

My predictions for the next decade in cardiac critical and acute care

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My predictions for how to *improve* inpatient cardiovascular care over the next decade

Artificial Intelligence and Human Performance



AI fantasy for inpatients



- Alert team to deterioration before the team would recognize
- Assist (replace?) therapeutic decision-making

Opportunities for AI on inpatient units



- Event prediction
 - Cardiac arrest
 - Sepsis
 - Brain injury
 - Readmission



- Decision support
 - Extubation readiness
 - Use of MCS
 - Re-intervention
 - Care de-escalation



Current state - AI



RESULTS BY YEAR

9,846 results

Page 1 of 985 > >>



AI or ML AND pediatrics

1974

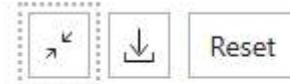
2025

2651

RESULTS BY YEAR

237 results

Page 1 of 24 > >>



Above plus cardiac

303

Current state - AI



www.nature.com/pr/



REVIEW ARTICLE

Artificial intelligence-based clinical decision support in pediatrics

Sriram Ramgopal¹✉, L. Nelson Sanchez-Pinto^{2,3}, Christopher M. Horvat⁴, Michael S. Carroll⁵, Yuan Luo³ and Todd A. Florin¹

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Check for updates

REVIEW ARTICLE

The use of machine learning and artificial intelligence within pediatric critical care

Neal Shah¹✉, Ahmed Arshad², Monty B. Mazer³, Christopher L. Carroll⁴, Steven L. Shein² and Kenneth E. Remy^{3,5}

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Check for updates

SYSTEMATIC REVIEW

From bytes to bedside: a systematic review on the use and readiness of artificial intelligence in the neonatal and pediatric intensive care unit

Janno S. Schouten^{1,2}✉, Melissa A. C. M. Kalden^{1,2,3}, Erti van Twist⁴✉, Irwin K. M. Reiss¹✉, Diederik A. M. P. J. Gommers^{2,5}, Michel E. van Genderen^{2,5} and H. Rob Taal^{1,2,6}

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A machine-learning algorithm for neonatal seizure recognition: a multicentre, randomised, controlled trial

oa

Andrea M. Povel, Janet M. Rennic, Linda Sels-Vries, Mats Binnenveld, Adrienne Toran, Dinyen K. Shah, Roelit M. Prinsen, Olga Kapelou, Eugene M. Dempsey, Sean R. Matheson, Elena Pavlidis, Alexander C. van Huffelen, Vicki Livingstone, Monu C. Toet, Lauren C. Weeks, Mikael Finder, Sofieke de Mots, Dendrie M. Murray, William P. Marsons, Geraldine R. Blyden

Limit CINAHL Address Items: 3500; 4-742-49

Summary

Background Despite the availability of continuous conventional electroencephalography (cEEG), accurate diagnosis of neonatal seizures is challenging in clinical practice. Algorithms for decision support in the recognition of neonatal



The Journal of Thoracic and Cardiovascular

Surgery

Available online 1 February 2023

In Press, Journal Pre-proof

What's this?

Navigating the Future of Pediatric Cardiovascular surgery: Insights and Innovation powered by ChatGPT

Ritto Mehta MPH, BDS, ⁶ Justus G. Heitz MD, ⁶ Alyssia Vienna MBS, ⁶ Arif Selcuk MD, ⁶ Bishalke Dlamola, Jennifer Klein MD, ⁶ Christine Sawatzky MD, ⁶ Mitchell Hoverty MS, ⁶ Cun Yerebakan MD, Aybaba Tongul MD, ⁶ Moran Desai MD, ⁶ Yves d'Udekem MD, ⁶

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Published by Elsevier

LETTERS

RESEARCH LETTER

Artificial Intelligence-Enabled Electrocardiogram Predicts Sudden Cardiac Death in Repaired Tetralogy of Fallot

Joshua Maynard, MD, PhD, ¹ Edward T. O'Leary, MD, ¹ John K. Thisted, MD, ¹ Rachel N. Wald, MD, ¹ Anne Marie Valente, MD, ² Tel Geva, MD, ¹

Current state - AI



Intensive Care Med (2024) 50:1767–1777
https://doi.org/10.1007/s00134-024-07629-8

SYSTEMATIC REVIEW

From bytes to bedside: a systematic review on the use and readiness of artificial intelligence in the neonatal and pediatric intensive care unit

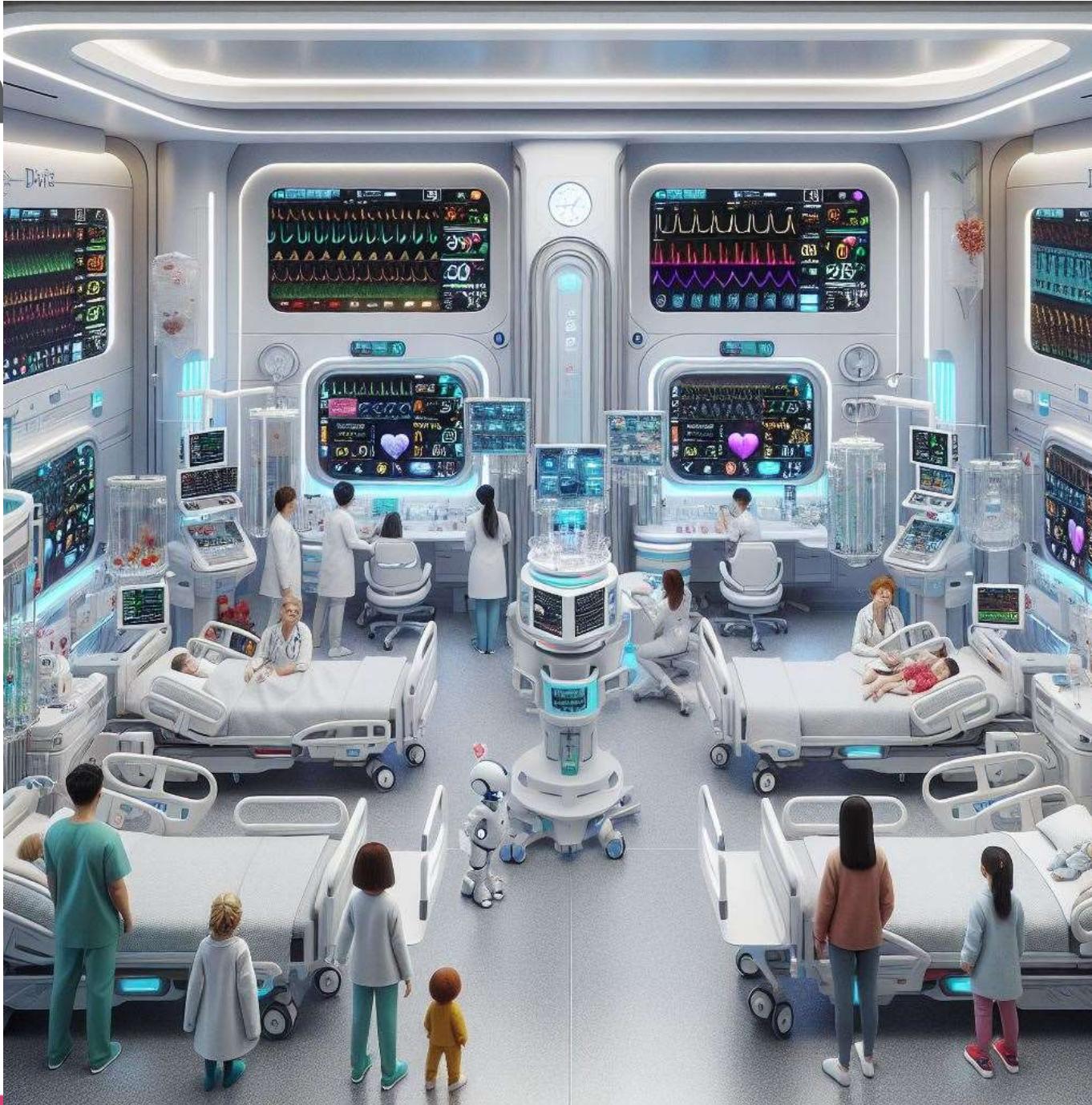


Janno S. Schouten^{1,2} , Melissa A. C. M. Kalden^{1,2,3} , Eris van Twist⁴ , Irwin K. M. Reiss¹ , Diederik A. M. P. J. Gommers^{2,5} , Michel E. van Genderen^{2,5}  and H. Rob Taal^{1,2*} 

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- 262 studies included
 - Predicting disease
 - Predicting mortality
 - Predicting sepsis
- Only 1 study included testing the application in clinical practice

Current



Think about the last 3 *preventable* bad outcomes...

- Failure to recognize something difficult or impossible to detect?
- Failure to communicate/escalate/intervene effectively?

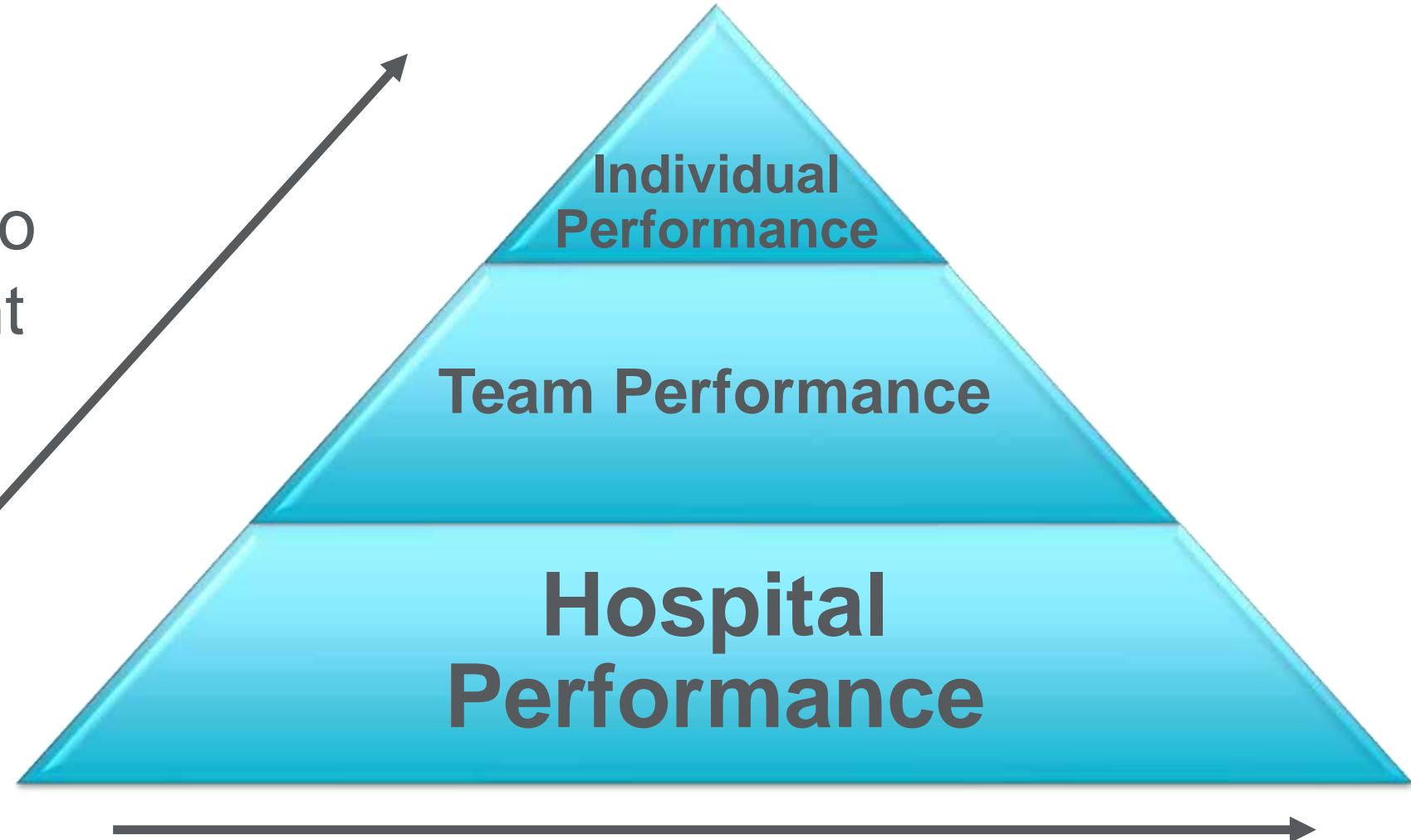
Human Performance



Improvement Pyramid



Importance to improvement



How much we know, how much we measure

Human Performance



**“It’s not about the Xs
and Os, it’s about the
Jimmies and Joes”**

 **Talent wins** 



Bum Phillips
1923-2013

Coaching

ANNALS OF MEDICINE

PERSONAL BEST



By Atul Gawande

September 26, 2011



Coaching



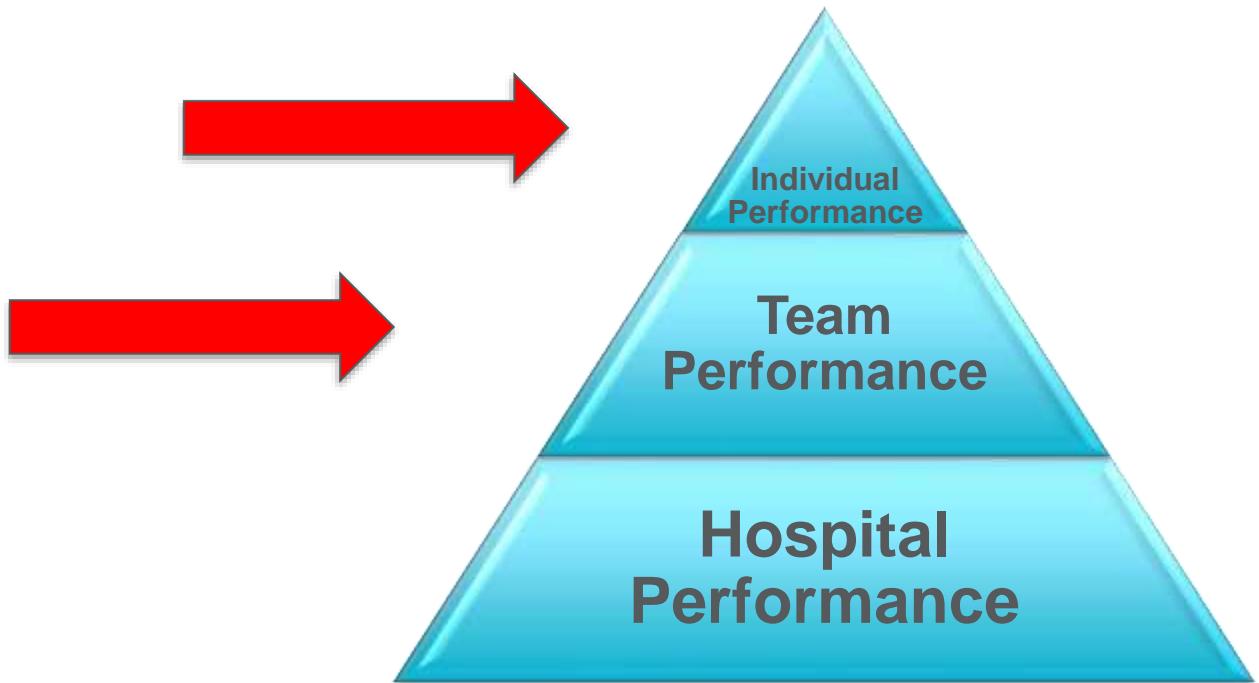
ANNALS OF MEDICINE

PERSONAL BEST



By Atul Gawande

September 26, 2011



Coaching Improves Team Performance



JAMA Pediatrics | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Preventing Cardiac Arrest in the Pediatric Cardiac Intensive Care Unit Through Multicenter Collaboration

Jeffrey Alten, MD; David S. Cooper, MD, MPH; Darren Klugman, MD; Tia Tortoriello Raymond, MD; Sharyl Wootton, MS; Janie Garza, RN, MSN; Katherine Clarke-Myers, PhD; Jeffrey Anderson, MD; Sara K. Pasquali, MD, MHS; Mohammed Absi, MD; Jeremy T. Affolter, MD; David K. Bailly, DO; Rebecca A. Bertrandt, MD; Santiago Borasino, MD, MPH; Maya Dewan, MD, MPH; Yuliya Domnina, MD; John Lane, MD; Amy N. McCommand, MD; Dana M. Mueller, MD; Mary K. Olive, MD; Laura Ortmann, MD; Parthak Prodhan, MD, MBA; Jun Sasaki, MD; Carly Scahill, DO, MSCR; Luke W. Schroeder, MD; David K. Werho, MD; Hayden Zaccagni, MD; Wenyi Zhang, MS; Mousumi Banerjee, PhD; Michael Gaies, MD, MPH, MS; for the PC4 CAP Collaborators

JAMA Network **Open**



Original Investigation | Critical Care Medicine

Sustained Performance of Cardiac Arrest Prevention in Pediatric Cardiac Intensive Care Units

Dana Mueller, MD; David K. Bailly, DO; Mousumi Banerjee, PhD; R.A. Bertrandt, MD; Santiago Borasino, MD, MPH; Mario Briceno-Medina, MD; Titus Chan, MD; J. Wesley Diddle, MD; Yuliya Domnina, MD; Katherine Clarke-Myers, PhD; Chloe Connelly, MA; Amy Florez, DNP, APRN, CPNP-AC; Michael Gaies, MD, MPH, MS; Janie Garza, RN, MSN; Rod Ghassemzadeh, MD; John Lane, MD; Amy N. McCommand, MD; Mary K. Olive, MD; Laura Ortmann, MD; Parthak Prodhan, MD, MBA; Tia Tortoriello Raymond, MD, MBA; Jun Sasaki, MD; Carly Scahill, DO, MSCR; Luke W. Schroeder, MD; Kurt R. Schumacher, MD, MS; David K. Werho, MD; Wenyi Zhang, MS; Jeffrey Alten, MD; for the PC4 CAP Collaborators

- Intervention = making teams communicate more effectively
- Teams/hospitals coached one another
- Zero dependence on artificial intelligence

Coaching Improves Individual Performance



PLOS ONE

RESEARCH ARTICLE

Development and application of a non-technical skills coaching intervention framework for surgeons: A pilot quality improvement initiative

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Association of a Statewide Surgical Coaching Program with Clinical Outcomes and Surgeon Perceptions

Caprice C. Greenberg, MD MPH¹, Mary E. Byrnes, PhD², Tedi A. Engler, BS², Sudha Pavuluri Quamme, MD MSc¹, Jyothi R Thumma, MPH², Justin B. Dimick, MD MPH²

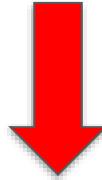
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My predictions for the next decade in inpatient cardiovascular care?



Wellbeing



**Better teams,
better inpatient care**



My predictions for the next decade of inpatient cardiovascular care?

- Optimize teams, cultivate individuals → highest quality care
- Coaching is a mechanism to achieve better teams and healthier individuals
- Figure out how AI serves these purposes



Thank you
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