



## Executive summary

Daniel Hommes, CEO

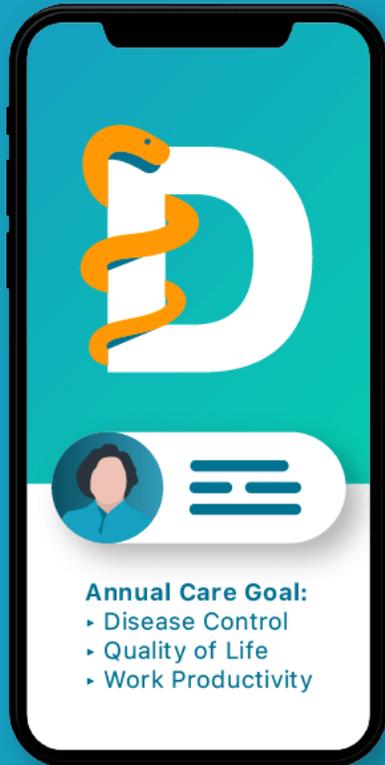
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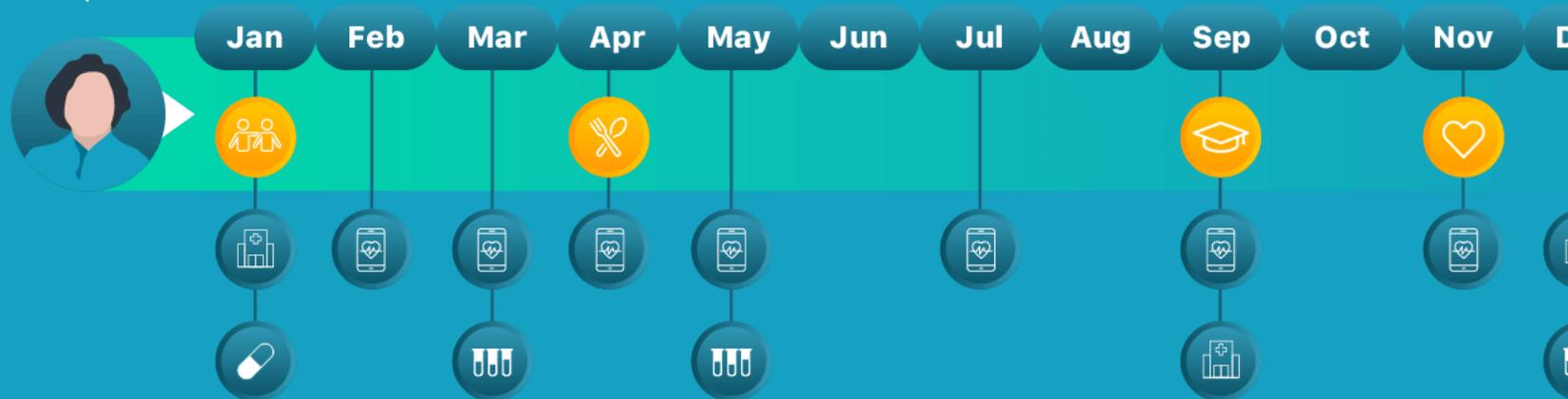


**Let's scale AI-powered  
continuous care**

# Dear health



AI-powered healthcare pathways for personalised continuous care



# EQ

- Shared decision making
- Appropriateness of care
- Communication

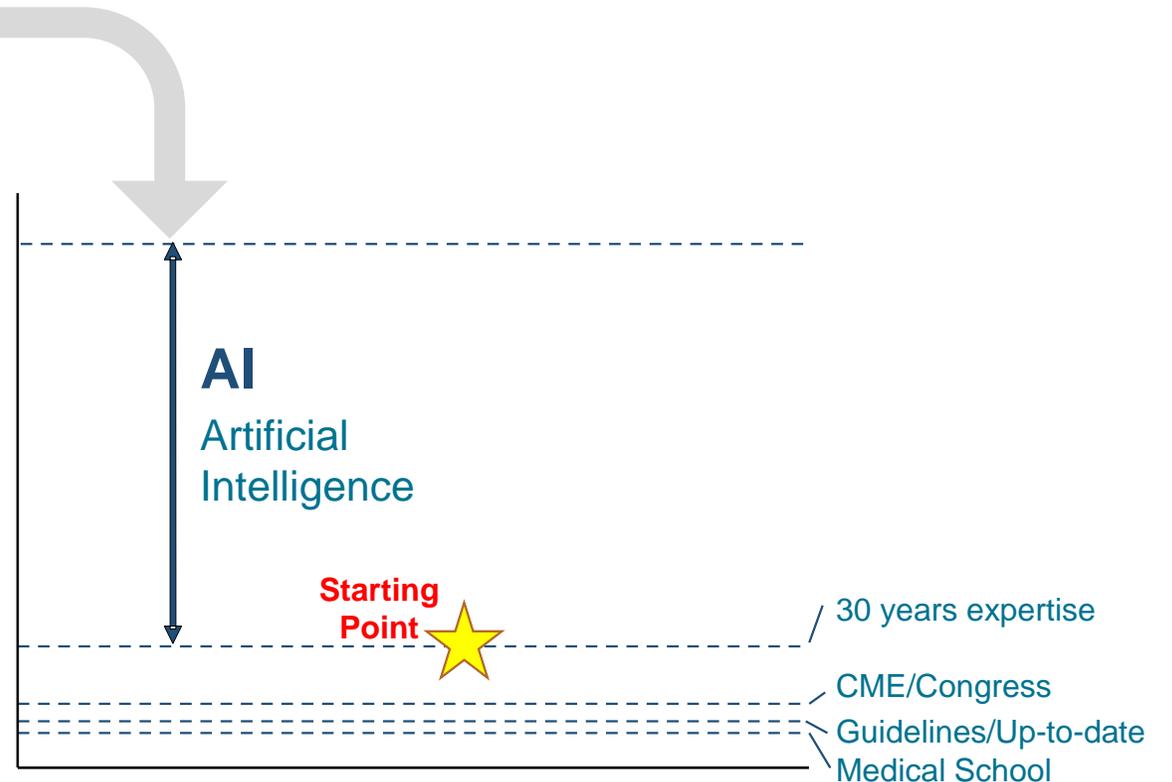


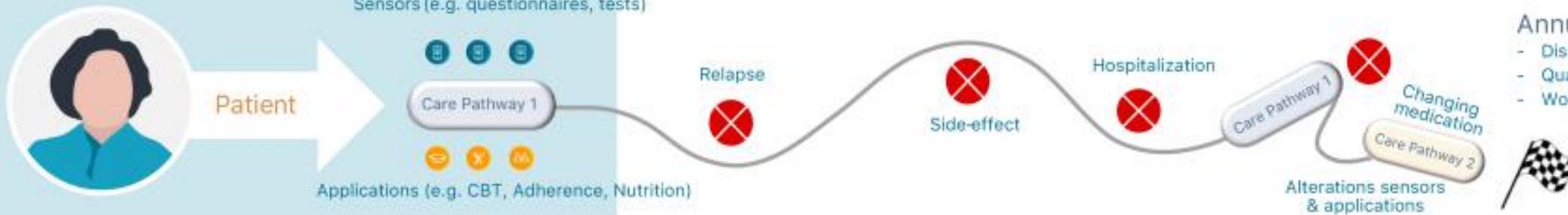
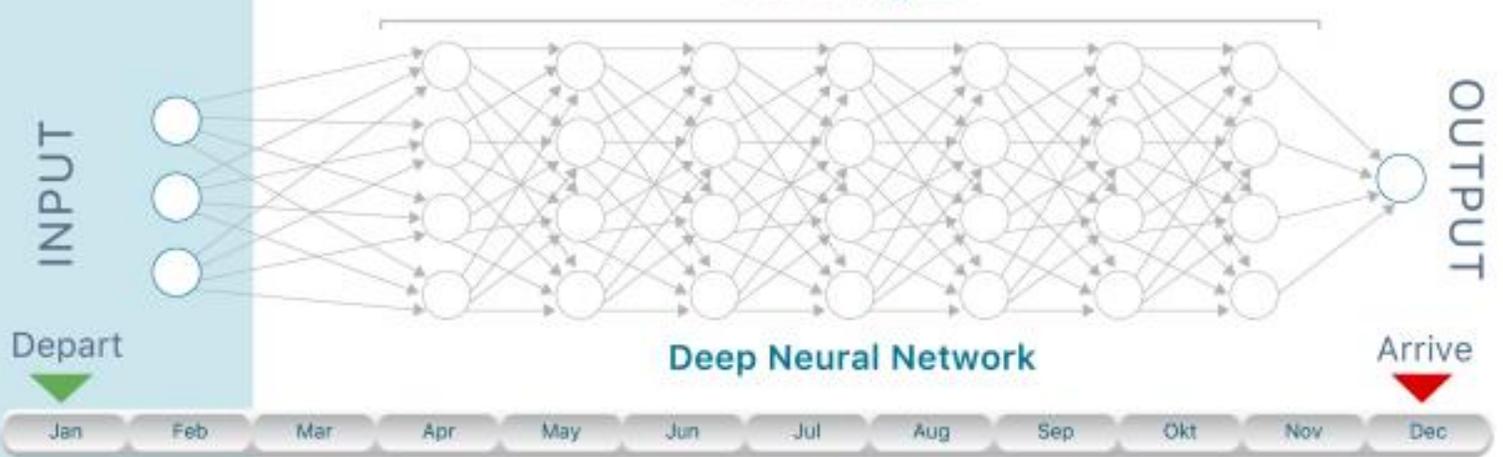
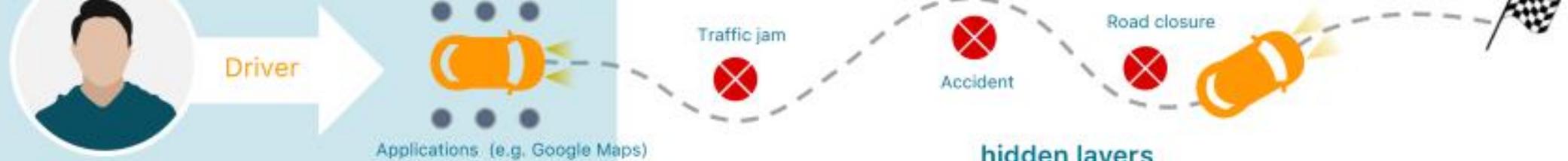
# IQ

Prediction

Recommendation accuracy:

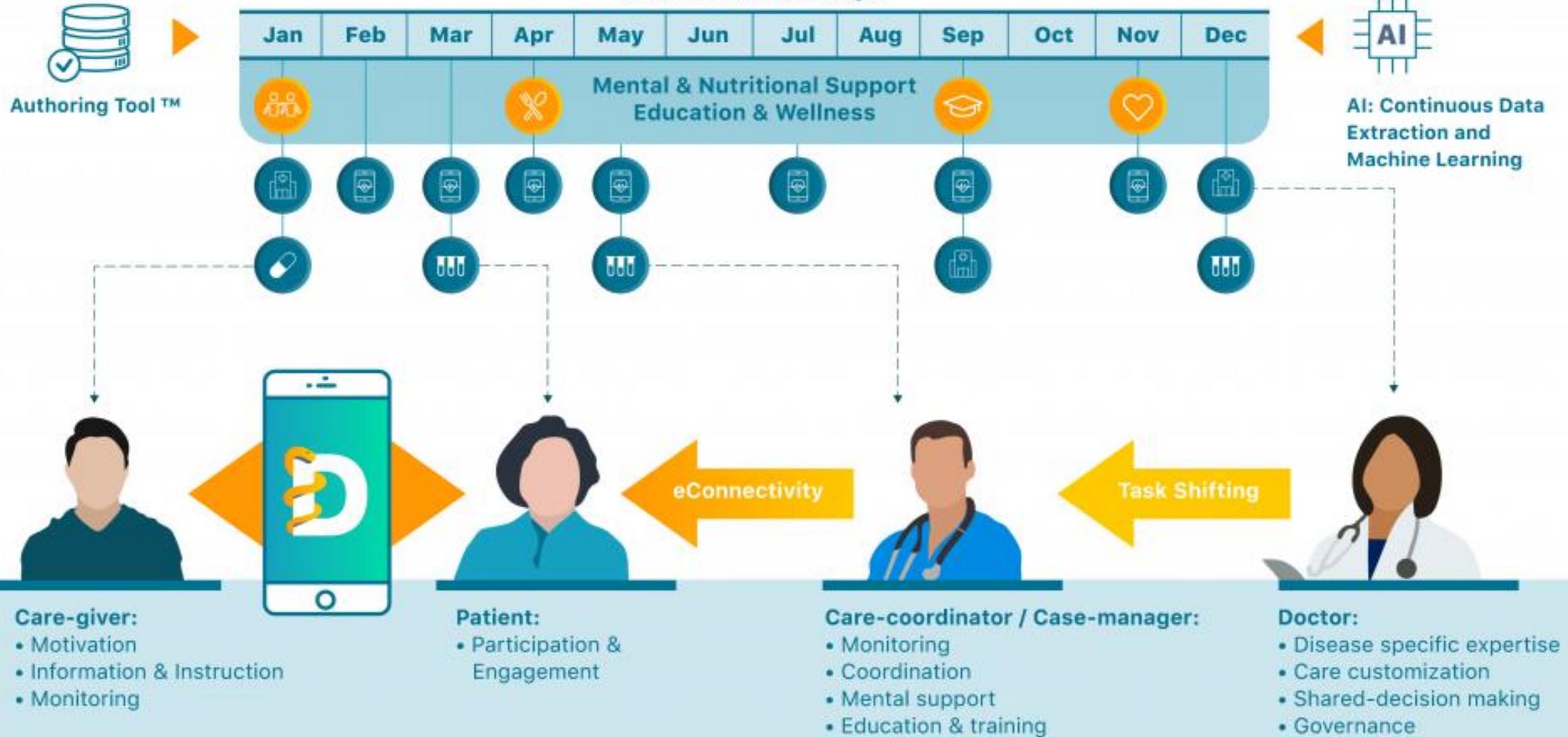
1. Therapy
2. Tests
3. Procedures
4. Clinic visits





# AI-Powered Care

## Annual Care Pathways



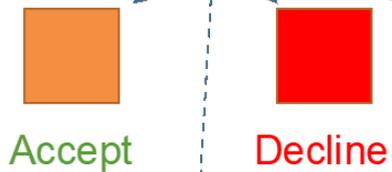
# DEARhealth Recommender function



- 1** Patient data is updated.
  - 2** Classifier updates patient's risk-profile.
  - 3** Recommender proposes updates to default care pathway based on profile.
  - 4** Physician accepts recommendation and care pathway is updated.
- A** Risk-profile learning models and algorithms are updated periodically based on learnings from Datasets, model adjustments collected offline and through system events.

# DEARhealth Recommender function

## Populating the recommender



## Adoption



Physician behavior  
& associated outcomes

### Basic Learning

1. Common algorithms, examples
  1. IF [PHQ-9=ABNORMAL] THEN trigger [CBT\_6week]
  2. IF [temp > 38°C] THEN trigger [e-consult Care Coordinator]
  3. IF [ADHERENCE=NORMAL] THEN [ADD\_PARTICIPATION\_SCORE]
2. Disease specific algorithms, example Rheumatoid Arthritis
  1. IF [CRP>5] THEN order [LAB2] AND trigger [MD\_Task\_Monitoring]
  2. IF [miR-1286 = present] THEN [ORDER\_Imaging\_MRI-jointX]
  3. IF [SOFI=Abnormal] THEN trigger [MyAcademy\_S3.4] AND order [PT] with [VISIT]

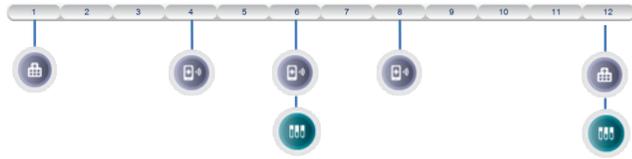
### Deep Learning

#### Machine Learning – Deep Neural networks

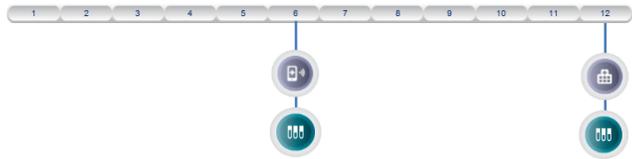
- Disease specificity – feature sets selected with deep domain expertise
- Data: claims, EMR, socio-economic, devices, ...
- Consensus layer (MD supervised)

# Multimorbidity functionality

Chronic Heart Failure



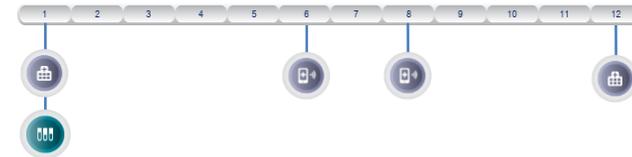
Dyslipidemia



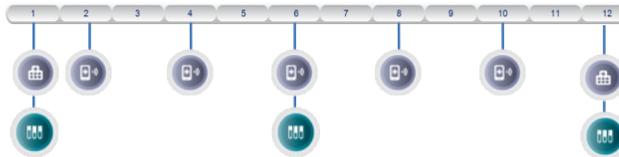
Hypertension



Diabetes



Removing redundant  
clinic visits; medical  
procedures



Care-Coordinator



Cardiologist



Lipidologist



Internist



Endocrinologist



# Multimorbidity functionality

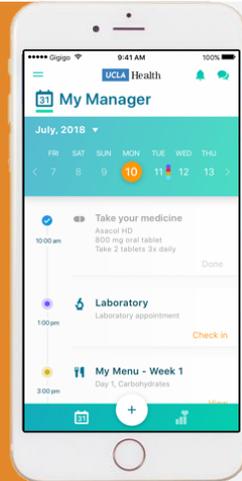
Symptoms	Cancer	Infectious	Cardiovascular	Respiratory	Renal/Urinary	Digestive	Endocrine	Neurologic	Joints
Back/neck/Hip pain	Colorectal Cancer	Tuberculosis	Atrial Fibrillation	Asthma	Chronic Kidney Disease	Inflammatory Bowel Diseases	Diabetes	Stroke	Rheumatoid Arthritis
Headache	Breast Cancer	HIV/AIDS	Chronic Heart Failure	COPD	Dialysis	Functional Bowel Disorders	Thyroid Disease	Dementia	Gout
Diarrhea	Prostate Cancer	Lyme Disease	Hypertension	Cystic Fibrosis	ESRD	Celiac Disease	Osteoporosis	Epilepsy	Osteoarthritis
Constipation	Pancreas Cancer	Influenza	Hyperlipidemia	Smoking Cessation	Nephrolithiasis	Cirrhosis Management		Parkinson's Disease	Fibromyalgia
Fatigue	Lung Cancer		Deep Venous Thrombosis	Pulmonary Embolism	Benign Prostate Hyperplasia	GERD		Depression	Familial Med Fever
Health Pathways	Uterus/Ovary Cancer					Hepatitis		Anxiety	
	Skin Cancer					Liver Transplantation			

# Mobile apps and EMR-integrated applications

“UCLA in your back-pocket\*”



Hommes, Stanford Medicine X, 2015



## App Features:

- 1 Patient Profile
- 2 My Care Pathway
- 3 Health Reporting:
  - 1) Disease Activity
  - 2) Quality of Life
  - 3) Productivity
- 4 Messaging Care Coordinators
- 5 Tele-Wound Monitoring (Surgery scenario)
- 6 My Manager (Scheduling appointment)
- 7 Lab Outcomes
- 8 Medication Compliance
- 9 My Postcard (Out of Network Utilization)
- 10 My Wellness
- 11 My Academy
- 12 Program Training
- 13 Traffic Navigator
- 14 Patient Satisfaction

## Patient & Caregiver apps

## Provider applications



\* 1-click ordering of Care Pathways



## Provider Features:

- 1 Disease Summaries
- 2 Quality Indicators
- 3 Provider Variation
- 4 vQ Reporting:
  - 1) Disease Activity
  - 2) Quality of Life
  - 3) Productivity
  - 4) Costs
- 5 Care Scenario customization
- 6 Messaging Services
- 7 Mental Support Services
- 8 Nutritional Support Services
- 9 Medication Compliance
- 10 Wellness & Education Modules
- 11 Task Tool Box
- 12 (Work) Productivity Module
- 13 Care-Giver Manager
- 14 Patient Experience & Satisfaction

# Evidence generated

- 2012 IBD Program prospective controlled study: initial evidence of DEAR care pathway efficacy (N=20)
- 2013 Care pathway economics: analysis of claims databases to build DEAR care pathway cost savings model (N=964,633)
- 2013 Adding Mental Support (My Coach) to the DEAR platform: assessment of anxiety and depression of chronic IBD (N=413,334)
- 2014 Validation of a new Value-based Care platform for Chronic Diseases (N=901)
- 2014 Patient Reported Outcome Measures (PROMs): development and validation of PROMs tool for DEAR platform (N=219)
- 2014 Adding Productivity (My Work) to the DEAR platform: assessment of loss of productivity and indirect costs (N=441)
- 2016 Patients' preferences for outcome reporting on the DEAR platform (N=210)
- 2016 Adding Caregiver functionality to the DEAR platform: assessment of impact on caregivers of chronic patients (N=102)
- 2016 Health outcomes of DEAR post-surgery care pathway (N=54)
- 2017 Three year health outcomes of patients on DEAR platform measured by URSA Health (N=829)
- 2017 Review of DEAR Technology by UCLA Patient Focused Technology Council
- 2018 DEAR platform: Patient Outcomes and Experiences Study 2018 (N=50)
- 2018 Adding Adherence functionality to the DEAR platform: development of Adherence Index for chronic patients (N=133)
- 2018 Adding AI functionality to the DEAR platform: Machine Learning of claims to populate the Recommender functionality
- 2018 Adding AI functionality to the DEAR platform: development of a Chat Bot as electronic Health Assistant (N=1,712)



# Outcomes



**>95%**

Patient Satisfaction



**-46.6%**

Decrease Relapse Rate



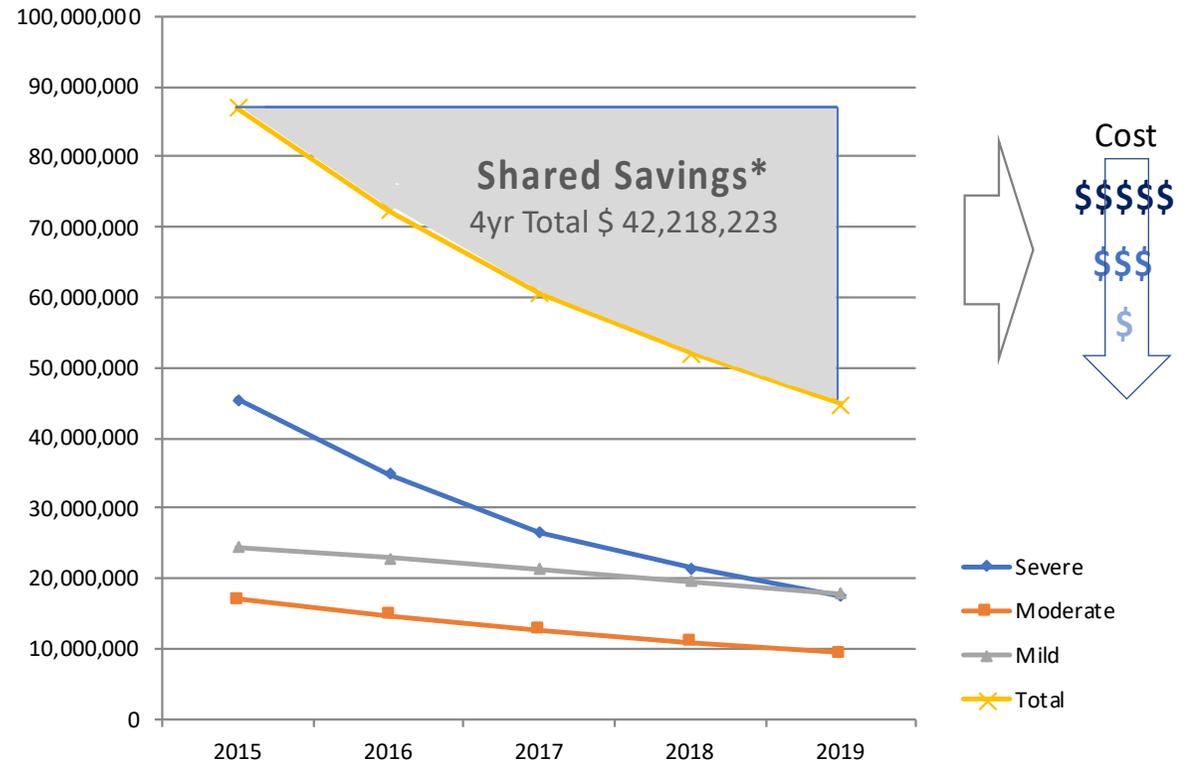
**-40%**

Decrease Physician Workload



**-79.4%**

Decrease Hospital Admissions

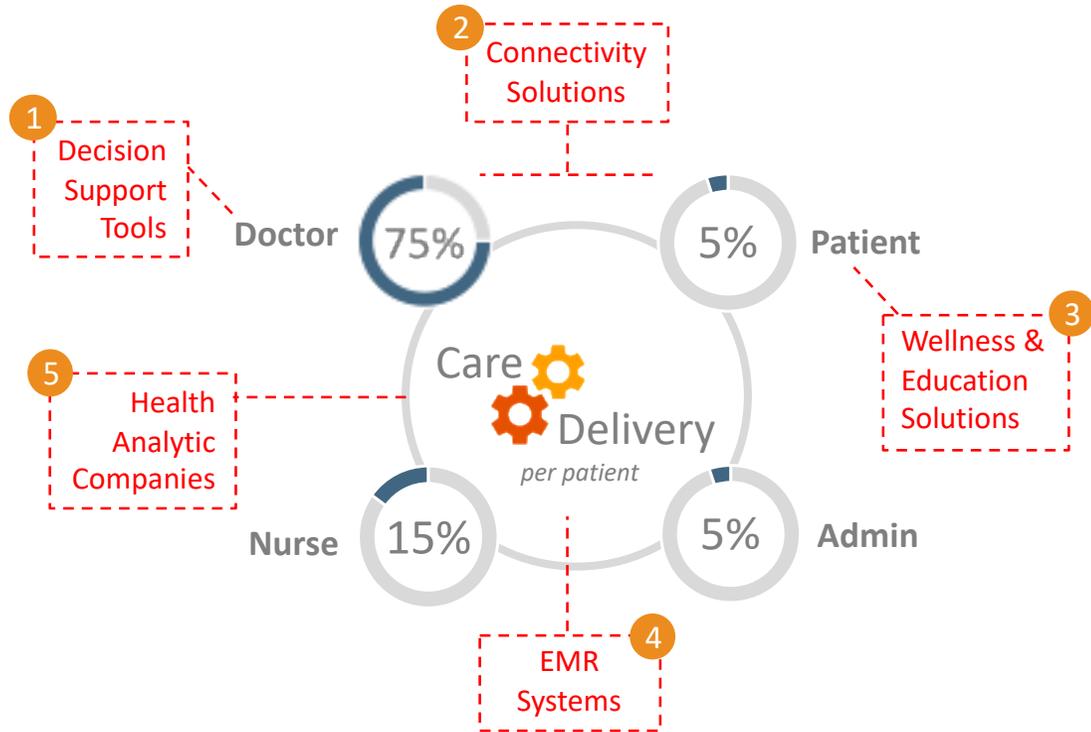


**Projected cost reduction \$10,555 /patient/year\***

\*Financial model based on example in 10,000 IBD patients; collaboration with Anthem California

# How is DEAR different?

DEAR delivers *direct* care instead of *indirect* care solutions



## Market Analysis

- |  |  |   |   |   |
|--|--|---|---|---|
| <p><b>1</b></p> <p>Welkin Health<br/>Wellframe<br/>Welltok</p> | <p><b>2</b></p> <p>eCaring<br/>Livongo<br/>Vivify Health</p> | <p><b>3</b></p> <p>Noom Health<br/>Zipnosis<br/>RedBrick Health</p> | <p><b>4</b></p> <p>EPIC<br/>Allscripts<br/>Cerner</p> | <p><b>5</b></p> <p>Evidation Health<br/>CareScore<br/>Aledade</p> |
|--|--|---|---|---|



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