

WORLD SUMMIT AI & INTELLIGENT HEALTH

Northwell Health Physician Partners

September, 2024

Made for *this*™



AGENDA

- 1 Who is Northwell Health
- 2 AI Form Factors
- 3 Northwell AI Areas of Focus
- 4 Closing



ECONOMIC IMPACT



\$18.0 billion
annual operating budget



\$1.3 billion
capital budget

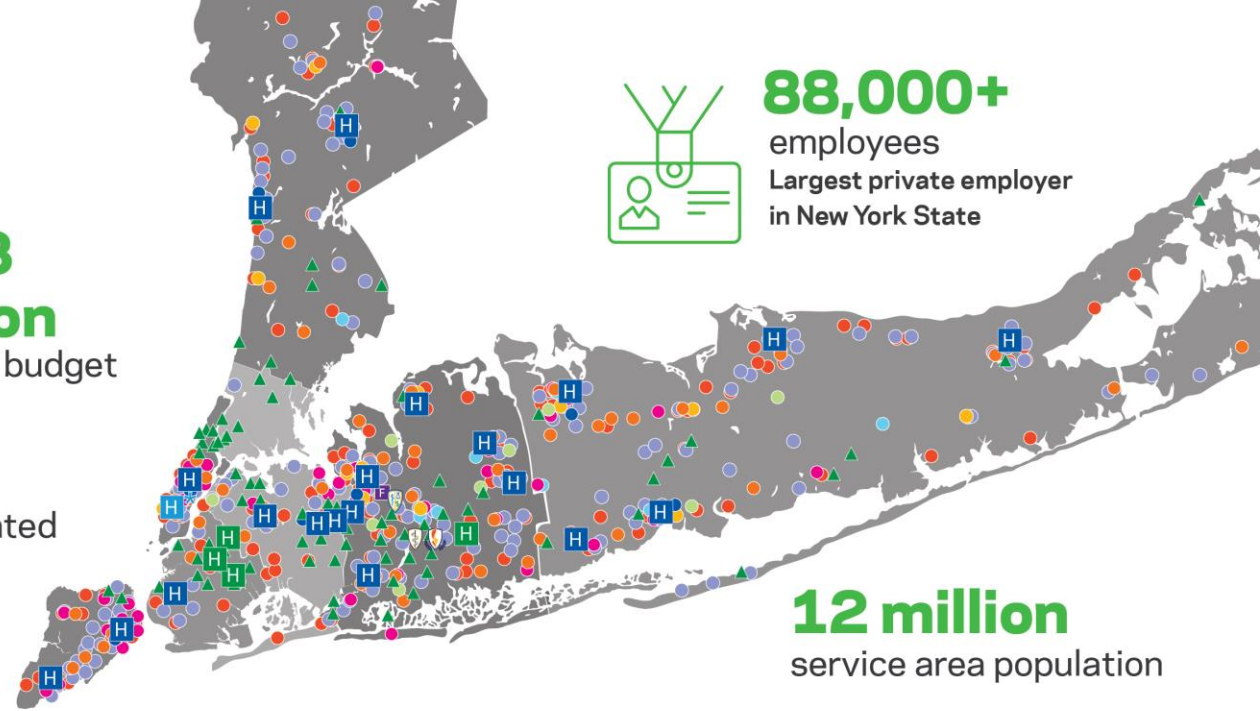


21 hospitals } **11** magnet-designated

875+ ambulatory facilities



88,000+
employees
Largest private employer
in New York State



12 million
service area population

CAREGIVERS



12,000+
credentialed physicians

19,000+
nurses

5,800+
employed physicians
Largest Physician Group
in the New York Area

2,000+
residents & fellows in
160 programs

4,000+
advanced care providers

5,550+
volunteers

OPERATING STATISTICS

5.5 million
patients encounters
— 2 million patients treated annually



850,000+ emergency visits*

250,000+ ambulatory surgeries*

37,000+
births



1,000+
active clinical
research studies



1 million
home health visits



250+ principal investigators



COMMUNITY IMPACT



\$485 million
in education & research

\$465 million
in health improvement
services & building

\$221 million
in charity care

*2022 budgeted

**NORTHWELL IS
NOW NEW
YORK'S MOST
AWARDED
HEALTH SYSTEM
BY U.S. NEWS &
WORLD REPORT**

**North Shore
University Hospital**



**Lenox Hill
Hospital**



**Long Island Jewish
Medical Center**



**Cohen's Children's
Medical Center**



**Huntington
Hospital**



**Plainview
Hospital**

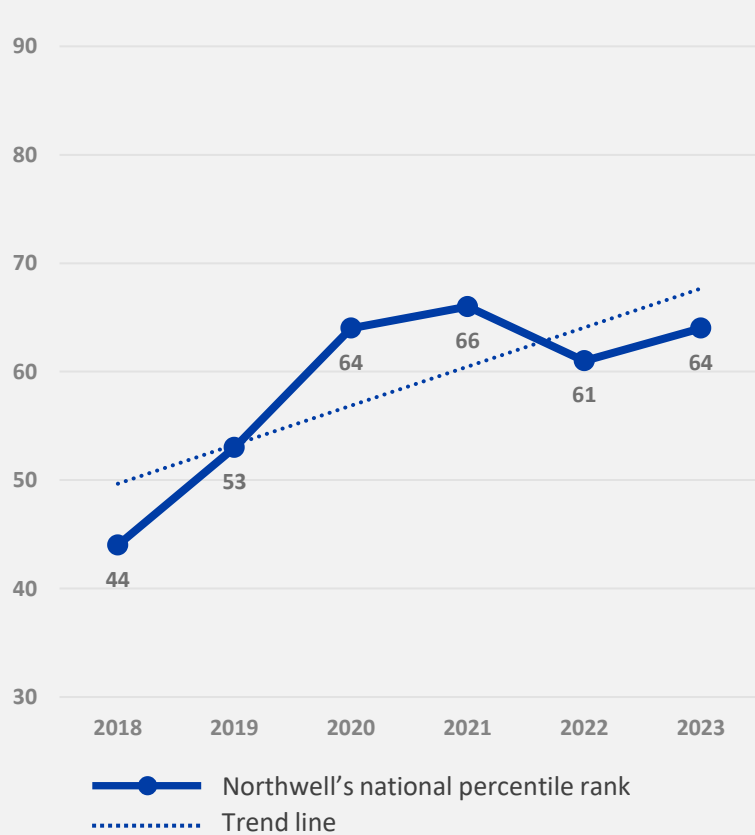


Patient Experience

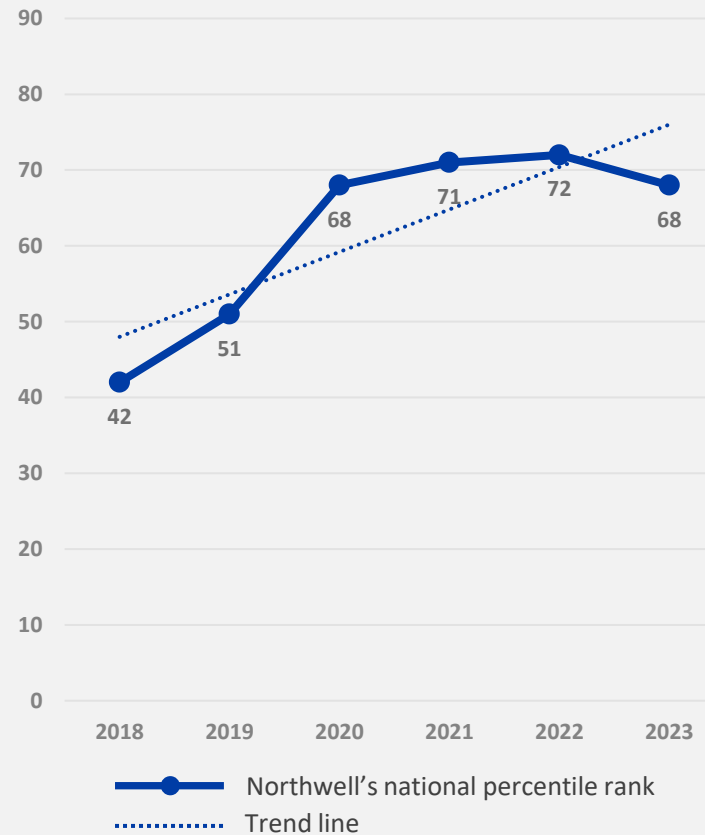
Northwell's National Percentile Rankings



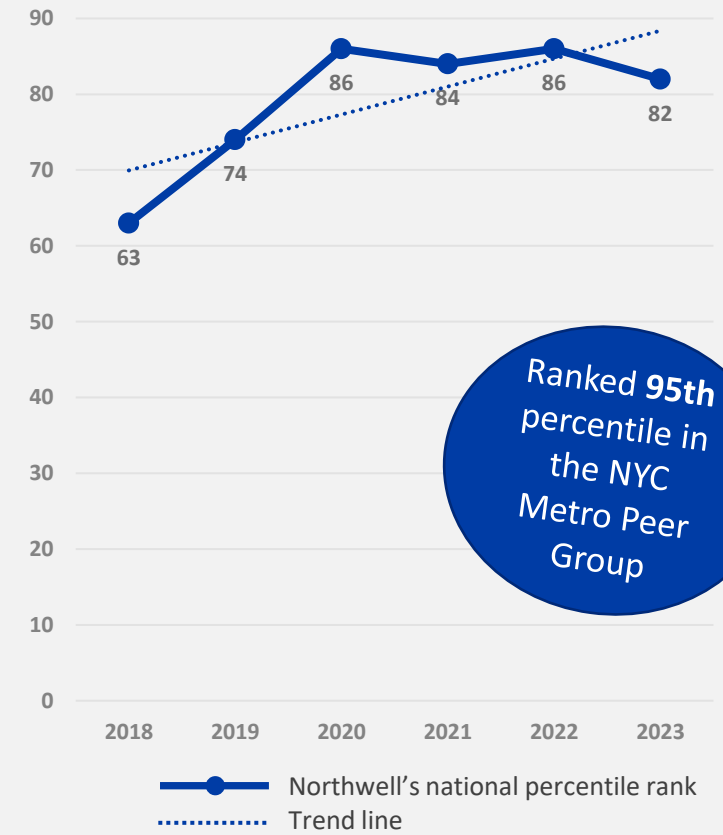
Recommend the Hospital



Recommend the Practice



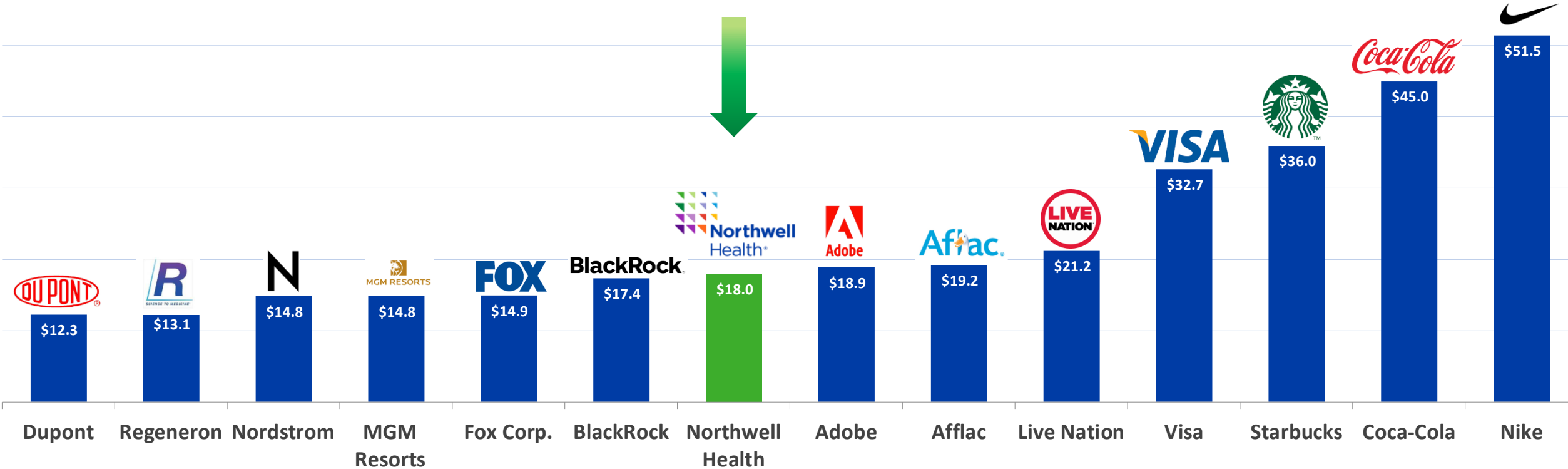
Recommend the Provider



Ranked 95th percentile in the NYC Metro Peer Group

Total Operating Revenue

(Dollars in billions)



At \$18.0B in top line revenue, Northwell compares to several other multinational companies

Salesforce

Epic

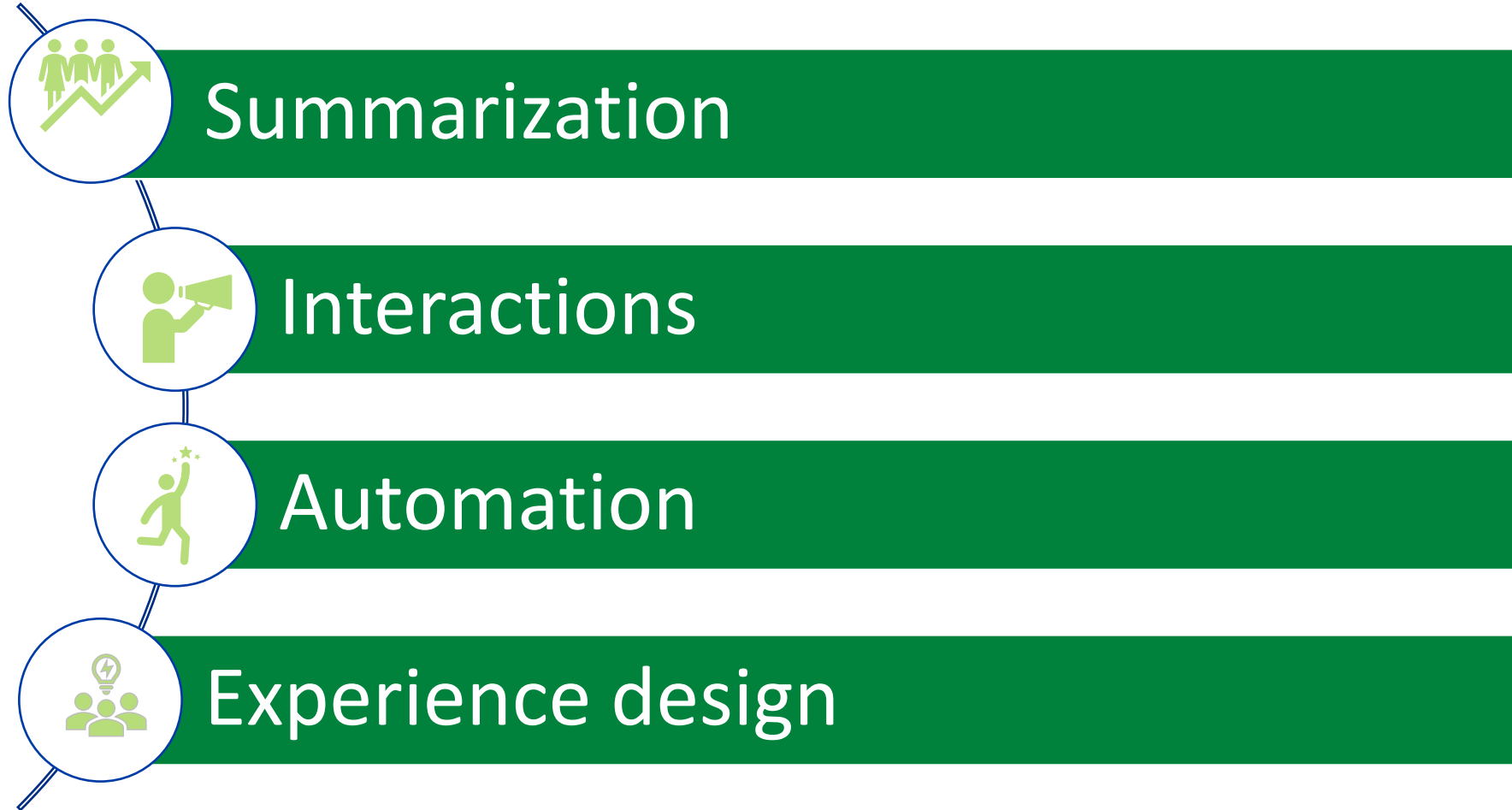


Digital Strategic Focus

Seamless & Connected Care

- 1 Create best in class experience for our customers, patients, clinicians, and team members
- 2 Redefine the relationship between providers and patients
- 3 Enhance business operations
- 4 Raise health in the communities we serve

BUILDING AND MEASURING TRUST



Predictive AI



- Automates analysis.
- Streamlines data processing.
- Works with structured data.
- Works well for well-known use cases.
- Does best with structured and time series data

Generative AI



- Summarizes complex documents or data sets.
- Easily works with unstructured data.
- Creates articulate and simple answers to complex queries.
- Works well across different modalities such as text, video, audio, robot instructions and data formats.

LITERATURE SUMMARY

Measuring environmentally sustainable health care: a scoping review

Michael Padgett*, Anitha Devadasan*, Iris Blom, Guilhem Molinie, Wynne Armand, Ann-Christine Duhaime, Jodi D Sherman, Jonathan Slutzman, Dionne Krings



Work to reduce environmental pollution is defined and measured in current literature included either a definition or description of health care on the environment. 328 definitions or descriptions of environmental health care in the current definition, measurement, and care in published literature. Work is needed progress and reduce environmental pollution.

Introduction

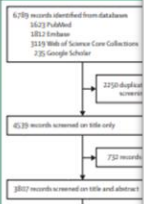
Health-care systems globally have a substantial generating greenhouse gases and other pollutants that have direct and indirect impacts on human health.¹⁻⁴ Recognising this role, many health systems have committed to reducing pollution and a move towards environmental sustainability. As of 2023, 84 countries across all income levels have developed health systems that are resilient to climate change and have low carbon footprints.⁵ In March 2023, 100 health organisations in the USA endorsed a pledge aiming to achieve net-zero emissions by 2040. Similar initiatives and pledges are also occurring across Europe.^{6,7}

Although these pledges mark important steps, addressing pollution related to health care remains fragmented and lacks standardised definitions and measurement. For example, measurements of greenhouse gas emissions in health care can be estimated using a variety of techniques and approaches that are not comparable with one another.^{8,9} Practice-based hospital membership organisations have created health-care sustainability advocacy groups, on a range of environmental measures.¹⁰ However, the report is limited by members who choose to voluntarily participate. Without rigorous, standardised tools, developers might find themselves uncertain about which definitions to pursue or might be misled regarding the effectiveness of implemented measures. Various nascent national and international schemes for sustainability in health care have not yet produced standardised, actionable, and comparable metrics.^{11,12} Facilitate progress on this topic, a clear definition of environmentally sustainable health care, as well as robust, comparable

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For more on measurement techniques and approaches used to measure greenhouse gas emissions in health care see <https://doi.org/10.1136/bmjopen-2023-029444>.

For more on Practice GreenHealth see <https://www.practicegreenhealth.com>.

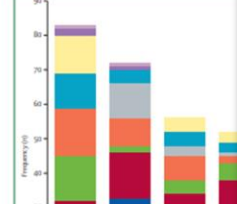


Panel: Selected data extraction categories and response

- System level**
 - Global
 - Regional or local
 - Specific programme
 - Hospital
 - Other facility types
 - Procedural
 - Service or department
 - Product or device
- Impact categories**
 - Air pollution
 - Energy use

Title	Year	Journal	Review or Definition	Def. and Measure
Ismail-Abdullah et al	2020	International Journal of Integrated Engineering	NA	NA

Table 1: Example data extraction of a research article



Measure	Total number of measures reported	Most common measure reported
Greenhouse gas	369	Weight (kg, g)
Water	37	Weight (mg, g)
Air pollution	74	Weight (kg, g)
Energy use	70	Amount of energy

Table 2: Common and divergent measures for carbon footprinting

level, then focusing on water measurement at this appropriate. Some goals might require multiple levels of measurement. An analysis of the levels and targets currently used and proposed environmental policy might be useful in shaping future measurement. Different policies might also require different quantities of data, necessitating different measurement strategies on a system-wide level. A single system-wide carbon emission using an input-output-based LCA, whereas a product level might need very precise comparisons across a wide variety of products, using process LCA studies.

Reported measures showed relative homogeneity within the greenhouse gas, waste, and energy

Limitations
Our study includes several limitations. Our data search was limited to online databases and English language articles, which might have resulted in fewer articles from non-English speaking countries. We also did not conduct a specific search of grey literature, although these publications were eligible for inclusion if they were retrieved in our searches. Data extracted from articles included in our study did not always fit neatly with the available values for variables, such as calculation technique or data sources. Different possible response options might have modified results although most studies did fit well with existing options.

Moving forward
Advancing and harmonising environmental sustainability definitions and measurements in the health care sector is a wide and frequently intractable

Overcoming the current heterogeneity in measuring and defining environmental sustainability in health care necessitates collaborative efforts. By fostering partnerships among stakeholders, including researchers, policy makers, health-care providers, and environmental experts, and using rigorous, standardised approaches, we can address methodological inconsistencies and develop common frameworks. Through collaborative action, we can advance the field, driving progress towards more accurate, comprehensive, and actionable measures of environmental sustainability and help the health-care field to achieve its important sustainability goals.

Contributors
MP, AD, and DK conceived the project and the methodology. MP, AD, IB, GM, and DK conducted the literature review, data extraction, and data analysis. ACD and JS contributed to data extraction and categorisation methodology. MP led the writing of the scoping review. All authors provided critical feedback and helped shape the analysis and manuscript.

Declaration of interests
MP received payment for lectures at Ecole des Hautes Etudes en Santé Publique, Public Health School, Rennes, France. IB received consulting fees and travel support from London School of Hygiene & Tropical Medicine; payment for a lecture from The Medical Society Consortium on Climate and Health; and travel support from the conference 'Organisations of the Climate & Health 2023 Conference on Oct 22-23, 2023, at the Zucker School of Medicine, NY, USA. WA received an honorarium for lectures from Harvard Medical School and travel support from Massachusetts General Hospital. JDS received royalties or lectures from Up to Date; consulting fees from the Institute for Healthcare Research; payment for lectures from several medical societies and academic institutions; and travel support from the World Association Summit for Health, American Thoracic Society, National Academy of Medicine, Johns Hopkins University, and the Health Summit at Sandstone. JS received consulting fees from Genentech, AlphaGraphics, CapVisions, and Sclerix; payment for lectures from AstraZeneca, University of New Mexico, Columbia University, University of Colorado, Harvard University, Institute for Healthcare Improvement, and University of California at Los Angeles; and travel support from Vicent, AstraZeneca, University of Colorado, and Institute for Healthcare Improvement. All other authors declare no competing interests.

Admissions
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

References

1. Lutzen M, Malin A, Li M, et al. The environmental footprint of health care: a global assessment. *Lancet Planet Health* 2020; 4: e271-79.
2. Malin A, Padgett M, Carter S, et al. Environmental impacts of Australia's largest health system. *Resour Conserv Recycl* 2021; 168: 105554.
3. Eckelman MJ, Huang K, Lagasse R, Seney E, Dubois R, Sherman JD. Health care pollution and public health damage in the United States: an update. *Health Aff (Millwood)* 2020; 39: 2075-79.
4. Romanello M, Napoli CD, Govers C, et al. The 2023 report of the Lancet Countdown on health and climate change: the imperative for a health-centred response in a world facing irreversible harms. *Lancet* 2023; 402: 2348-94.
5. Alliance for Transformative Action on Climate and Health. WHO based network. International Development. Consensus and action. 2023. <https://www.atachcommunity.org/atach-community/> (accessed July 22, 2024).
6. US Department of Health and Human Services. Health Sector Pledge. May 22, 2024. <https://www.hhs.gov/climate-change-health-equity-environmental-justice/climate-change-health-equity/health-sector-pledge/index.html> (accessed July 22, 2024).

This scoping review examined how environmentally sustainable healthcare is defined and measured in current literature. The study found a lack of standardized definitions and measurements, hindering progress in reducing the environmental impact of healthcare. The review highlights the need for a common approach to guide progress through shared goals, methods, and learning. The authors suggest adopting approaches used for evaluating and reporting health quality metrics, including consensus-building and empirical analyses. They also emphasize the importance of considering a wider range of environmental impacts beyond greenhouse gases and tailoring measurement levels to specific policy actions.

Methods of screening and selection
To select publications for inclusion the PRISMA Extension for Scoping Reviews procedure is depicted in figure 1.
In the first step, search results were screened by two reviewers (two IB) independently. Finally, after the full texts of the resultant 2582 publications were screened by two reviewers independently.

the grey literature were retained. One publication from National Health Service England and one publication from the Dutch National Institute for Public Health and the Environment were included in the original research category.¹⁰ One publication from WHO and one publication from the Commonwealth were included in the review article category.¹¹⁻¹³ 152 publications focused on a specific medical specialty or specific care context (104 research articles, 48 review articles). The most common category specialty care (n=101), among which nephrology (n=21), anaesthesiology (n=14), and dentistry (n=12) were most reported specialties. 39 articles reported perioperative care, with those focused on surgery being the most common (n=10). 12 articles focused on care contexts and three on procedural care.

environmental impacts included in other categories (14 pollution (28), travel (27), food and recycling (three; figure 2), these categories is available in the supplemental appendix.
The frequency of impact categories by system level
The frequency of impact categories by system level was identified at the global level. 83 identified at the product or device level were identified at the global level. 39 articles investigated across this impact category was the time of ten system levels. The category was identified at all system levels: global, specific-programme level, and procedural care.

and calculation methods as at least one other occurrence used data source and calculation combinations unique to their study. The frequent calculation methods and data sources by impact category are presented in table 3.
Of the 157 occurrences of the greenhouse gas calculation, with 72 (46%) studies using this method, 45 (29%) occurrences used process-based LCA, 21 (13%) used output-based LCA, and 61 (39%) used a hybrid LCA that used process-based and input-output-based approaches. Simple or no calculations were the most common calculation method among the 56 occurrences of waste; the 40 occurrences of energy use; a

enhancing environmental sustainability in surface water and groundwater," a definition clearly aligned with specific actions necessary to improve sustainability to guide work in this area.
Along with more precise and measurable elements that refer to specific types of impacts, a useful definition of environmental health care might also include the consistent use of all definitions and discussion manuscripts referred to health. The idea into a common definition, and environmental impacts, could provide a framework for environmental work in the health sector. Accounting for existing health systems as an important aspect of promoting

A very small number of studies reported structural process measures, such as the presence of environmental sustainability-related protocols. These types of measures are generally easier to collect and compare across settings and can be useful in supporting implementation science research. However, the links between structural measures and desired outcomes are often unclear. Additional development and validation of measures, linking them to important outcomes, facilitate reporting in some cases.
Measurement methods
Across all impact categories, LCA was the most common method. LCA studies provide a holistic environmental assessment of a process, product, or service, accounting impacts from across the lifecycle, and providing

reporting, and others. Incorporating these voices into measurement development will be crucial to create appropriate, actionable, and understandable metrics for stakeholders.
Work on measurement should also include consideration of the setting and relevant actions for improvement. Decarbonisation goals on a health system level might need very different types of measures to waste segregation and improvement goals in a local clinic.
Conclusion
Environmental sustainability in the health-care sector is a growing topic with important human and planetary health consequences. Although interest is growing, there remains substantial work to define and measure goals and track progress.

LITERATURE SUMMARY

The screenshot displays the Northwell Health Artificial Intelligence Hub interface. At the top left is the Northwell Health logo. The main header is "Artificial Intelligence Hub" with a "PREVIEW" badge. Below the header, there are navigation options: "New Convo" and "Launch Task". The current view is "New Conversation".

On the left side, there is a "Scratch Pad" and a "Recent" list of conversations:

- New Conversation (Today 10:57 AM)
- New Conversation (08/18/2024 09:40 PM)
- New Conversation (08/01/2024 07:57 PM)
- New Conversation (07/26/2024 12:15 PM)

The main chat area shows a message from Gemini 1.5 Pro:

Today 11:03 • Gemini 1.5 Pro

please summarize

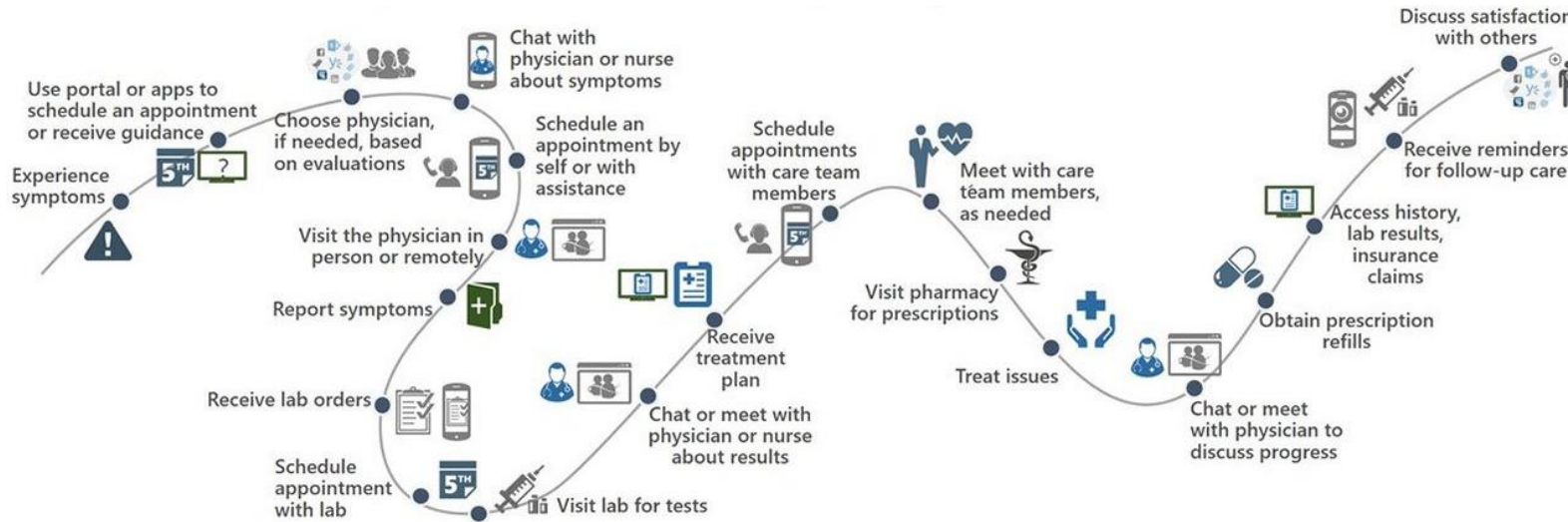
Today 11:03 • Gemini 1.5 Pro

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Today 11:03 • Gemini 1.5 Pro

At the bottom, there are "SETTINGS" and "LEARNING CENTER" links. The chat input area contains "Chat with Gemini 1.5 Pro" and a "1" icon.

PATIENT INFORMATION SUMMARIZATION



EMR

PATIENT INFORMATION SUMMARIZATION

Overall summary for hospitalist/PCP:

Mr. XXXXX is a 55 year old male with a history of IgG4-related autoimmune pancreatitis and depression who was admitted twice recently for jaundice. During his first admission in February, he was found to have a pancreatic mass causing biliary obstruction and underwent ERCP with stent placement. Biopsies showed IgG4-related pancreatitis without malignancy. He also had mediastinal lymphadenopathy biopsied showing granulomas, with sputum culture growing mycobacterium avium intracellulare (MAI). He was readmitted in April with recurrent jaundice. MRCP showed worsening biliary dilation with sludge/stones. After ID clearance, he underwent repeat ERCP with stent exchange and stone extraction. He was started on prednisone 40mg daily for treatment of his autoimmune pancreatitis. He will need close outpatient follow-up with GI for further stent management and with ID to monitor for any MAI reactivation on steroids.

Thanks!



INTERACTIONS:

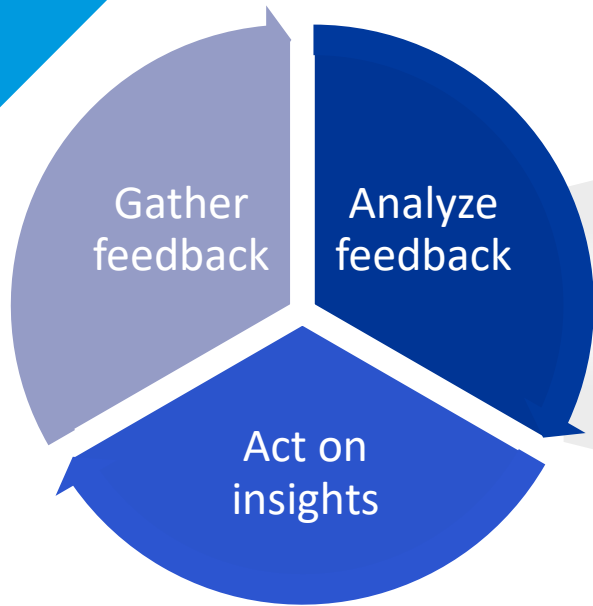
PATIENT FRIENDLY RESULTS DELIVERY & INTERPRETATION

Young man, recently emigrated from India, presented with abdominal pain & distension; liver lesions (parenchymal and serosal) and small amount of ascites seen on CT. Subsequently had MRI followed by biopsy of liver lesion. Results of all imaging plus pathology results and microbiology results presented to LLM, prompted to provide patient-friendly summary:

- Here is a concise patient-friendly summary of the findings:
- The CT scan of your abdomen and pelvis on 12/4/2023 showed a few small abnormal areas in your liver up to about 2 cm in size. The MRI of your abdomen on 12/18/2023 provided more details on these liver lesions, which have not significantly changed in size. The radiologist felt these could be due to an infection, inflammation, or less likely a tumor.
- Since the cause was still unclear, a biopsy of one of the liver lesions was done on 1/24/2024. The biopsy showed areas of inflammation called granulomas, but special stains did not find any microorganisms like tuberculosis or fungus. The biopsy tissue was also cultured and no tuberculosis bacteria grew after 5 weeks.
- In summary, you have several small inflammatory lesions in your liver, but the cause is still not certain based on the imaging and biopsy results. Further discussion with your doctors is recommended to determine the next steps in your care.

INTERACTIONS:

PATIENT PRODUCT MANAGEMENT



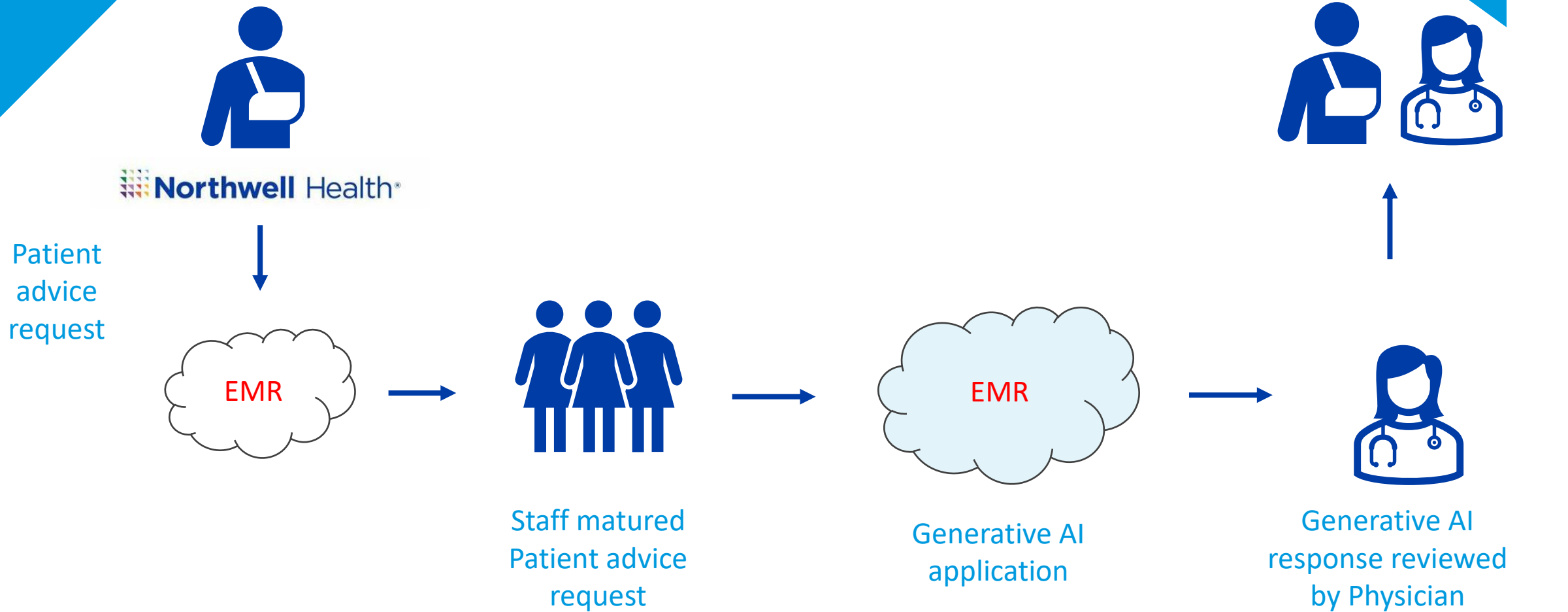
Feedback Loop: A customer experience strategy meant to constantly enhance and improve your product offering based on user reviews, opinions, and suggestions. This is how we interact with our customers

Patient: "I had a great experience because of [actionable feedback]"

Patient: "I had a poor experience because of [actionable feedback]"

Provider has a successful quarter because [promotor analytics]

INTERACTIONS: GENERATIVE AI TO MESSAGE PATIENTS



AUTOMATION: AMBIENT LISTENING

WHAT IT IS

Clinical ambient listening is a form of generative ai technology that listens into a clinical consult and leverages sophisticated *large language models* (LLMs) to **generate clinical notes on behalf of the Provider.**

THE VALUE

The Documentation burden on providers has worsened over time.
Burnout is high.
Ambient listening helps free up physicians, providing them the ability to focus on better patient communication & engagement.

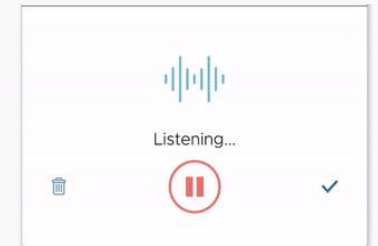
WHAT WE'RE HEARING

Early adopters are telling us that:

- Providers are spending less time in the EHR
- Providers aren't working as many late nights
- **Providers are feeling less burnt out**
- **Patients are feeling better engaged**
- There are indications of potential positive ROI



LISTEN – GENERATE – SUMMARIZE



JOURNAL ▾ EVENTS ▾ INSIGHTS COUNCIL ▾ TOPICS ▾ ABOUT PUBLICATIONS ▾ Q

Ambient Artificial Intelligence Scribes to Alleviate the Burden of Clinical Documentation

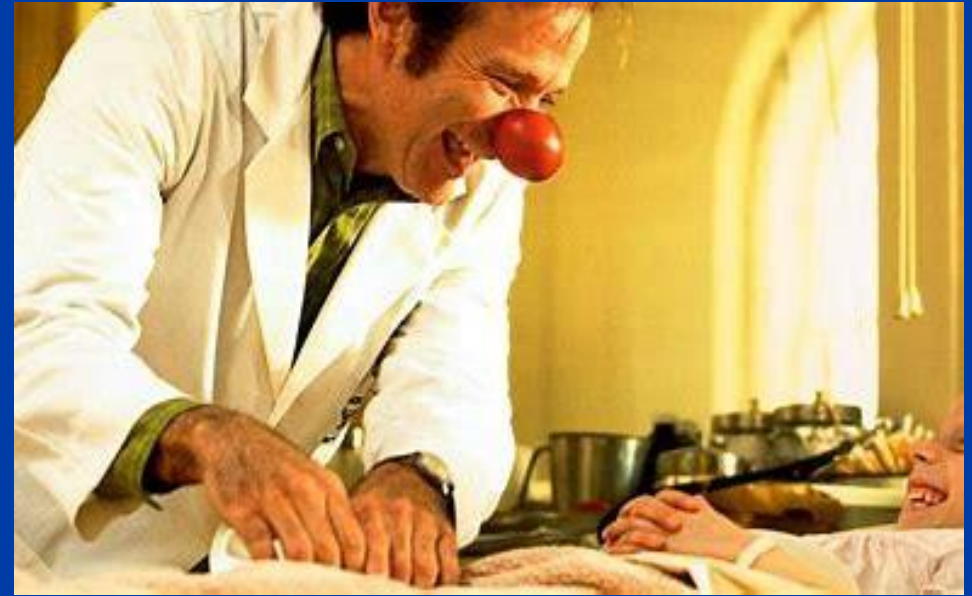
Early results with generative artificial intelligence deployed in The Permanente Medical Group yield some promising results and key observations, although the long-term development and wider deployment will require a rigorous evaluation framework that tracks engagement, effectiveness, quality, and safety.

Authors: Aaron A. Tierney, PhD, Gregg Gayre, MD, Brian Hoberman, MD, MBA, Britt Mattern, MBA, Manuel Balleca, MD, Patricia Kipnis, PhD, Vincent Liu, MD, MS, and Kristine Lee, MD [Author Info & Affiliations](#)

EXPERIENCE DESIGN DEPENDS ON IDENTITY

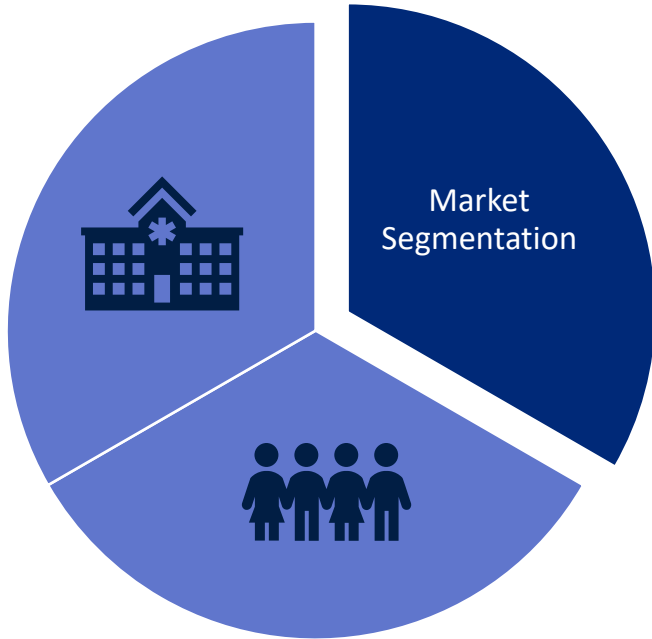
The best way to find yourself is to *lose yourself in the service of others*

-Mahatma Gandhi



EXPERIENCE DESIGN

VALUE PROPOSITION



Create a Patient AND Provider Fly Wheel

Wellness: Personalized Optimization, Development & Engagement

Activate talent to create, scale, & market clinical/non-clinical programs

Provider Life Cycle and Network Succession Planning

Provider Patient Matching – AI driven feedback loop

Customer Feedback Loop – AI driven responses

Identity can be a source of strength by promoting connection, belonging, and purpose.

It can be an obstacle to success due to perpetuating stereotypes, discrimination, & systemic barriers



**We are
Made for** *this*

Thank

you



Northwell Health

Physician Partners[®]