System Design

- Available today in 43 states + D.C., accessible to 95% of U.S. adult pop (238M)
- Salaried physician team including stock options & licensed in all 50 states
- On track to have 100,000 members under contract by end of year

Resolution Rate, Patient Acceptance

- Over 200 different conditions treated per month
- 95% of conditions/questions resolved without need for in-person care
- Over 25% of visits are returning users with a new condition or question
- Average patient wait time of less than 30 seconds
- Over 30% of visits are requested from non-traditional settings (coffee shop, airport, during commute, from work, etc.)
- Net Promoter Score higher than Apple and Netflix, Kaiser, health plans, and current primary care

Affordable Cost

- Employers: $1 PEPM
- Global access: unlimited primary care at US$10 per year through foundations

Early Use By Demographics

- Male: 60%
- Female: 40%

Graph showing the distribution of early use by demographics with a bar chart comparing different age groups.
Habits are formed through a series of repeated triggers, behaviors, and rewards. On average, it takes 66 days of repetition to form a habit.¹

Wellth produces 89% average care plan adherence

Focus on high-risk Medicare/Medicaid populations

Average Daily Adherence: 89%

Of Users ≥80% Adherent: 86%

Average length of program in days:
- Post-Discharge AMI: 84 days
- Mount Sinai High Risk: 124 days
- Medicaid Diabetes: 310 days
- Medicaid Heart Failure: 132 days
- Staten Island PPS: 30 days
- Coordinated Behavioral Care: 9 days
- Trenton Health Team: 11 days
- Type 2 Diabetes: 30 days
Implications for Clinical Care (2)

• Five years from now, market traction is likely to confirm the consumer preference and clinical resource efficiency of similar applications of AI.

• These implications – from the examples presented and from other emerging solutions – suggest these effects, at a minimum:
  – Rapid and extensive leveraging of clinicians, resulting in far fewer clinician resources needed per population covered
  – Clinician roles evolve to consultation on population management, resolution of complex cases, and increasingly limited direct patient care engagement.
  – Struggles for individual clinicians, professional organizations, education and training programs, and policymakers in challenging, adjusting to, and regulating these changes may shift the nature of clinician wellbeing discussions.