Digitalizing Healthcare To Deliver Value-based Care And Improve The Patient Journey

Tamara Sunbul, MD, CPHIMS, FHIMS, PMP Medical Director of Clinical Informatics Johns Hopkins Aramco Healthcare

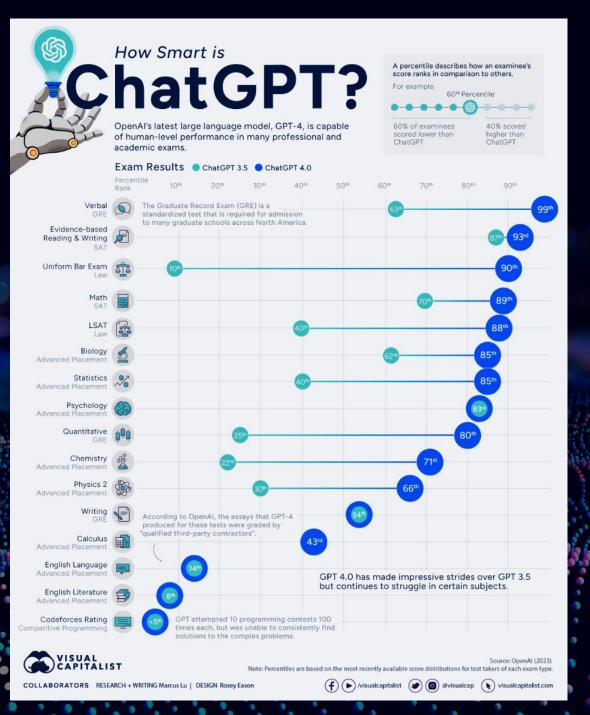
İNTELLIGENT HEALTH 2024



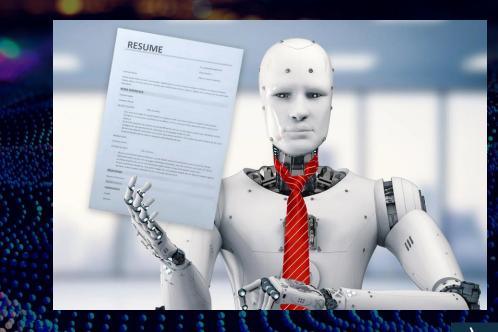


Nothing to disclose





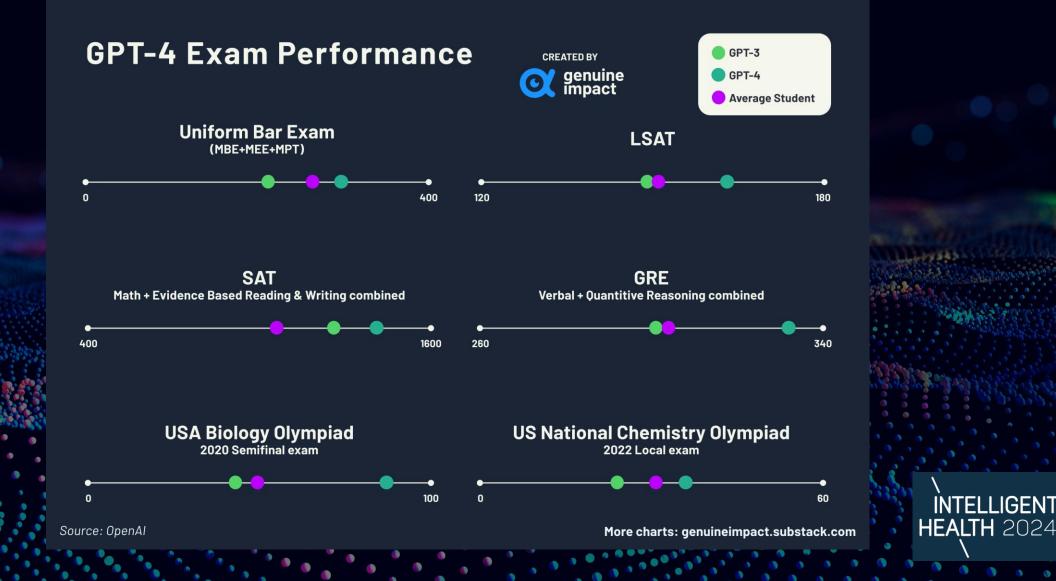
90% In Bar Exam, 88% In LSAT: GPT-4 Beats 90% Of Humans In World's Toughest Exams



INTELLIGENT HEALTH 2024

0 0 0 0 0

How Smart Is That Compared to Humans?



INTELLIGENT



Will We Lose Our Jobs?

85 Million Workers Replaced Globally by 2025 – World Economic Forum Projects

-



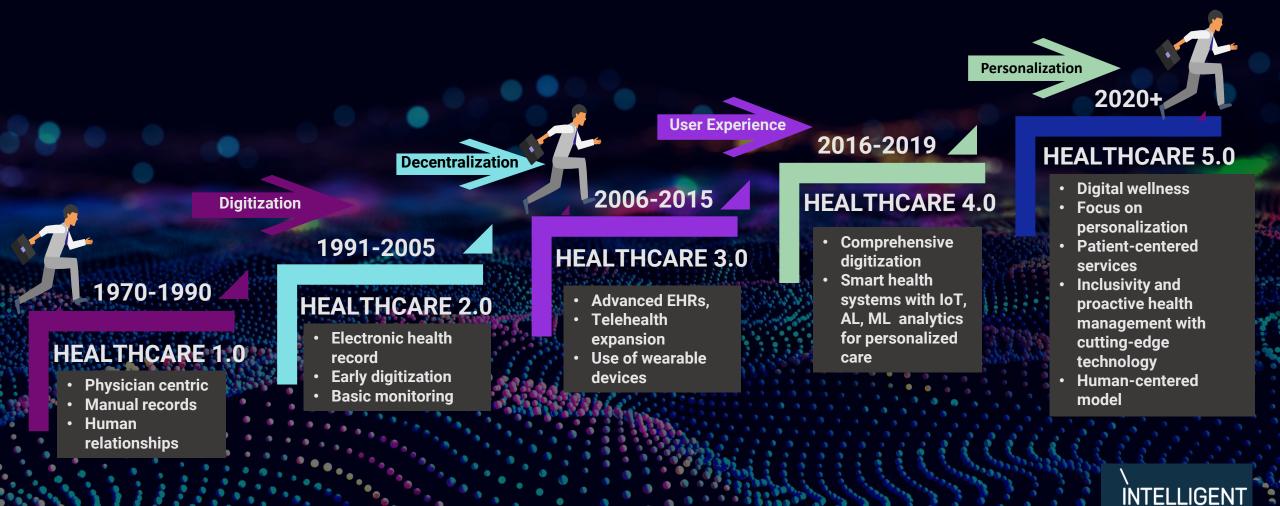
Generative Al Likely To Influence & Reshape Not Destroy Jobs

85 Million Workers Replaced Globally by 2025 – World Economic Forum Projects

97 Million Jobs Created Globally – World Economic Forum Projects

INTELLIGENT HEALTH 2024

Evolution Of The Healthcare Industry From Healthcare 1.0 to 5.0



HEALTH 2024

The New Era of Healthcare



Reactive & Fragmented

-----Proactive & Integrated

Reactive

One Size Fits All

Institutional Centered

Paternalistic

Volume Based

Improve d Citizens Health

Efficient Health System Vibrant Health Economy **Proactive**

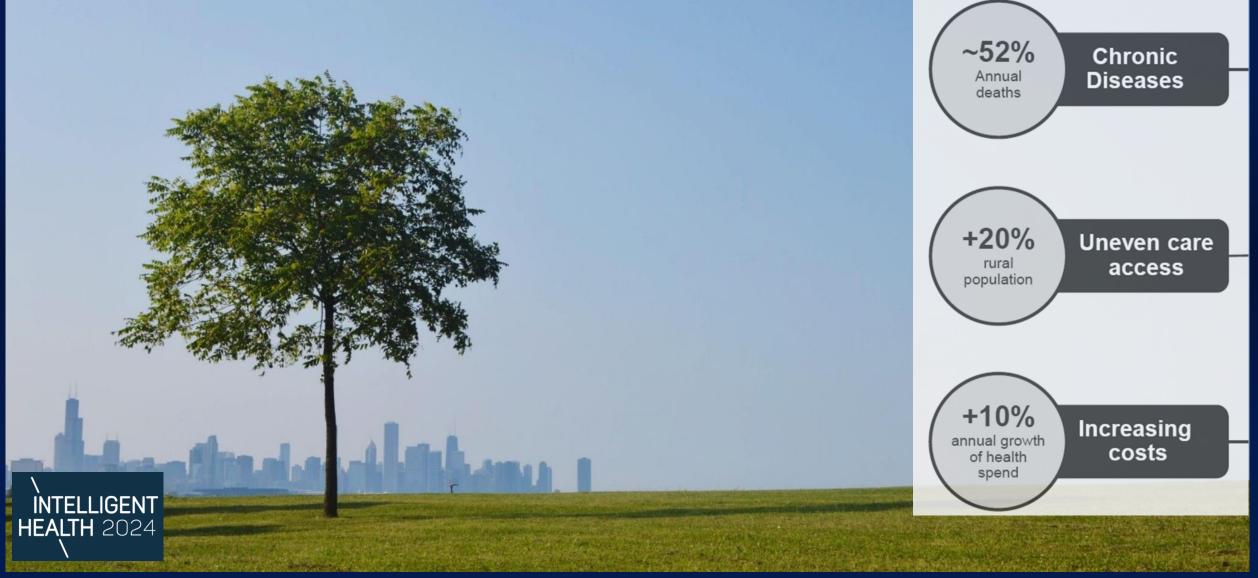
Personalized

Decentralized

Empowered

Value Based

Persistent Challenges in KSA: Access To Quality Care, Rising Chronic Diseases, And An Aging Population



Definition of Value-Based Care and Emphasis on Population Health Strategies

Institute of Medicine "Quadruple Aim":

- Improving the health of populations
- Improving the patient experience of care
- Reducing the per capita cost of health care
- As well as improving clinician experience



Integration of Population Health Initiatives into Value-Based Care Models

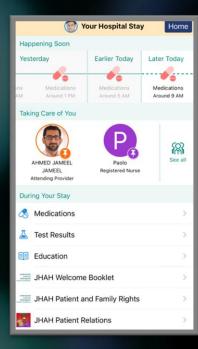


Data's Role in Shaping Preventive Healthcare Measures To Deliver Coordinated Care Efficiently



Leveraging Technology and Data Data for Proactive Population Health

Empowering Patient As Partners In Care









Patient Portals & Bedside

Self-Triage Symptom Checker

Patient Questionnaires

Wearables & Remote Monitoring

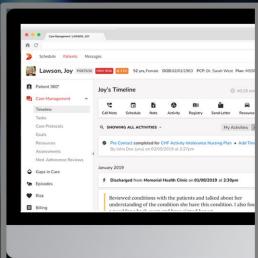


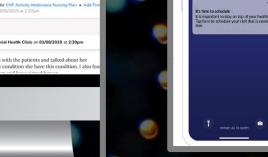
Prevention Before Intervention



RISK

STRATIFICATION





A

9:41

Monday, June 3



Risk Stratification

Care & Risk Scoring

Actionable Care Gaps



Clinical Decision Support Delivering Safer Care





Risk of Hospital Admission or ED Visit

Al Amri, Mivas Abdallh - Score calculated just now

	43.35% High					
	Range		Value			
40%	-	100%	High			
20%	-	40%	Mediur			
0%	-	20%	Low			

Factors Contributing to Score Factor	Value
Number of ED Visits	1
Is in Relationship	No
Number of Hospitalizations	1
Has PCP	Yes
Factors Not Contributing to Score	*
Description	*

This model predicts the 1-year risk of a patient having a hospital admission or ED visit. The model is designed to be used on patients 18 years old and older.

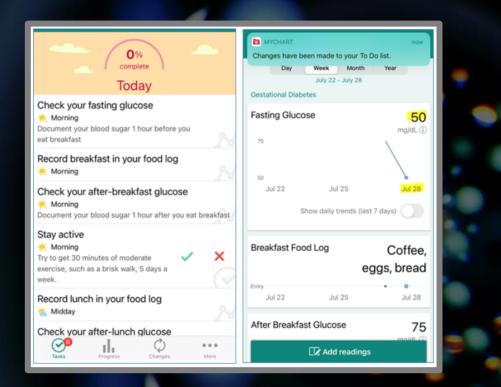
See the dependencies listed in registry metric scoring rule DM SCORE RISK OF HOSPITAL ADMISSION OR ED VISIT (R CER 82307) for the registry metrics that are required to calculate this score correctly.

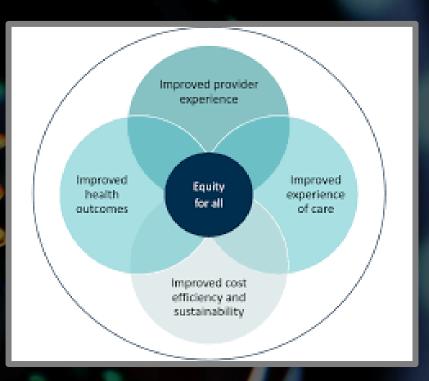
Closed Loop Medication, Specimen Extraction, Milk & Blood Administration

AI & Cognitive Computing Models



Reducing Clinical Variation And Care Standardization





Pathways (Caregivers & Patients) And Evidence Based Order Sets Measuring Evidence Based Outcomes

INTELLIGENT HEALTH 2024

Technologies Empowering Safer Care: Al's Application in Harm Reduction

Healthcare-Associated Infections

> Surgical Complications

Pressure Ulcers



Venous Thromboembolism

> Adverse Drug Events (ADEs)

> > INTELLIGENT HEALTH 2024

Falls

Democratization Of Data

nphies

Because every connection matters

nphies.sa



Angene Statute Mit. Bill Fig.								
	lent Location. None may Plan. Seattle.	2039457 Factorie Manager	Patent Frite FV1			Centeral France 2 CHED-APT CHEE 4	mang Alkan ongin celu	pry vota .
apais N Calendar De D	other Micedenson Fede Toronte The				# [114		a - 162108 → Q	
	LOUIS AVAILUUS > Multimeter To			*348.08.07	P (199		a - 165111 → 2	ney s
	16/05/0817 - 3	wing .		100				
elient Spotlight				155				
pertension Vitals				148				
	an or make on 🗄 make or	6/12/2014		140				
pertension Meds sta20uant05 30 M0 TABU	Presented dose: 250 mp date Startin	g-take 11/25/2917 D-ding-take 12/25/2917						
		Marting data: 3/18/1918 making data: 8/18/1918 phone turing data: 3/25/2918 Uniting data: 3/25/2918	réiseit)	10				
COPIer 1 MO/NE ONLE D	(UD (C) Prescribed doors. 3 mg Daily	before bands the ting date: 3/13/2017 testing date: 3/1	40018 (December)	10				
Knobi 100 mg TABUET Press	Read done: 100 mg daily Starting date	T(05/2017 Ending date: T(05/2016 Starting date: 8/T(2018 Ending date: 7(04/2018		0.00				
They a report for diffusion	Through period	Starting date: 1/40/2018 Ending date: 1/67/2018 arting date: 2/16/2016 Ending date: 5/20/2018		- H				
CADERWITH/20125 Hg1 CADERWITH/20125 Hg1	VERT President door 21 mg daily 50 VERT President door 30 mg daily 50	arting data: 2/46/2018 Ending data: 5/26/2018 arting data: 3/25/2018 Ending data: 4/26/2018		1 100				
SENDERE HE HAD TABLET. Free	ribed door. 18 mg Daily Starting date	10:5/2817 Ending dute: 6/17/2018				_		
Conference and Description of	ited door. 20 mg daily thering date bed door. 5 mg daily Starting date. 5					-		
pertension Results								
eatrine	12	2/46/2818						
				"n				
				-				
				40 4 (1410		NB		
						diam 23 hours of 10		
				Ì				
	Patient Lookup (22)	の Barret 前のredee [チョ hy Planet Diabetes		_			Reports	Phon
	Patient Lookup Fat	n Dairich 🏦 Strieduse 👔 D	Registry Patien	ts - Al	I (39810	25] as of	Reports Thu 8/	- + t
	Patient Lookup Fail JHAH Healt Charl Qr En	n Qasket at Stredale 200 ny Planet Diabetes counter - Signerate Lette	Registry Patien	ts - Al	I (39810	25] as of	Reports Thu 8/	- + t
	Patient Lookup E21 JHAH Healt E2 Charl 92 Enc Detail List	nowein ☆ ennowe 200 ny Planet Diabetes	Registry Patien	ts - Al	I (39810	25] as of	Reports Thu 8/	- + t
	Patient Lookup Fail JHAH Healt Charl Qr En	n Qasket at Stredale 200 ny Planet Diabetes counter - Signerate Lette	Registry Patien	ts - Al	I (39810	25] as of	Reports Thu 8/	- + t
Epic	Patient Lookup E21 JHAH Healt E2 Charl 92 Enc Detail List	n Qasket at Stredale 200 ny Planet Diabetes counter - Signerate Lette	Registry Patien	ts - Al	I (39810	25] as of	Reports Thu 8/	- + t
Poic 2 Poic	Patient Lookup F21 JHAH Healt My Charl Qr End Detail List	n the state of State-State ▶ 0 ny Planet Diabetes counter + ℃h. generate Latte Age Range Detail	Registry Patien	ts - Al	I (39810	25] as of	Reports Thu 8/	- + t
Poice Control of the second se	Patrettucing @ HAH Healt Gran or En Detail List T Elter	n Quarter de Starreiter 20 hy Planet Diabetes sounter - 100 Generate Lette Age Range Detail p Diab Comp Trand MRN	Registry Patien rs 街 HM Modifiers 🕂 Patient	ts - Al	I [39810. t m Send F	25] as of	Reports	- + t
Poice Control of the second se	Patier Looky III IHAH Healt Detail List That Shart of En Detail List The Diabetes Con	Planet Diabetes planet Diabetes conter - Diabetes conter - Diabetes plane Comp Trend MRN Diabetes Comp	Registry Patien rs (a) HM Modifiers (+ Patient patient posite Score	Add to Lis	t 🖻 Send F	25] as of atients Megsa	Reports	(Phen 4/20 8 Pt ou
Poice Control of the second se	Dateri Lookap (2) IHAH Healti Charl v En Detail List V Elter Diabetes Con	Planet Diabetes planet Diabetes conter - Diabetes conter - Diabetes plane Comp Trend MRN Diabetes Comp	Registry Patien rs 街 HM Modifiers 🕂 Patient	Add to Lis	t 🖻 Send F	25] as of atients Megsa	Reports	(Phen 4/20 8 Pt ou
Poice Control of the second se	Patier Looky III IHAH Healt Detail List That Shart of En Detail List The Diabetes Con	n daviati, di dantolile (* 1 ny Planet Diabetes counter = 1 Sta Ganerata Little Age Range Detail plate Comp Trand MRN plate tes Comp This score indicate in t	Registry Patien rs (a) HM Modifiers (+ Patient patient posite Score	Add to Lis	t 🖻 Send F	25] as of atients Megsa	Reports	(Phen 4/20 8 Pt ou
Poice Control of the second se	Datief Lobup (2) PHAH Healt Detail List V Elter Diabetes Con 2 2	n daviati, di dantolile (* 1 ny Planet Diabetes counter = 1 Sta Ganerata Little Age Range Detail plate Comp Trand MRN plate tes Comp This score indicate in t	Registry Patien rs (a) HM Modifiers (+ Patient patient posite Score	Add to Lis	t 🖻 Send F	25] as of atients Megsa	Reports	(Phen 4/20 8 Pt ou
Poice Control of the second se	Dateri Lookap (2) IHAH Healti Charl v En Detail List V Elter Diabetes Con	n daviati, di dantolile (* 1 ny Planet Diabetes counter = 1 Sta Ganerata Little Age Range Detail plate Comp Trand MRN plate tes Comp This score indicate in t	Registry Patien rs (a) HM Modifiers (+ Patient patient posite Score	Add to Lis	t 🖻 Send F	25] as of atients Megsa	Reports	(Phen 4/20 8 Pt ou
Poice Control of the second se	Paters/Loong Cal HAH Healt Detail List T Elite Diabetes Con Q Q Q	tettaster, ∰faneske €1 ny Planet Diabetes santer - ©igenerate Letta Age Range Detail 10 Jako Comp Trand Mitti Dialectos comp Dialectos comp Dialectos comp Dialectos comp	Registry Patien rs (a) HM Modifiers (+ Patient patient posite Score	Add to Lis	t 🖻 Send F	25] as of atients Megsa	Reports	(Phen 4/20 8 Pt ou
Poice Control of the second se	Datief Lobup (2) PHAH Healt Detail List V Elter Diabetes Con 2 2	n daviati, di dantolile (* 1 ny Planet Diabetes counter = 1 Sta Ganerata Little Age Range Detail plate Comp Trand MRN plate tes Comp This score indicate in t	Registry Patien rs (a) HM Modifiers (+ Patient patient posite Score	Add to Lis	t 🖻 Send F	25] as of atients Megsa	Reports	(Phen 4/20 8 Pt ou
Poice Control of the second se	Print Leving and HAH Healt By Cher System Detail List Y Eller Diabetes Con 0 0 0 0 0 0 0 0 0 0 0 0 0	vy Planet Diabetes contre - Ci Querrale Left Age Range Detail 2 Alab Camp Trend MIN Diabetes Compy Diabetes Co	Registry Patien rs (a) HM Modifiers (+ Patient patient posite Score	Add to Lis	t 🖻 Send F	25] as of atients Megsa	Reports	(Phen 4/20 8 Pt ou
Poice Control of the second se	Paters/Loong Cal HAH Healt Detail List T Elite Diabetes Con Q Q Q	tettaster, ∰faneske €1 ny Planet Diabetes santer - ©igenerate Letta Age Range Detail 10 Jako Comp Trand Mitti Dialectos comp Dialectos comp Dialectos comp Dialectos comp	Registry Patien rs (a) HM Modifiers (+ Patient patient posite Score	Add to Lis	t 🖻 Send F	25] as of atients Megsa	Reports	(Phen 4/20 8 Pt ou
Poice Control of the second se	Print Leving and HAH Healt By Cher System Detail List Y Eller Diabetes Con 0 0 0 0 0 0 0 0 0 0 0 0 0	vy Planet Diabetes contre - Ci Querrale Left Age Range Detail 2 Alab Camp Trend MIN Diabetes Compy Diabetes Co	Registry Patient Patient Dsite Score w many of the standar	Add to Lis	t Send F	25] as of atients Megsa	Reports Thu 8/ ge ✓ Tracional s a patient i	(Phen 4/20 8 Pt ou
Poice Control of the second se	Phane (conception) (2) PHAH Healt Because of the first Detail (set of the first Detail (set of the first) Detail (set of the	vy Planet Diabetes contre - Ci Querrale Left Age Range Detail 2 Alab Camp Trend MIN Diabetes Compy Diabetes Co	Registry Patien rs (a) HM Modifiers (+ Patient patient posite Score	Add to Lis	t 🖻 Send F	25] as of atients Megsa	Reports	(Phen 4/20 8 Pt ou
Poice Control of the second se	Print Leving and HAH Healt By Cher System Detail List Y Eller Diabetes Con 0 0 0 0 0 0 0 0 0 0 0 0 0	vy Planet Diabetes contre - Ci Querrale Left Age Range Detail 2 Alab Camp Trend MIN Diabetes Compy Diabetes Co	Registry Patient Patient Dsite Score w many of the standar	Add to Lis	I (39810) t m Send P Treatmen rr living well	t Location	Reports Thu 8/ ge ✓ Tract ge ✓ Tract s a patient i Today	2 Pren 4/20 8 Pt ou
Poice Control of the second se	Phane control of the second se	the second	Registry Patient Patient Patient Osite Score w many of the standar	ts Ald to Lis d goals fo	I (39810) t 📼 Send F Treatmen rr living well weeks ago	t Location with diabete	Reports Thu 8/ ge ✓ Trad s a patient i Today Today	2 Pren 4/20 8 Pt ou
Poice Control of the second se	Pharet control of the PHAH Healt Beauting System Detail the Outputs Cont Outputs Output	Althouse 2010 2010 Section 2010	Registry Patien rs (a) 104 Modifies Patient Patient Patient Solide Score www.sayof the standar 2 wwessayo 7 weeksayo Volue 10408 10408	ts Ald to Lis d goals fo	I (39810) t 📼 Send F Treatmen rr living well weeks ago	t Location with diabete	Reports Thu 8/ ge ✓ Trad s a patient i Today Today	2 Pren 4/20 8 Pt ou
	Phane control of the second se	the set of the se	Registry Patient Patient Patient Osite Score w many of the standar	ts Ald to Lis d goals fo	I (39810) t 📼 Send F Treatmen rr living well weeks ago	t Location with diabeter	Reports Thu 8/ ge ✓ Trad s a patient i Today Today	2 Pren 4/20 8 Pt ou

HIE

Self service Reporting for Data Driven Decisions

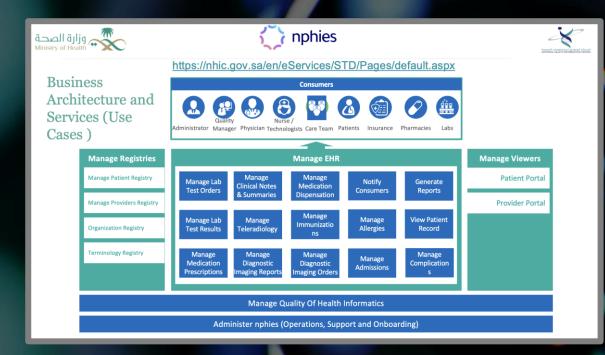
Actionable Data at Point of care



Open Notes & Sharable Records

> INTELLIGENT HEALTH 2024

Democratization Of Data



NPHIES - HIE



Command And Control Center



Cross Border Democratization Of Data



Dashboards Powering Utilization Optimization

Organization - Central Region -	Drill into Central Reg	ion 🗸			Go to Comparison Overview	Go to Operat	tional Overview	r Year	November •	Week	Day 🔹
Revenue					(Volumes						
\$187.9M Total Gr	ross Revenue	0.96	96 Case Mix II	ndex		% Occupant	з у	_	4.6 d	Average Inpatie Length of Stay Target: 0 - 3	nt
N	Iovember Last Year \$187.5M	0.95 0.94 0.93 D J F M	A M J J	J A S O N	50	мээ	A S	O N	October 4.5 days	November Las 4.6 days	Year
November	Budget 96 Variar	nce Goal Met	October	November Last Vear		November	Expected	% Variance	Goal Met May J. J. A. S. Der	October	November Last Year
Hospital Gross Revenue \$187.9M	\$189M 🌼 -0.6			\$187.5M	Occupied Beds	1.1K	1.1K	-4.3 %	<u> </u>	1K	1.1K
Professional Gross Revenue \$187.8M	\$187.5M 📀 0.2	96 	\$193.3M	\$168-2M	Inpatient Admissions (Billed)	1.3K				1.3K	1.3K
Total Costs \$376.1M	\$450M 🙁 -16.4	% <u> </u>	\$406.9M	\$411.8M	Inpatient Discharges (Billed)	1.2K	1.3K	🅸 -1.4 %	× × × < × <	1.3K	1.3K
Total AR Days 24.4	23.0 🌼 6.1	% ××××××	25.1	25.4	ED Visits	1.6K	1.6K	0.5 %	$\times \checkmark \times \times \checkmark \checkmark \checkmark$	1.6K	1.6K
Total Work RVUs 11.4M	11.7M 🌼 -2.5	% ××××××	11.6M	11.4M	Outpatient Visits	18.4K	18.7K	🏶 -1.9 %	✓ × × ✓ × ×	18.6K	18.5K
					Outpatient Surgeries	8.2K	SK.	0 1.9 %	X 🗸 X 🗸 X 🗸	8.1K	8.1K
					Inpatient Surgeries	8K	8K	0.6 %	× × × × × ×	8K	7,9K
0.3% Overall Readmission Rate (30-day, 65+)	I.0 CLAI Targe	BSIs Per 1000 Days tt: 0 - 1		UTIs Per 1000 Days pd: 1 - <2.2	@Efficiency						
0.4 0.2 0 J F M A M J J A S O N			DJFMA	M J J A S D N	19.5d Average All Appointmen		20.1			93.8 % ^s	chedule Utilization
0.3% Overall Mortality Rate (30-day, 65+)	"79 Day	ent Falls Per 1000 s tt: 0 - <1				ASON					I J A S O N
0.2 DJFMAMJJASON	- 7.5 N D J F M A	MJJASON			Emergency Average ED Arrival to Triage Time	Ma 33n			Jul Aug Im 38m	Sep 36m	Oct November 39m 38m

Utilization & Demand Management Pay for Performance & Value Based Care

INTELLIGENT HEALTH 2024

Registry Measurement & Benchmarking



Improving Access Through Telehealth







Telehealth B2C Synchronous & Asynchronous e-visits Remote ICU & Patient Monitoring

Telehealth B2B





Improving Access Through Telehealth







Virtual ICU Rounds





مستشفى صحة الافتراضي SEHA VIRTUAL HOSPITAL Telestroke

Tele-EEG

INTELLIGENT

HEALTH 2024

Automation Allowing Staff Augmentation & Care Givers To Practice At Top Of Their Licenses







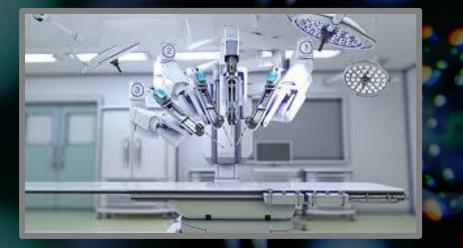
Pharmacy Robotic Automation

Chatbots

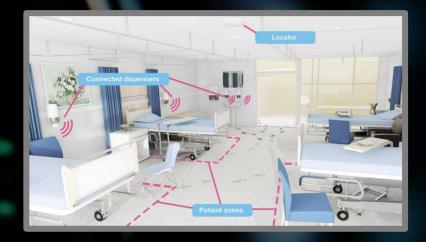
NLP & Ambient



Robotics, Mixed Reality & RTLS







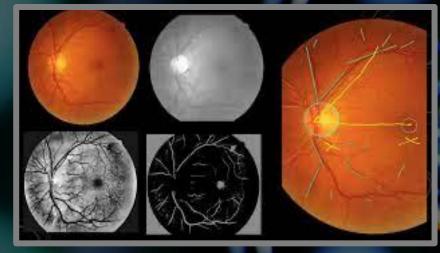
Surgical Robots

Mental Health

RTLS For Infection Control



"PB4I": Early Detection of Disease







Al Assisted Retinopathy Screening

AI Assisted Peripheral Vascular Disease Screening

AI Enabled Wearable Sensors

> **INTELLIGENT HEALTH** 2024

Identification & Alarming







Smart Socks

Smart Alarms

Biometric Identification Systems



Moving into the future Precision Medicine & Gene Editing

Genomics & Precision Medicine- Saudi Genome Project Digital Twins "Ask the Algorithm" Digital Diagnostics & Therapeutics

> INTELLIGENT HEALTH 2024

Collaboration and Partnerships for Value-Based Care Models



Developing Policy and Regulatory Frameworks as Well as Revising & Aligning Payment Structures

INTELL

HEALTH 2024

Showcasing JHAH Care Plus Program: Impactful Initiatives in Value-Based Population Health:



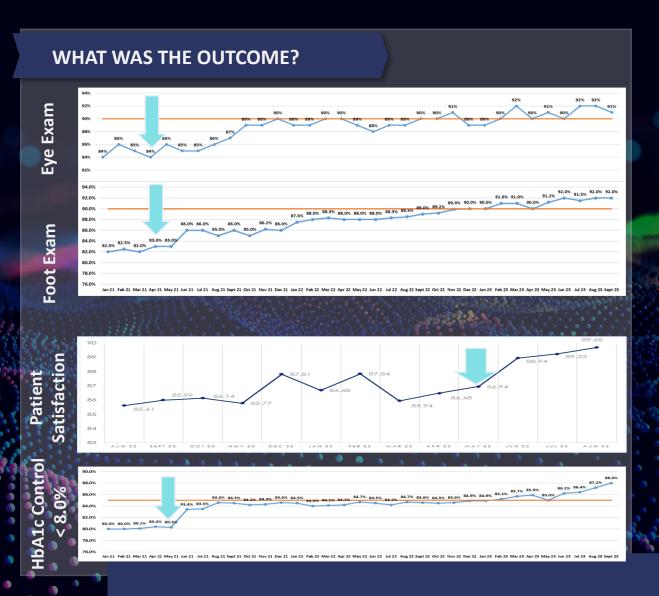
Data-Driven Decisions for Population Health: JHAH Care+ Program.

ACO Diabetes And Prediabetes Archetypes Case Study

WHAT WAS THE PROBLEM?

INTELLIGENT HEALTH 2024

- Patient Experience: Low costumer satisfaction rate and experience rate
- Health Outcomes: Declined overall population health & individual
 health outcomes from long inpatient stays, recurrent emergency visits
- Aligning With JHAH Strategy to choose the first archetype that would provide the most impact and be aligned with JHAH strategy



Call To Action: Continued Collaborative Efforts in the Healthcare Landscape





"Coming together is a beginning, staying together is progress, & working together is success." Henry Ford