



Potential of Advanced Technology for Native Healthcare

2024 Indian Health Service Partnership Conference

August 14, 2024

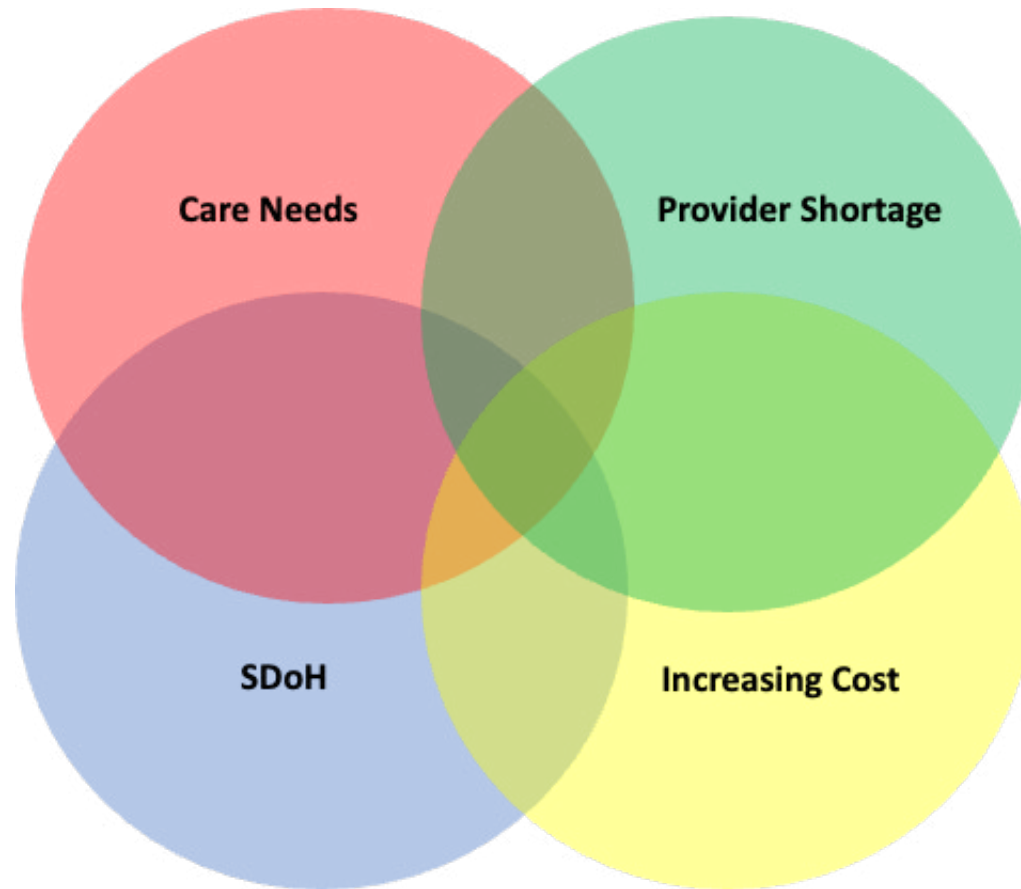
Thomas Osborne, MD
Chief Medical Officer
Microsoft | Federal Civilian

Presentation Overview:

- **Challenges**
- **Perspectives**
- **Tools**



National & Global Challenges (High Level)





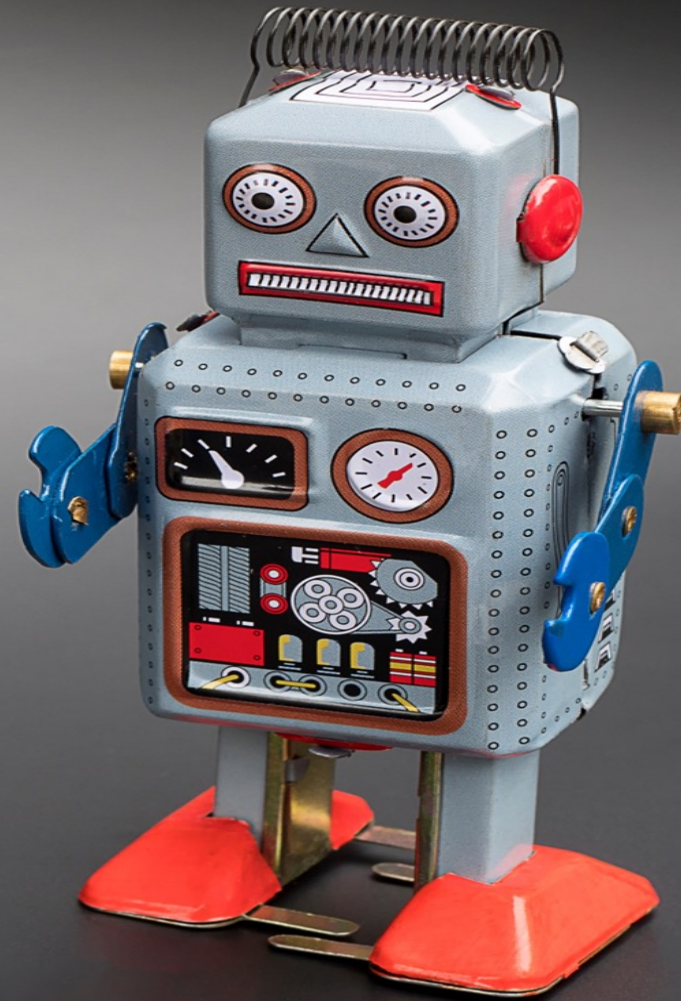
Innovation: *3 Keys to Success*

- 1. Effectively solve challenges that people want addressed**
- 2. Empower others to be successful**
- 3. Diversity is a strategic advantage**

What is AI?

Ability of machines to perform tasks that normally require human intelligence.

Use algorithms and statistical models to learn from data and improve over time.



Brief history of AI

Artificial Intelligence

Machine Learning

Deep Learning

Generative AI

1956

Artificial Intelligence

the field of computer science that seeks to create intelligent machines that can replicate or exceed human intelligence

1997

Machine Learning

subset of AI that enables machines to learn from existing data and improve upon that data to make decisions or predictions

2017

Deep Learning

a machine learning technique in which layers of neural networks are used to process data and make decisions

2021

Generative AI

Create new written, visual, and auditory content given prompts or existing data.



Satya Nadella, Microsoft's Chairman and CEO, set a clear course for the company to adopt a principled and human-centered approach to AI

References:
[Advancing AI trustworthiness: Updates on responsible AI research - Microsoft Research](#)
[Advancing human-centered AI: Updates on responsible AI research - Microsoft Research](#)

Responsible AI @ Microsoft

In 2016 Microsoft:

Led the industry in creating a set of human centered principles to guide the ethical creation and use of AI

Established its AI and Ethics in Engineering and Research (AETHER) Committee to ensure that its AI products and services are designed and used responsibly.

- Privacy & security**
- Reliability & safety**
- Accountability**
- Fairness**
- Inclusiveness**
- Transparency**

Microsoft's Commitment to its Clients & Partners

Enterprise-level technology

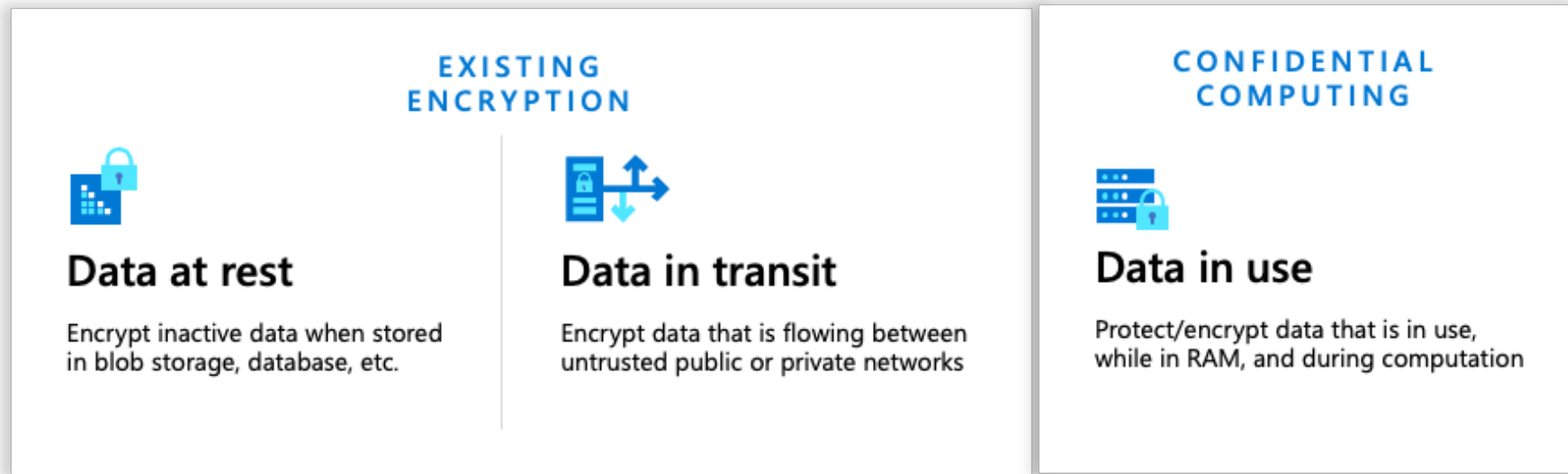
- Secure
- Interoperable
- Intelligent (AI-infused)
- Trustworthy

Clear Boundaries

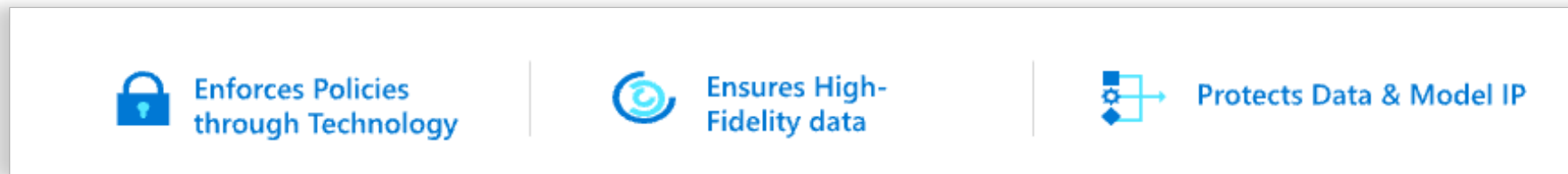
- We will NOT compete with you
- We will NOT monetize your data
- We will NOT use your data without your permission

Confidential Compute

A *hardware root-of-trust, customer verifiable* with *remote attestation*, and *memory encryption*



Value Proposition



Our mission

Empower every person and every organization on the planet to **achieve more**

Support inclusive economic growth



Protect fundamental rights



Create a sustainable future



Empowering with technology





Care @ Home

- Convenience
- Decrease Exposure to Infections
- Necessity
 - *Transportation Challenges*
- Prevention Care
 - Improve Compliance
 - Remote Monitoring
- Empowerment/Engagement
- Medical Education

- Face to Face Interactions
- Democratize Care (*Experts From Far*)
- Social Isolation
- General Learning/Career Development
- Career options



Infrastructure

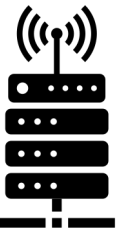
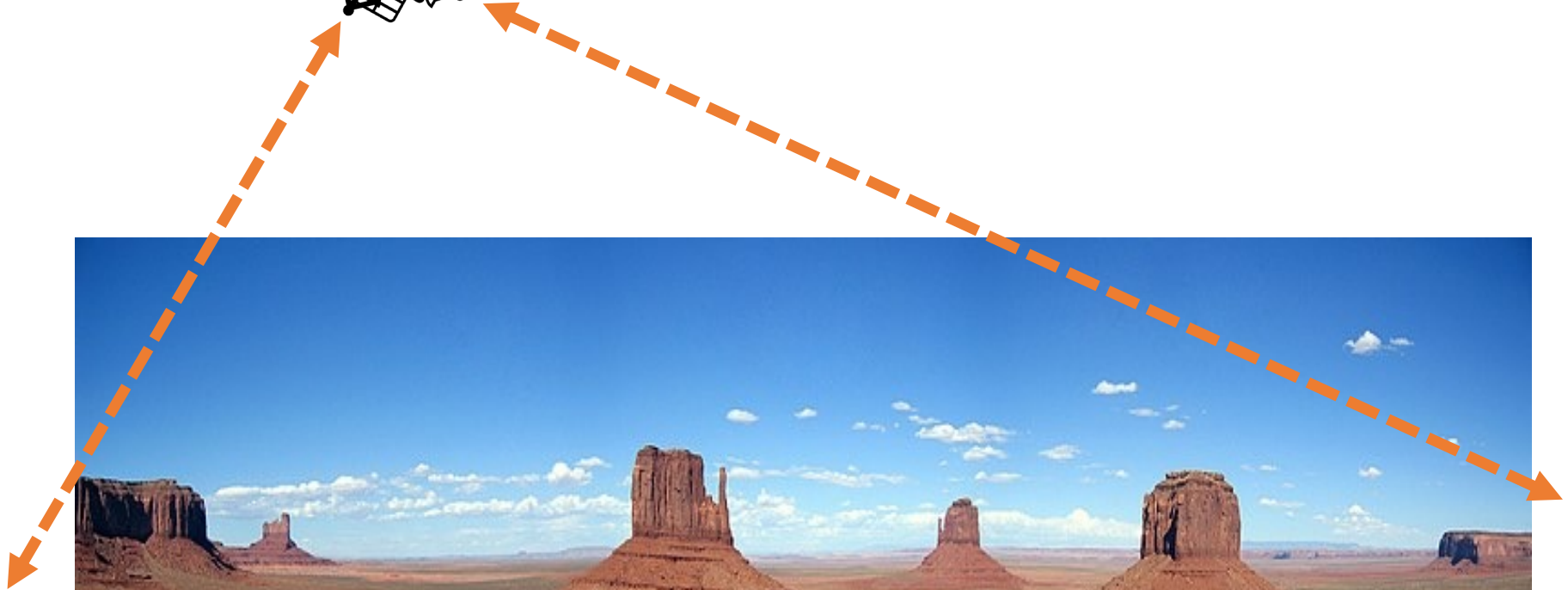


Photo credit: <https://en.m.wikipedia.org/wiki/File:Monumentvalley.jpg>

Virtual Reality



VR Relieves Pain & Anxiety

Effect of Immersive Virtual Reality on Pain and Anxiety at a Veterans Affairs Health Care Facility

Caitlin R. Rawlins^{1*}, Zachary Veigulis², Catherine Hebert¹, Catherine Curtin^{2,3} and Thomas F. Osborne^{2,4}

¹US Department of Veterans Affairs, Western North Carolina Health Care System, Asheville, NC, United States, ²US Department of Veterans Affairs, Palo Alto Healthcare System, Palo Alto, CA, United States, ³Department of Surgery, Stanford University School of Medicine, Stanford, CA, United States, ⁴Department of Radiology, Stanford University School of Medicine, Stanford, CA, United States

Our peer reviewed article demonstrating VR reduced pain and anxiety in hospitalized patients.



[file:///C:/Users/motor/Downloads/frvir-02-719681%20\(3\).pdf](file:///C:/Users/motor/Downloads/frvir-02-719681%20(3).pdf)

<https://marketplace.va.gov/communities/va-immersive>

VR During Surgery: Benefit for patients & Providers

Contents lists available at [ScienceDirect](#)

 **ASSH**

Journal of Hand Surgery Global Online

journal homepage: www.JHSGO.org



Original Research

The Impact of Virtual Reality on the Patients and Providers Experience in Wide-Awake, Local-Only Hand Surgery



Meghan McCullough, MD, MS, ^{*} Thomas F. Osborne, MD, ^{†, ‡} Caitlin Rawlins, RN, [§] Robert J. Reitz III, MD, ^{||} Paige M. Fox, MD, PhD, ^{†, ||} Catherine Curtin, MD ^{†, ||}

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[†] US Department of Veterans Affairs, Palo Alto Healthcare System, Palo Alto, CA
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[§] US Department of Veterans Affairs, Western North Carolina Health Care System, Asheville, NC
^{||} Department of Surgery, Stanford University School of Medicine, Stanford, CA



<https://www.jhsgo.org/action/showPdf?pii=S2589-5141%2823%2900018-X>

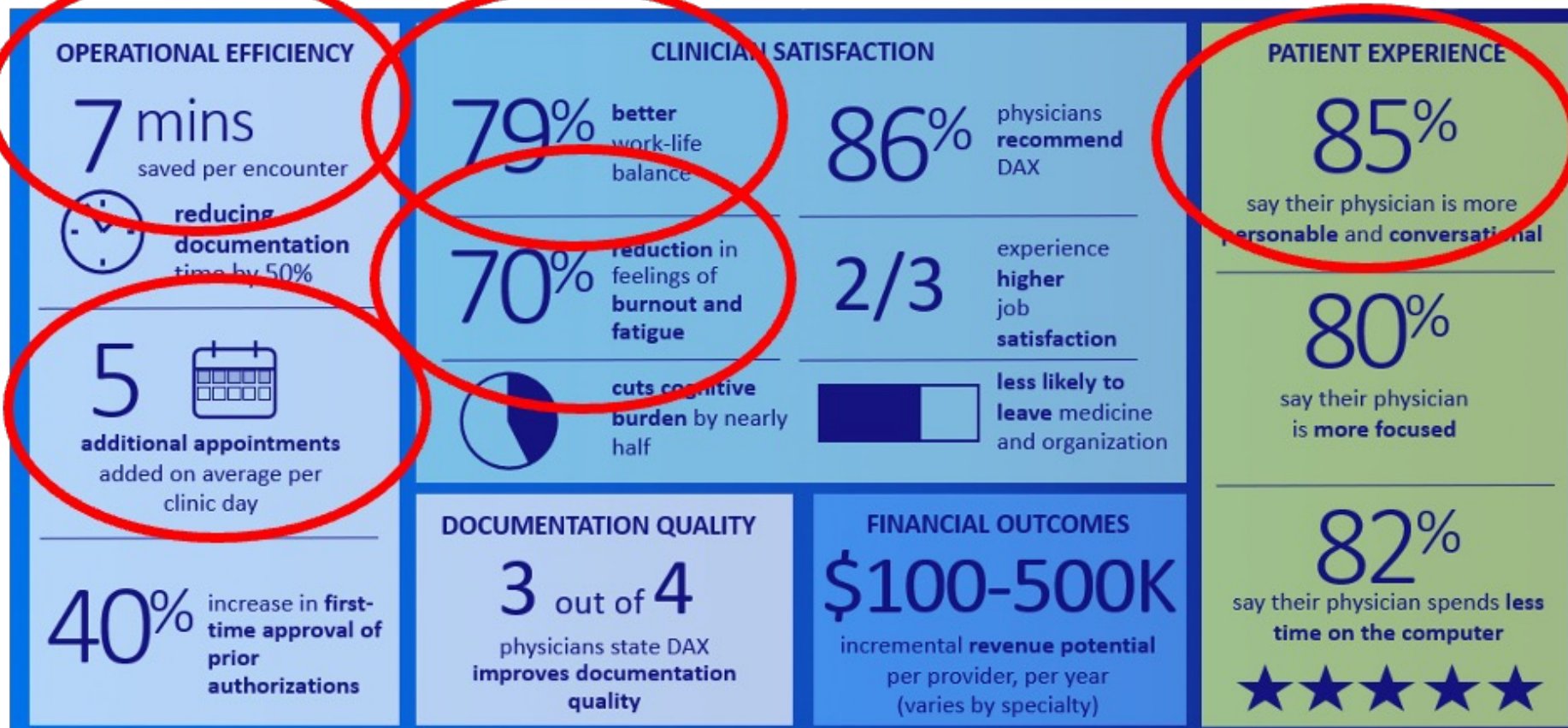
Day in the life...





Ambient Technology (Nuance DAX)

Real-world outcomes across specialties and care settings



SOURCE: Over 1,000 clinician survey responses 2/2023
Independent studies conducted at healthcare organizations

Nuance DAX Audio Meets the Benchmark for Vocal Biomarker Analysis

In partnership with Intermountain Health, a 33-hospital system in the Mountain West spanning 7 states, the Canary Speech research team analyzed Nuance DAX audio and successfully processed the data with vocal biomarker analytical models for confirmation of symbiotic relationship.

GAD-7 Scoring (standard cutoffs)

Score	Category	Screening	Canary Vocal Category
0-4	Minimal	No Generalized Anxiety Disorder (GAD)	Low
5-9	Mild		Medium
10-14	Moderate	Generalized Anxiety Disorder (GAD)	High
15-21	Severe		

PHQ-8/9 Scoring (standard cutoffs)

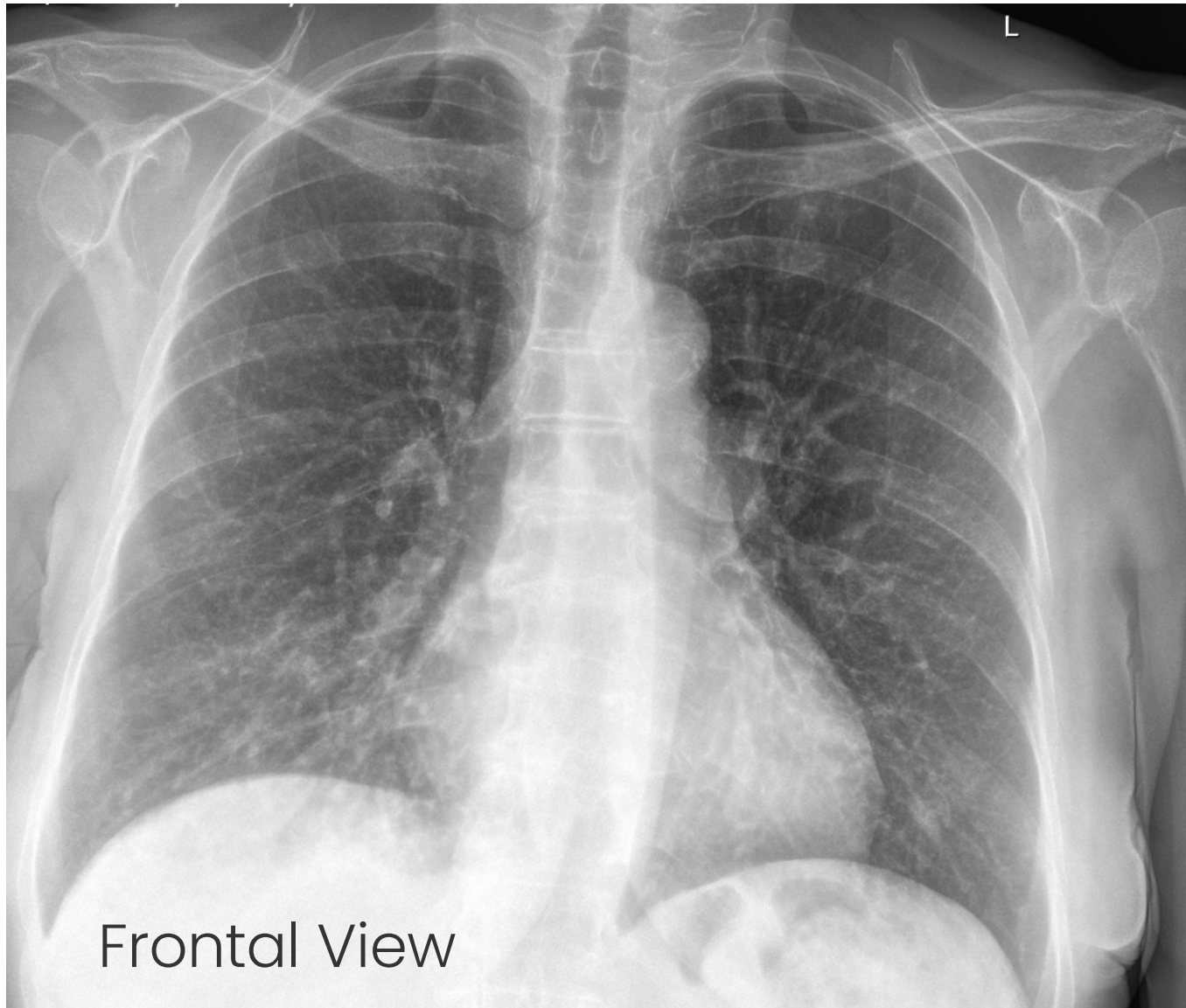
Score	Category	Screening	Canary Vocal Category
0-4	None / Minimal	No Major Depressive Disorder (MDD)	Low
5-9	Mild		Medium
10-14	Moderate	Major Depressive Disorder (MDD)	High
15-19	Moderately Severe		
20-27	Severe		

Results

Audio #	Role	Vocal Anxiety	Vocal Depression	Vocal Energy (Power)	Vocal Energy (Speed)	Vocal Energy (Dynamics)	Canary Wellness
1	patient	high	high	14.56	52.11	66.69	44.97
2	patient	low	medium	37.16	31.36	56.11	74.85
3	patient	low	low	70.69	47.85	47.48	89.36
4	patient	medium	high	17.5	63.84	63.6	49.3
5	patient	high	medium	48.35	30.4	74.62	52.73
6	patient	low	medium	38.23	38.01	61.39	74.66
7	patient	low	high	40.71	51.1	67.51	70.34
8	patient	low	high	46.98	37.48	70.28	66.62
9	patient	low	medium	60.86	45.71	55.77	81.48
10	patient	low	medium	42	25.94	76.11	62.51
1	clinician	medium	low	36.31	51.36	67.57	74.44
2	clinician	low	medium	59.04	67.35	38.03	73.26
3	clinician	low	low	73.2	65.53	34.31	75.09
4	clinician	low	low	12.95	78.35	76.32	58.05
5	clinician	low	low	53.79	50.62	75.73	82.8
6	clinician	high	low	75.99	50.62	36.92	65.71
7	clinician	low	low	25.32	61.9	72.58	71.82
8	clinician	low	low	41.36	64.14	76.77	74.83
9	clinician	medium	low	35.07	26.41	86.57	53.65

Other Assistants





Human Radiologist Laser Focused on Lungs

Impression: No focal
infiltrate



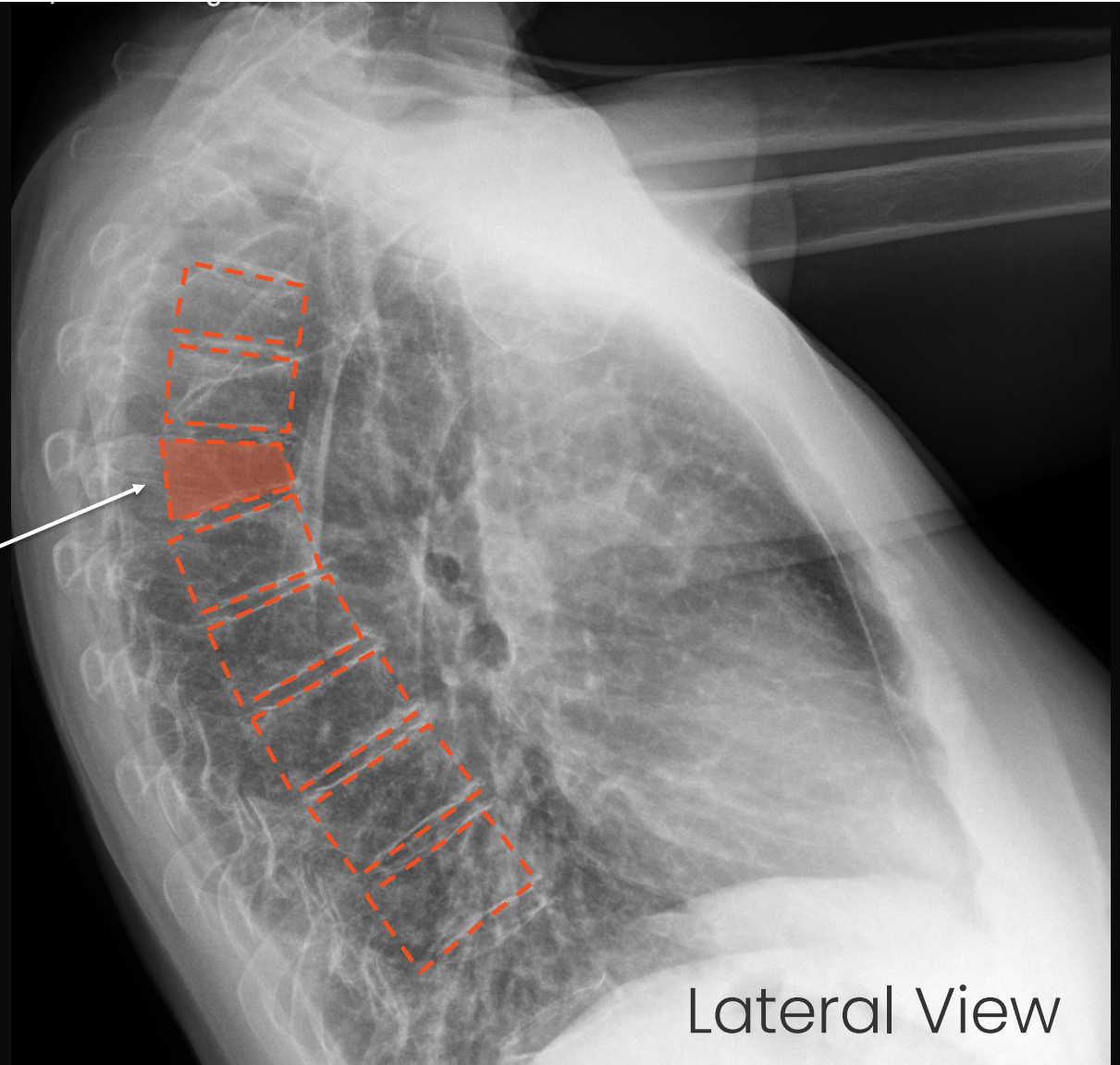
Microsoft



covera health

AI Analyzes Pixel by Pixel to Identify Critical Omissions

Fracture of the Vertebral Body



Lateral View



covera health

Impact of early detection

62%

Of fractures visible on radiological images were undiagnosed in the patient's report¹

38%

Of patients with a VCF will have a second fracture within two years²

30-40%

Less likely to have a secondary hip or vertebral fracture when taking medication to treat osteoporosis³

¹ Covera Health pilot study involving relevant imaging from 16,000+ Medicare beneficiaries

² Rates of osteoporosis screening and treatment following vertebral fracture. Barton, et al. The Spine Journal. 2019

³ Clinical review. Comparative effectiveness of drug treatments to prevent fragility fractures: a systematic review and network meta-analysis. Murad, et al. J Clin Endocrinol Metab 2012 Jun



covera health

Impact of early detection

13%

Of Medicare patients have a vertebral compression fracture present on imaging¹

38%

Of patients with a VCF will have a second fracture within two years²

30-40%


Less likely to have a secondary hip or vertebral fracture when taking medication to treat osteoporosis³

¹ Covera Health pilot study involving relevant imaging from 16,000+ Medicare beneficiaries

² Rates of osteoporosis screening and treatment following vertebral fracture. Barton, et al. The Spine Journal. 2019

³ Clinical review. Comparative effectiveness of drug treatments to prevent fragility fractures: a systematic review and network meta-analysis. Murad, et al. J Clin Endocrinol Metab 2012 Jun

Time matters *(and trust but verify)*

 **Journal of Stroke and Cerebrovascular Diseases**
Volume 27, Issue 5, May 2018, Pages 1190-1193

The Benefit of a Triage System to Expedite Acute Stroke Head Computed Tomography Interpretations



Thomas F. Osborne MD * †  , Andrew J. Grabel *, Reese H. Clark MD †




Image credit: <https://en.wikipedia.org/wiki/Stroke>

Radiology: Artificial Intelligence




Just Accepted | Current Issue | All Issues | Collections ▾ | For Authors ▾ | CLAIM |

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< PREVIOUS NEXT >

AI in Brief 

Deep Learning to Detect Intracranial Hemorrhage in a National Teleradiology Program and the Impact on Interpretation Time

 Andrew James Del Gaizo ,  Thomas Osborne,  Troy Shahoumian,  Robert Sherrier

✓ Author Affiliations

Published Online: Jul 17 2024 | <https://doi.org/10.1148/ryai.240067>

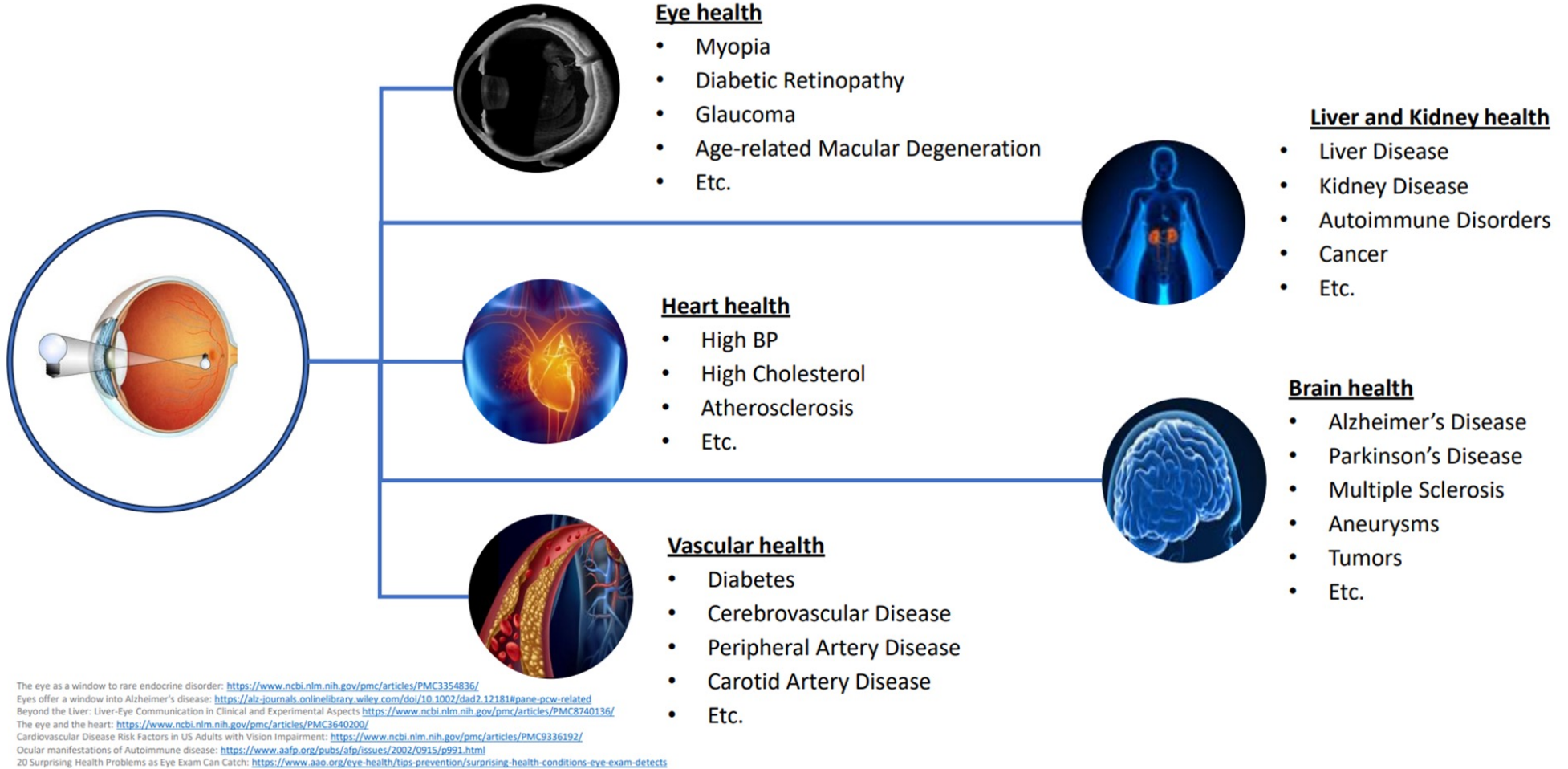


Image credit: https://en.wikipedia.org/wiki/Subarachnoid_hemorrhage

New Windows



Healthcare Through The Eye





Choroidal and retinal thinning in chronic kidney disease independently associate with eGFR decline and are modifiable with treatment

Received: 1 March 2023

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Published online: 05 December 2023

Tariq E. Farrah^{1,2}, Dan Pugh^{1,2}, Fiona A. Chapman^{1,2}, Emily Godden ^{1,2},
Craig Balmforth¹, Gabriel C. Oniscu^{3,4}, David J. Webb ¹, Baljean Dhillon ^{5,6},
James W. Dear ¹, Matthew A. Bailey ¹, Peter J. Gallacher¹ &
Neeraj Dhaun ^{1,2,3}

Check for updates



Biosurveillance

Malaria
Dengue
WNV
Yellow Fever
Zika
Encephalitis
Etc.



Ethan Jackson



Insights From EHR



Analytics / AI Informs Care

SCIENTIFIC ARTICLES

Patient Electronic Health Records Score for Preoperative Risk Assessment Before Total Knee Arthroplasty

Osborne, Thomas K. MD; Sasser, Paola MPH; Edwards, Deena M.L.S., BS; Hernandez-Guassan, Tina PhD; Curtis, Catherine MD

Author information

JBGS Open Access 5/21/2022, April 19, 2022 | DOI: 10.1195/bjgs.0a.1000061

American Journal of Hospice and Palliative Medicine

Automated Electronic Health Record Score to Predict Mortality Risk at the US Department of Veterans Affairs

Osborne TK, Sasser P, Edwards D, Hernandez-Guassan T, Curtis C. *Am J Hosp Palliat Care*. 2022;37(4):241-247.

scientific reports

Geographic and temporal variation in racial and ethnic disparities in SARS-CoV-2 positivity between February 2020 and August 2021 in the United States

Wang W, Ferguson N, Chen T, Osborne T, O'Ryan M, Hale C, Muddu M, Anderson L, Powell A, et al. *PLoS ONE*. 2022;17(8):1-12.

JBGS REVIEWS

Risk Factors for Readmissions After Total Joint Replacement: A Meta-Analysis

Wang W, Sasser P, Edwards D, Curtis C, Osborne T, Hernandez-Guassan T, et al.

PLOS ONE

Regional variation in financial hardship among US veterans during the COVID-19 pandemic

Rahaf R, Kessler L, David P, Rafi S, Chen J, Grier M, Tenney L, Ekerdt D, et al.

PLOS ONE

Automated EHR score to predict COVID-19 outcomes at US Department of Veterans Affairs

Osborne TK, Sasser P, Edwards D, Hernandez-Guassan T, Curtis C.

thebmj

Changes in postoperative opioid prescribing across three diverse healthcare systems, 2010–2020

Joan Cooper, Alison Zarandi, David El Hajaji, Keith Humphreys, Wayne M. Nash, Thomas F. Osborne, Catherine M. Curtis

thebmj

Adverse outcomes of SARS-CoV-2 infection with delta and omicron variants in vaccinated versus unvaccinated US veterans: retrospective cohort study

Amy SD Bohmet, Kyle Kumbler, Matthew Rowinski, Ashwini Gupta, Christina Bajima, Denise M Hayes, Elizabeth Valerik, Zen N O'Hara, Thomas Osborne, Edward J Boyko, Young Soong Kim, Theodore Hwashima, Matthew Maciejewski, Richard Schildhouse, Derek Dimcheff, George N Ioannou

Open Access Research

Using an Automated Electronic Health Record Score to Estimate Life Expectancy in Men Diagnosed With Prostate Cancer in The Veterans Health Administration

Osborne TK, Sasser P, Edwards D, Hernandez-Guassan T, Curtis C.

International Journal of Environmental Research and Public Health

Differences in COVID-19 Risk by Race and County-Level Social Determinants of Health among Veterans

Li K, Madhavi S, Gupta S, Ferguson N, O'Ryan M, Hale C, Muddu M, Anderson L, Powell A, et al.

PLOS MEDICINE

Changes in the associations of race and rurality with SARS-CoV-2 infection, mortality, and case fatality in the United States from February 2020 to March 2021: A population-based cohort study

Georgios N Ioannou, Nicholas M Ferguson, Zen N O'Hara, Jay E. Rabin, David P. Rahaf, Thomas F. Osborne, Matthew L. Maciejewski, C. Nirmal Babu, Denise M. Hayes, Theodore J. Hwashima, Molly Costello, Patrick Cooper, Maura Papp

PLOS ONE

MP30-06 PSA VARIABILITY AND THE DIAGNOSIS OF CLINICALLY SIGNIFICANT PROSTATE CANCER

Fernando Viloso, David Zhang, James Deeks, Thomas Osborne, Elaine Fay, and John Leece

PLOS ONE

Association of mortality and aspirin prescription for COVID-19 patients at the Veterans Health Administration

Thomas F. Osborne, Zachary P. Vegiloff, David M. Ansell, Sarah M. Malinin, Diane Roub, Catherine M. Curtis

JAMA Open

Risk of Potentially Preventable Hospitalizations After SARS-CoV-2 Infection

Diana J. Givner, PhD, MPH, Melke Niederhausen, PhD, Yonita Takata, PhD, Alex Hickok, MS, Madhavi Rowinski, MPH, MS, Holly McCready, BS, BA, Valerie A. Smith, DPH, Thomas P. Osborne, MD, Edward J. Boyko, MD, MPH, George N. Ioannou, BMBC, MS, Matthew L. Maciejewski, PhD, Elizabeth M. Vignanti, MD, Amy S. Bohmet, PhD, Zen N. O'Hara, BA, MD, Theodore J. Hwashima, MD, PhD, Denise M. Hayes, PhD, MPH, BS, for the US Department of Veterans Affairs Health Services Research and Development COVID-19 Observational Research Collaborative

Annals of Internal Medicine

Effectiveness of COVID-19 Treatment With Nirmatrelvir-Ritonavir or Molnupiravir Among U.S. Veterans: Target Trial Emulation Studies With One-Month and Six-Month Outcomes

Ioannou GN, Kessler L, Grier M, Muddu M, Anderson L, Powell A, et al.

Annals of Internal Medicine

Real-world effectiveness of immune checkpoint inhibitors and BRAF/MEK inhibitors among veteran patients with cutaneous melanoma

Donald S. Kim, Susan M. Swetter, Lindsey Halperin, Matthew R. Uzun, Jacquelinne M. Ferguson, Allison C. Spore, Barbara J. Hodgson

Annals of Internal Medicine

Effectiveness of Nirmatrelvir-Ritonavir Against the Development of Post-COVID-19 Conditions Among U.S. Veterans: A Target Trial Emulation

Ioannou GN, Kessler L, Grier M, Muddu M, Anderson L, Powell A, et al.

Journal of General Internal Medicine

Risk of Suicide-Related Outcomes After SARS-CoV-2 Infection: Results from a Nationwide Observational Matched Cohort of US Veterans

Osborne TK, Sasser P, Edwards D, Hernandez-Guassan T, Curtis C.

JAMA Network Open

Development of COVIDvax Model to Estimate Risk of SARS-CoV-2-Related Death Among 7.6 Million US Veterans for Use in Vaccination Prioritization

George N. Ioannou, MS, PhD, Pamela Green, PhD, Vincent S. Lee, MD, MS, Jason A. Dominick, MD, MPH, Amy K. O'Hara, MD, Lisa L. Backus, MD, PhD, Emily Leach, MPH, Melissa C. Eastman, MD, Thomas F. Osborne, MD, PhD, Holger C. Ioannou, PhD, Kristin Berry, PhD

The Journal of Climate Change and Health

Trends in heat related illness: Nationwide observational cohort at the US department of veteran affairs

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JAMA Network Open

Differences in COVID-19 Testing and Test Positivity Among Veterans, United States, 2020

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Analytics / AI Informs Care

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JGIM Open Access 5/20/e0061, April 1, 2020 | DOI: 10.1195/BJG.OA.1600061

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https://doi.org/10.1177/1049909121104282

scientific reports

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https://doi.org/10.1038/s41598-021-12478-1

JAMA Network Open

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Original Investigation | Infectious Diseases

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https://doi.org/10.1093/aje/kwaa055

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https://doi.org/10.1097/JBJS.000000000000110

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https://doi.org/10.1093/cid/ciaa111

PLOS ONE

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https://doi.org/10.1371/journal.pone.0240332

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https://doi.org/10.1371/journal.pmed.1004095

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Open Access | 2024 | April (vol 182) | DOI: 10.1093/ajph/2024.182.00001

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Adverse outcomes of SARS-CoV-2 variants in vaccine retrospective cohort study

Black, as well as American Indian/Alaska Native Veterans accounted for a greater proportion of heat related illnesses.

COVID vaccination was lowest among American Indian and Alaska Native groups

- February 12, 2020 and August 16, 2021
- Greater rates of COVID-19 infection observed among Black, Hispanic, and American Indian/Alaska Native.
- American Indian/Alaska Native individuals had elevated odds of testing positive in the West in all time periods apart from wave 5, with the highest odds observed in wave 1

Trends in heat related illness: Nationwide observational cohort at the US department of veteran affairs

Differences in COVID-19 Testing and Test Positivity Among Veterans, United States, 2020

Rates of and Factors Associated With Primary and Booster COVID-19 Vaccine Receipt by US Veterans, December 2020 to June 2022

Strategic Advantage



Thank You

