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The Hospitalist

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p5 HISTORY OF HM
Antibiotic stewardship for hospitalists

p8 CLINICAL
The power of inpatient immunizations

p16 POCUS
Cardiac POCUS: window view of heart

p12 **Dr. Valerie Press shares her thoughts on health literacy and how improving it empowers patients**

Kawacoo Yow

IN THE LITERATURE
The Ohio State University
p3 Medical literature reviews

INTERPRETING DIAGNOSTIC TESTS
Drs. Signoff, Kapa, and Shi
p20 Cystatin C use in the inpatient setting

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IN THE NEXT ISSUE...
QI in VA hospitals, new diabetes meds, more

Coding Corner: Type 1 MI, Type 2 MI, or Non-Ischemic Myocardial Injury

By Arfaa Ali, MD

An 82-year-old female with a history of hypertension and stage 3 chronic kidney disease (CKD) was admitted with fever, hypotension, and confusion. The workup revealed *Escherichia coli* bacteremia due to a urinary tract infection. She developed acute kidney injury requiring IV fluids and monitoring. Labs showed a troponin Ievel of 0.22 ng/mL (reference, less than 0.04). Her ECG showed no ischemic changes, and she had no chest pain or dyspnea. The hospitalist team noted the elevated troponin as likely secondary to demand ischemia from sepsis and renal failure.

What documentation is most accurate for this situation?

The final diagnosis will include sepsis, acute renal failure, and non-ischemic myocardial injury. Elevated troponin above the 99th percentile, alone, does not justify myocardial infarction (MI) coding. Documentation must specify which of the following the elevation reflects: Type 1 MI which is plaque rupture or acute coronary syndrome with ischemia (can be documented as ST-segment elevation myocardial infarction or non-ST-segment elevation myocardial infarction depending on ECG findings); Type 2 MI which is supply-demand mismatch with ischemia (needs ischemic symptoms, ECG changes, or imaging evidence of ischemia); or non-ischemic myocardial injury, which reflects elevated troponin without symptoms of ischemia, ECG changes, or imaging evidence of ischemia such as in the setting of sepsis or acute renal failure. Coders require this distinction, as it affects diagnostic related group classification and reimbursement.

Tip

Don't document "elevated troponin" in isolation. Specify: Type 1 MI, Type 2 MI, or non-ischemic myocardial injury based on symptoms, ECG changes, and imaging findings. This distinction ensures accurate coding, complexity, and reflects appropriate care. In sepsis or renal failure, "non-ischemic myocardial injury" is often the most accurate term. ■

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From JHM

The article "The Manuscript Sales Pitch: Getting Your Foot in the Journal's Door" offers editorial insights from the *Journal of Hospital Medicine's* editor in chief, Samir S. Shah, MD, MSCE, MHM, and Charlie M. Wray, DO, MS on how authors can successfully navigate the initial stages of manuscript submission to academic journals—specifically the *Journal of Hospital Medicine.*

Drawing on more than two decades of experience, the authors liken the process to a sales pitch, emphasizing the importance of making a strong first impression to get past the editor-in-chief's initial screening and into external peer review.

The editorial outlines key criteria used during this early review: alignment with the journal's scope, relevance to its audience, and contribution to the field.

Notably, about 75% of submissions are rejected at this stage, often within three days. For those that proceed, external peer review follows, and while rare, acceptance without revisions is possible.

The authors stress that a request for revision is a positive outcome, as nearly 45% of manuscripts sent for peer review are ultimately accepted.

This piece complements the journal's "Beginner's Guide to Manuscript Publishing" series and serves as a practical guide for researchers aiming to improve their chances of publication.

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In the Literature

The Ohio State University Wexner Medical Center Medical Research Reviews

By Rupa Baro, MD, Saurabh Chitnis, MBBS, FACP, Rajalakshmi Esakky, MD, Angeline Pallante, MD, Soluman Culver, MD, Emily Graham, MD, Samta Jain, MBBS, James Kenney, MD, Kashif Khan, MD, FHM, Brian Petullo, MD, FHM, Ahmad Salem, MBBCh, and Nour Abou Assalie, MD,

The Ohio State University Wexner Medical Center, Columbus, Ohio

IN THIS ISSUE

1. Using AI/NLP to Improve Clinical Efficiency and Drive Patient-Centered Care in Cancer Research
2. Patients View Physicians as More Compassionate and Trustworthy When Their Message is Optimistic
3. IV Iron Lowers the Risk of HF Hospitalization for Patients with HF (EF <50%) and Iron Deficiency
4. AI-Assisted Patient Screening Improves Rate of Eligibility Determination and Enrollment Compared to Traditional Manual Methods
5. SGLT-2i's Increased Risk of PAD-Related Surgical Events Compared to DPP-4i's When Used as Add-On Therapy in Diabetes
6. Liberal Fluid Intake Does Not Worsen Outcomes in CHF

By Rupa Baro, MD, and Saurabh Chitnis, MBBS, FACP

1 Using AI/NLP to Improve Clinical Efficiency and Drive Patient-Centered Care in Cancer Research

CLINICAL QUESTION: Should clinicians use artificial intelligence with natural language processing (AI/NLP) to assess patient messages and review patient concerns to further develop meaningful, novel patient-centered research topics?

BACKGROUND: Patient-centered research is crucial because it directly impacts their specific needs and health goals, which in turn can improve cancer care. Though patient portal messages are a valuable source of patients' concerns, assessing this readily available data can be arduous. AI/NLP can be used to study this data to derive their viewpoints, but these outcomes still need to be assessed for meaningfulness and validity.

STUDY DESIGN: Retrospective case series

SETTING: Message threads from patients in Stanford Health Care and 22 affiliated centers from July 2013 to April 2024

SYNOPSIS: A total of 614,464 de-identified patient portal messages were used for the study, from a total of 25,549 patients, out of which 10,665 had breast cancer (98.6% female), and 14,884 had skin cancer (49.0% female). ChatGPT-4o [OpenAI] was used to summarize the patient concerns through these patient portal messages. Primary concerns within breast cancer patients were related to skin, urinary function, dental health, genetic testing, and liver, while skin cancer patients related to lesions on the nose, moles versus melanoma, issues with earlobes, management of surgical wounds, and side effects with 5-fluorouracil. AI also developed corresponding research ideas after searching for scientific articles related to these concerns. Oncologists and dermatologists further assessed these AI-generated research topics for meaningfulness and novelty.

Overall, mean (standard deviation) scores for meaningfulness and novelty were 3.00 (0.50) and 3.29 (0.74), respectively, for breast cancer topics and 2.67 (0.45) and 3.09 (0.68), respectively, for skin cancer topics. One-third of the AI-suggested research topics were highly meaningful and novel when both scores were lower than the average (5 of 15 for breast cancer and 6 of 15 for skin cancer). Two-thirds of the AI-suggested topics were novel (10 of 15 for breast cancer and 11 of 15 for skin cancer).

Limitations to this particular study included that only two specialties were investigated, breast and skin cancer, so generalizability is difficult to extrapolate to other types of cancer patients. In addition, certain data sets were excluded as the AI tool focused on specific concerns for this study and excluded others. Also, despite the large sample size, only experts from one single institution were involved, and this can result in bias.

BOTTOM LINE: AI can be used in the future to help guide and develop research topics that are patient-centered, given that they are priorities for patients and bring value to their care.

CITATION: Kim J, et al. Patient-centered research through artificial intelligence to identify priorities in cancer care. *JAMA Oncol*. 2025;11(6):630-635. doi: 10.1001/jamaoncol.2025.0694.

Drs. Baro and Chitnis are clinical assistant professors in the division of hospital medicine at The Ohio State University Wexner Medical Center in Columbus, Ohio.

By Rajalakshmi Esakky, MD, and Angeline Pallante, MD

2 Patients View Physicians as More Compassionate and Trustworthy When Their Message is Optimistic

CLINICAL QUESTION: Does a pessimistic prognosis alter how patients view their physician?

BACKGROUND: Although terminally ill patients often prefer honest prognostic information, physicians have historically hesitated, largely due to concerns about harming the therapeutic relationship.

STUDY DESIGN: Double-blinded, randomized, clinical trial

SETTING: Outpatient supportive care center in a cancer center in Houston, Texas

SYNOPSIS: In a study of 100 adults with advanced cancer, patients viewed videos of physicians delivering identical information with empathetic tone and posture but differing in optimism. The more optimistic video received higher compassion scores (median 15 versus 23; *P* <.001), and greater perceived compassion was linked to higher trust, regardless of message type. Though limited by sample size and delivery variability, the findings suggest that message tone impacts patient perception.

BOTTOM LINE: Even with empathy and body language held constant, optimistic messages lead patients to perceive physicians as more compassionate.

CITATION: Tanco K, et al. Patient perception of physician compassion after a more optimistic vs a less optimistic message: a randomized clinical trial. *JAMA Oncol*. 2015;1(2):176-83. doi: 10.1001/jamaoncol.2014.297.

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By Soluman Culver, MD, and Emily Graham, MD

3 IV Iron Lowers the Risk of HF Hospitalization for Patients with HF (EF <50%) and Iron Deficiency

CLINICAL QUESTION: Does IV iron reduce the risk of heart failure (HF) hospitalization and/or cardiovascular mortality in patients with systolic heart failure (EF <50%) and iron deficiency?

BACKGROUND: The American College of Cardiology and the American Heart Association recommend IV iron replacement to improve functional status and quality of life in patients with systolic heart failure and iron deficiency with or without anemia (grade 2a), but uncertainty has remained about the impact of IV iron on HF hospitalization and mortality.

STUDY DESIGN: Systematic review and meta-analysis

SETTING: A meta-analysis of six randomized trials conducted in Europe and the U.S.

SYNOPSIS: This Bayesian meta-analysis included 7,175 patients with iron deficiency and sys-

tolic heart failure (EF <50%) across six clinical trials. Patients were randomized to IV iron or standard of care, and the authors analyzed the composite outcome of cardiovascular mortality and HF admission. A significant effect was identified in the treatment group at 12 months (risk ratio [RR] 0.72; 95% confidence interval [CI] 0.55 to 0.89), and it remained significant over the duration of follow-up (RR, 0.81; 95% CI, 0.55 to 0.89). The treatment also showed a significant effect on HF admissions alone (RR, 0.69; 95% CI, 0.48 to 0.88), and both effects were robust to several sensitivity analyses.

There was no significant effect on overall or cardiovascular mortality, and there was no difference in adverse events between the study groups. Subgroup analysis did show heterogeneity of the treatment effect across gender, with no significant benefit noted among women (RR, 0.98; 95% CI, 0.75 to 1.26). The meta-analysis was slightly limited by heterogeneity in the dose and formulation of the IV iron treatment among the several trials.

BOTTOM LINE: IV iron therapy in patients with systolic heart failure (EF <50%) and iron deficiency significantly reduces the risk of HF hospitalizations.

CITATION: Anker SD, et al. Systematic review and meta-analysis of intravenous iron therapy for patients with heart failure and iron deficiency. *Nat Med*. 2025;31(8):2640-2646. doi: 10.1038/s41591-025-03671-1.

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By Samta Jain, MBBS, and James Kenney, MD

4 AI-Assisted Patient Screening Improves Rate of Eligibility Determination and Enrollment Compared to Traditional Manual Methods

CLINICAL QUESTION: This study compares the efficiency of an AI-assisted screening tool versus manual chart reviews for unstructured data in assessing patient eligibility based on specific criteria.

BACKGROUND: Eligibility-based patient recruitment for clinical trials is time-consuming, labor-intensive, and expensive. Structured electronic health records helped improve this process; however, they still need a manual chart review for unstructured data. The authors developed a large language model tool, Retrieval Augmented Generation Enabled Clinical Trial Infrastructure for Inclusion Exclusion Review (RECTIFIER) that parses unstructured data.

STUDY DESIGN: Single-center, prospective, blind, randomized clinical trial

SETTING: Mass General Brigham Health System

SYNOPSIS: Study included 4,476 patients based on structured criteria between May 31 to Sept 28, 2024. They were randomized to two groups: manual screening by study staff or AI-assisted screening. RECTIFIER screening identified eligible patients significantly faster (hazard ratio, 1.78; *P* <.001). They found a higher eligibility rate, 20.4% (458/2,242 patients) in the AI group versus 12.7% (284/2,234 patients) in the manual group (*P* <.001). In the end, 35 patients were enrolled via AI versus 19 via manual screening (*P* = .04). Using cumulative incidence of eligibility determination and enrollment, the proportion of eligible patients was similar between the groups (20.8% [458/2,205] for the AI screening group and 21.1% [284/1,347] for the manual screening group; *P* = .86). More than 99% of AI-screened patients were processed within 15 days, compared to 50 days for manual screening.

Limitations include a single-center study focused on heart failure. Hence, this would need a broader validation across several sites and other diagnoses. Despite the limitations, the study shows AI-assisted screening significantly improved trial screening speed and enrollment.

BOTTOM LINE: AI-assisted technology implementation for screening is a promising tool for accelerating clinical research and reducing costs

CITATION: Unlu O, et al. Manual vs AI-assisted prescreening for trial eligibility using large language models—a randomized clinical trial. *JAMA*. 2025;333(12):1084-1087. doi: 10.1001/jama.2024.28047.

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By Kashif Khan, MD, FHM, and Brian Petullo, MD, FHM

5 SGLT-2 Inhibitors' Increased Risk of PAD-Related Surgical Events Compared to DPP-4 Inhibitors' Risk When Used as Add-On Therapy in Diabetes

CLINICAL QUESTION: Do sodium-glucose cotransporter-2 (SGLT-2) inhibitors, as add-on therapy for diabetes, increase the risk of amputations, stent placement, or revascularization surgeries compared with dipeptidyl peptidase 4 (DPP-4) inhibitors?

BACKGROUND: Early studies of SGLT-2 inhibitors suggested an increased risk of lower extremity amputation, though more recent studies did not come to the same conclusion. Given this conflicting evidence, uncertainty remains about the use of SGLT-2 inhibitors in patients with increased risk for peripheral artery disease (PAD).

STUDY DESIGN: A retrospective cohort study

SETTING: Veterans Health Administration

SYNOPSIS: 151,905 high-risk U.S. veterans with type 2 diabetes (median age, 68 years; median diabetes duration, 10 years; average hemoglobin A1c, 8.4%) were evaluated for risk of PAD-related surgical events (amputation, stent placement, or revascularization) between users of SGLT-2 inhibitors and DPP-4 inhibitors. The study found that SGLT-2 inhibitor use, predominantly empagliflozin, was associated with a higher risk of PAD-related surgical events compared to DPP-4 inhibitors (adjusted hazard ratio, 1.18; 95% CI, 1.08 to 1.29), with the increased risk being consistent across both amputations and revascularizations. Limitations included short median follow-up (approximately 0.7 years), potential residual confounding, and a demographically narrow sample (mostly older white men), limiting generalizability. These findings add to ongoing concerns about PAD risk with SGLT-2i's, reinforcing the importance of individualized risk-benefit assessment, particularly in patients with high baseline PAD risk.

BOTTOM LINE: The addition of SGLT-2 inhibitors as add-on therapy for diabetes is associated with an increased risk of amputations, stent placement, or revascularization surgeries compared to DPP-4 inhibitors, underscoring the need for a better risk-stratified approach to SGLT-2 inhibitor prescribing with respect to risks of PAD and cardiovascular benefit.

CITATION: Griffin KE, et al. Use of SGLT-2i versus DPP-4i as an add-on therapy and the risk of PAD-related surgical events (amputation, stent placement, or vascular surgery): a cohort study in veterans with diabetes. *Diabetes Care*. 2025;48(3):361-370. doi: 10.2337/dc24-1546.

Drs. Khan and Petullo are clinical assistant professors in the division of hospital medicine at The Ohio State University Wexner Medical Center in Columbus, Ohio.

By Ahmad Salem, MBBCh, and Nour Abou Assalie, MD

6 Liberal Fluid Intake Does Not Worsen Outcomes in CHF

CLINICAL QUESTION: Does advising liberal fluid intake, compared to fluid restriction, improve health status without compromising safety in stable chronic heart failure (CHF)?

BACKGROUND: Fluid restriction is frequently advised in patients with heart failure, on the assumption that it may prevent fluid overload, though data supporting its benefit are limited.

STUDY DESIGN: Multicenter, randomized, open-label, clinical trial

SETTING: Seven sites in the Netherlands

SYNOPSIS: 504 patients with stable CHF in an outpatient setting were randomly assigned to liberal fluid intake or fluid restriction (up to 1,500 ml per day). The primary outcome studied was health status after three months, as assessed by the Kansas City Cardiomyopathy Questionnaire Overall Summary Score (KCCQ-OSS). There was no significant difference in scores between the liberal fluid intake group (mean score, 74) and the fluid restriction group (mean score, 72.2), with a mean difference after adjustment for baseline scores of 2.17 (95% CI, 0.06 to 4.39; *P* = 0.06).

The key secondary outcome was thirst distress as assessed by the Thirst Distress Scale for HF (TDS-HF), which was significantly lower in the liberal fluid intake group (TDS-HF: 16.9 versus 18.6, with a mean difference of 2.29 (95% CI, −1.09 to −3.49; *P* <0.001)). No significant differences were observed in the composite of death, HF, and all-cause hospitalizations, and IV loop diuretic use during the total six months of clinical follow-up. No significant difference was observed in NT-proBNP values or weight.

BOTTOM LINE: In stable CHF patients, liberal fluid intake advice appears safe and improves thirst distress without worsening health status compared to a restrictive fluid approach.

CITATION: Herrmann JJ, et al. Liberal fluid intake versus fluid restriction in chronic heart failure: a randomized clinical trial. *Nat Med*. 2025;31(6):2062-2068. doi: 10.1038/s41591-025-03628-4.

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History of Antibiotic Stewardship

A path to sustainable healthcare

By Chris Migliore, MD, MS, FACP, FHM

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Antibiotic stewardship—the coordinated effort to optimize antimicrobial use—is integral to hospital medicine, though its origins extend much earlier than contemporary clinical programs suggest.[1,2] The initial recognition of antibiotic resistance occurred shortly after penicillin's widespread use began in the 1940s.[3,4] British bacteriologist Mary Barber documented hospital-wide outbreaks of penicillin-resistant *Staphylococcus aureus* in 1947, tracing transmission through hospital staff and implementing hygiene and antibiotic monitoring interventions that significantly reduced resistance rates within a decade.[4-6] Concurrently, Alexander Fleming, who discovered penicillin, issued a prescient warning in his 1945 Nobel lecture about antibiotic misuse potentially leading to resistance, laying a conceptual foundation for future stewardship programs.[3]

Despite these early warnings, antibiotic use surged in hospitals during the 1950s and 1960s, resulting in escalating hospital-acquired infections involving resistant strains.[6,7] This prompted calls for systematic approaches. In 1981, clinician-scientist Stuart B. Levy founded the Alliance for the Prudent Use of Antibiotics at Tufts University, advocating globally for cautious antibiotic usage.[6] The Alliance for the Prudent Use of Antibiotics evolved into a significant educational and advocacy body, later merging with the International Society of Antimicrobial Chemotherapy in 2019. The term "antimicrobial stewardship" first appeared in literature in 1996, describing a strategic approach beyond mere reduction of antibiotic volumes, emphasizing correct drug choice, dosage, duration, and route.[1,2,6]

Throughout the early 2000s, awareness grew within the infectious disease and hospital medicine communities, driven by evidence revealing that 20% to 50% of antibiotic prescriptions in U.S. hospitals were either unnecessary or suboptimal, with adverse events affecting up to 20% of inpatients receiving antibiotic therapy.[2,8] Responding to this crisis, the U.S. Centers for Disease Control and Prevention (CDC) launched its first educational initiative promoting stewardship in acute care hospitals in 2009, subsequently identifying improved antibiotic use as one of four national strategies to combat antimicrobial resistance by 2013.[9] The CDC introduced its "Core Elements of Hospital Antibiotic Stewardship Programs" in 2014, outlining essential components including leadership commitment, accountability, drug expertise, action, tracking, reporting, and education.[10,11] By 2015, the U.S. National Action Plan for Combating Antibiotic-Resistant Bacteria set implementation of these Core Elements in all federally funded hospitals as a key objective.

Between 2015 and 2020, regulatory and accreditation mandates reinforced stewardship initiatives. The Joint Commission recommended that all accredited hospitals establish active stewardship programs with clearly defined roles and protocols in 2017, followed by Centers for Medicare and Medicaid Services regulations mandating antimicrobial stewardship programs for all U.S. hospitals by March 2020.[12] These regulations accelerated program adoption, with over 85% of U.S. hospitals reporting implementation of all seven Core Elements by 2020, up from 41% in 2014. However, the quality and effectiveness of these programs vary, particularly in resource-limited settings where robust implementation may be incomplete.

Modern hospital stewardship programs include diverse organizational structures and interventions. Hospitals designate physician and pharmacist leaders responsible for program outcomes, resource allocation, and accountability.[2,10,13] Infectious-disease pharmacists provide essential expertise, conducting prescription reviews, optimizing doses, and overseeing preauthorization systems.[1,2] Core interventions commonly involve preauthorization processes requiring approval before administering certain antibiotics and prospective audits with feedback to evaluate and adjust antibiotic orders post-initiation.[1,2,8] Stewardship programs track metrics such as days of therapy, guideline adherence, and resistance patterns, providing detailed reports to clinical staff and hospital leadership.[10,11] Continuous education is key, with training regularly delivered to prescribers and clinical staff on appropriate antibiotic use.[10,13] Hospitals also implement evidence-based clinical guidelines tailored to local antimicrobial resistance profiles and formulary considerations, addressing common infections like pneumonia, urinary tract infections, *Clostridioides difficile*, and surgical prophylaxis.[1,2]

Hospital antibiotic stewardship programs demonstrate tangible clinical outcomes, reducing treatment failures, *C. difficile* infections, antibiotic-related adverse events, and hospital stays, while lowering costs.[8,14] These programs can also contribute to slowing the emergence of resistance in specific settings, such as reducing *C. difficile* or multidrug-resistant organism rates, though broader resistance trends are influenced by factors like community use and global spread.[14] For example, the multi-hospital Centralized Health System Antimicrobial Stewardship Efforts, or CHASE, stewardship network between 2018 and 2020 reported a 16% reduction in antimicrobial usage.[15]

Despite these advances, challenges persist. Antibiotic overuse remains a concern; a JAMA study from 2006 to 2012 across over 300 U.S. hospitals found no significant decline in overall antibiotic consumption, with increased use of broad-spectrum antibiotics like third- and fourth-generation cephalosporins.[16] While more recent data suggest modest declines in hospital antibiotic use since 2012, inappropriate prescribing remains prevalent.[17] Behavioral resistance among clinicians, driven by diagnostic uncertainty or concern about patient outcomes, complicates stewardship implementation, particularly in acute conditions

Dr. Migliore

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like sepsis. Experts like Brad Spellberg emphasize that stewardship alone cannot fully address antibiotic resistance without concurrent development of new antimicrobials, advocating for complementary conservation and innovation approaches.[18]

Hospital antibiotic stewardship integrates with global frameworks, notably the One Health approach, which addresses antimicrobial use and resistance across human, animal, and environmental sectors. The World Health Organization's AWaRe classification system, introduced in 2017, categorizes antibiotics into Access, Watch, and Reserve groups, guiding prescribing practices to limit resistance and preserve critical antibiotics globally.

Entering the 2020s, stewardship programs are widespread but unevenly implemented, particularly in smaller or rural hospitals needing tailored resources. The CDC supports these facilities through partnerships and specialized tools for critical access hospitals. Emerging research explores novel strategies, such as rapid diagnostics, clinical decision-support tools, behavioral-economics-inspired "nudges," and stewardship-focused care transitions.[8]

Antibiotic stewardship is essential to hospital-based patient care. Clinicians incorporate stewardship principles into daily decision-making, initiating timely empiric therapy and de-escalating based on diagnostic clarification. Pharmacists, microbiologists, and infection prevention specialists collaborate within multidisciplinary teams to audit usage, monitor trends, and provide feedback. Quality and patient safety leaders use stewardship metrics to monitor outcomes, adverse events, and guideline adherence. Hospital leadership plays a critical role in resourcing stewardship efforts, ensuring sustainability through reduced drug costs and improved outcomes. Documentation and validation remain crucial for maintaining CMS conditions of participation and Joint Commission accreditation.[2,10,12]

In conclusion, antibiotic stewardship's evolution—from early resistance recognition, through targeted advocacy, to standardized implementation—demonstrates its vital role in hospital medicine. Proven benefits include improved clinical outcomes, reduced adverse events, and sustained antibiotic effectiveness in specific contexts. Nonetheless, challenges such as clinician behavior, persistent inappropriate prescribing, the need for new antimicrobials, and implementation disparities necessitate continuous adaptation and support. Antibiotic stewardship remains an evolving, critical discipline safeguarding patient care and preserving the efficacy of these essential drugs for future generations. ■

View references online.

Commentary

Fighting the Pandemic of Misinformation

By Joseph S. Thomas, MD, FHM

Adapted from a talk given at TEDx-Buffalo, June 2025

On November 28, 2021, scrolling through Twitter, I came across a tweet by @SailingKateMD:

"Checked my ICU list after being gone for a few days for the holiday...Every single one of my COVID-19 patients died while I was gone. All of them."[1]

It was my third year as an attending hospitalist. The world was moving on from the still-deadly pandemic, while we continued to struggle with waves of COVID-19 patients. We had new treatments, and vaccines were on the horizon, so we felt slightly less helpless, but I was still seeing more death than I ever had before.

As I read that tweet, I heard the voices of families saying goodbye to their loved ones, felt the deep impressions of the N95 mask on my face, and saw patients dying in their beds. Heartbreakingly, I saw the social media posts pretending it wasn't happening.

As I walked into my kitchen, tweet still glowing on my phone, my brain screamed. All the helpless feelings were spilling out, my mental lid no longer holding them in. So, I turned to my favorite mindless activity: throwing on some headphones and doing the dishes.

The soapy water usually washed away the bad thoughts, but instead, I felt like I was drowning. I quietly put the sponge down and removed my headphones. I gingerly walked to the living room, where my wife sat on the couch. As I sat down, I said, "I don't think I'm okay. I don't think I'm going to be okay for a long time." Then I tearfully collapsed.

My wife frantically scrambled across the couch, taking my sobbing, shuddering body in her arms. Every dying patient, every piece of disinformation I'd seen, and every argument I'd made in support of masks and other mitigations suddenly exploded out of me. I hadn't cried that hard in over a decade. Eventually, exhaustedly, my tears subsided, and we went to bed. But I still wasn't okay. I needed to find a way to confront the disinformation to help the public and, honestly, myself.

A 2023 study by G. Camelia Adams looked at physicians involved in the initial peak of the pandemic. The researchers determined that "Despite efforts to employ adaptive coping, physicians' rates of psychological and physical health difficulties remained high or worsened over one year."[2]

When things ramped up in 2020, I, like many other physicians, became as adept as possible in the diagnosis and treatment of the disease. Beyond the hospital, I began posting educational content on my little corner of the internet. As I often tell people, "It was either that or find another couch to cry on." I started with Facebook, then a blog, then Instagram, but "the kids" were getting information elsewhere, so I made a TikTok account and officially became @DocWithBowtie.

I approached the camera the same way I approach patients in real life. Establishing a rapport with patients became essential because of how easily folks can be misled by disinformation. A dismissive or mocking response never works in these situations because, at the heart of it, this is a person trying to address their own health. Ideally, we provide factual evidence (or point out the lack thereof), and that's enough. Except it isn't. A culture of rejecting science has developed, strong enough to provide refuge and shape communities. When patients return to those communities after an appointment or hospitalization, they easily fall back into the same old thinking patterns, since acknowledging the misinformation may result in rejection by peers. As David McRaney discusses in "How Minds Change," "Social death is more frightening than physical death. We would rather be accepted by our social groups than be right."[3]

My own efforts ramped up in 2020 as I saw doctors spreading disinformation and influencing people into rejecting evidence-based medicine. They claimed to know "root causes" and cures your regular doctor "doesn't want you to know about."

Now, with kernels of truth hidden in their catchy yet unsupported messages, they make it difficult for laypeople to discern fact from fiction. They have millions of followers across multiple social media accounts, speak from podiums at press conferences, and meet with political leaders, yet claim they are being silenced.

They invite you to "follow the money" while charging for unregulated supplements or treatments that lack evidence and are only effective at draining your wallet.

It's hard to push back on their all-or-nothing logic and oversimplification. Brandolini's Law states, "The amount of energy needed to refute [disinformation] is an order of magnitude bigger than that needed to produce it."

Dr. Thomas

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So how do we as hospitalists fight back? We must be increasingly transparent and discuss the gray areas. Science is never black-and-white or all-or-nothing, and neither is humanity. That's why I talk about the times I've cried. The prevailing stereotype is that doctors are completely impartial and unaffected. My colleagues and I are trying to show that was never the case.

Pseudoscience loves to make things up to fill our known gaps in

scientific and medical knowledge. To counter it, we have to learn to acknowledge those gaps for ourselves and our patients so we can face them together. It's pausing to acknowledge the situation with a simple "This sucks. I hate this for you." It's humanizing.

When confronting misinformation, I focus on humanity. A fellow healthcare worker once cited the 99% survival rate of COVID-19 to downplay its impact, but 1% still means 3.3 million people whose lives and families would have been shattered. Furthermore, survival doesn't mean 100% recovery; many endure long-term, sometimes severe, consequences. Oversimplified statistics erase human stories, so I always pause and reintroduce the human costs behind the numbers.

In Jamil Zaki's book "Hope for Cynics," he talks about the difference between modern cynicism (a negative mindset that seems clever but shuts down information and hides behind negative assumptions) versus hopeful skepticism (in which we examine things critically, but are open to new data if there is good evidence behind it).[4] Medicine is full of hopeful skepticism as we review our practices and knowledge.

With that attitude in mind, what strategies can we use to dispel myths? My fellow physicians have discussed borrowing techniques from other fields, like SIFT, from librarians (stop, investigate the source, find trusted coverage, and trace to the original context), and climate science's three-step method (state the fact, identify the related myth, then explain the fallacy).[5]

While the COVID-19 pandemic has "settled" into an endemic phase, the pandemic of disinformation, or infodemic, as identified by Dr. David Scales and colleagues,[6] is still raging, and both are far from over. Where COVID-19 required funding of scientific research into refining vaccines and treatments, the infodemic requires the efforts of people like us, identifying pseudoscience and stopping its spread. As we examine ourselves and employ the strategies in this article, let's keep these things in mind.

1. Meet people where they are. Whether you like longer, nuanced blog posts, or short, succinct TikToks that may introduce further reading, it's important to share from a variety of sources based on the intended audience.
2. Pseudoscience loves oversimplification and making up explanations to fill in the gaps that science hasn't quite figured out yet.
3. Follow the money—the Sunshine Act empowers people to look up any physician and see how much they have taken from "Big Pharma." Is it a few lunches (like when you look me up) or a much higher amount? Or maybe they make a profit from unregulated supplements or lawsuits against the makers of evidence-based medicines.
4. Humanize the moment—it's easy to hide behind social media posts and meme-able disinformation, but look for the people simply informing you and acknowledging gaps in the system, rather than selling you their product.

In the Fall of 2022, I was asked, point-blank, if I thought what I was doing was actually making a difference or if I was just making content for the sake of it. My best friend asked, "Have you actually changed anyone's mind?" I said I wasn't sure and defaulted to that previous line, "it was either try to educate people or cry in a corner." That might have been it, except my wife immediately piped up with, "Didn't you show me a message yesterday from the pregnant woman who got vaccinated because of your posts?"

As usual, she was right, and she went on to discuss multiple comments she had seen or messages I'd told her about where people pointed out how I convinced them the vaccines were safe, or at least that they should think twice about avoiding them.

Sometimes I focus on the big, dramatic posts and commenters who belittle me for advocating for public health. Those aren't the people I'm going to convince. It's the people reading those comments who are in between the extremes, just trying to do right by their health and their loved ones. My videos put facts in front of people as a vaccination against the infodemic. I hope you are empowered to do the same. ■

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Boosting Patient Care: The Power of Inpatient Immunizations

Hospitalists discuss effective strategies

By Larry Beresford


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What is the hospitalist's role in helping to advance the immunization of hospitalized patients? Historically, hospitalization has been seen as an opportunity for vaccinating eligible patients. But could the field be doing better at this responsibility in today's post-pandemic world, with its greater public uncertainty about the place for vaccines in public health?

"We know that by most measures, immunization in the hospital setting is underutilized," said O'Neil Joseph Pyke, MD, MBA, SFHM, a hospitalist and physician executive with Jackson North Medical Center in Miami. But hospitals today are instituting protocols, screening patients' immunization histories, learning more effective communication of vaccine information, and integrating vaccines into "power plans" provided to clinicians through their electronic health record (EHR).


Dr. Pyke

Vaccines are more commonly provided in primary care and clinic settings, although that may fail to happen for any number of reasons. It can be hard these days for many patients to get in to see a primary care provider or get the vaccines they need there. For hospitalized patients, step one in addressing this breakdown is to obtain or confirm their vaccination histories and then offer the opportunity for those who are behind on recommended vaccines to catch up.

Today, the most common vaccines indicated for hospitalized older adults are the yearly autumn influenza vaccine and the pneumococcal vaccine to prevent Streptococcus pneumoniae. Both vaccines are especially recommended for patients who are over age 65 or have chronic conditions like heart or lung disease, diabetes, or a history of smoking. Another vaccine that is now available for patients in these groups protects against pneumonias due to respiratory syncytial virus (RSV), a common and highly contagious virus that can cause severe pneumonia.

"People haven't heard as much about the RSV vaccine, but it is effective for elderly and immunocompromised patients," said Jyoti Somani, MD, an infectious disease specialist and associate director of infection control and antimicrobial stewardship for Jackson Health Systems in Miami. "We need to introduce this vaccine to hospitalists and explain how effective it is."


Dr. Somani

More Challenges on the Adult Side

"I'll tell you this," Dr. Pyke said. "I think we've done an extraordinary job in this country as it relates to infant, toddler, and childhood vaccines. Our pediatric hospitalists really own that space, and it's the exception for parents to say no to this." But the adult side has proven more challenging, he said. "We've always needed to convince patients who are in the hospital."

Over the years, Dr. Pyke was able to persuade the majority of his patients who were getting ready for discharge from the inpatient setting to receive immunizations that were appropriate, as determined by the clinical team. But there was a turning point in practice due to the COVID-19 pandemic in 2020 and the skepticism that emerged surrounding it. That skepticism started to influence flu and pneumococcal vaccine hesitancy, as well.

"In our hospital, our role with COVID-19 was primarily centered around encouragement. We never forced it—we couldn't do that anyway," Dr. Pyke said. One of the initial hurdles was getting the hospital systems, physicians, and nurses to remember to offer the vaccine. "We got past some of that with protocols and helpful EHR reminders for the hospital team," he said.

During the pandemic's peak, there was a lack of public understanding about it and concerns about how quickly the vaccine had been developed. "I think that some folks who were not in favor of the vaccine, unfortunately, politicized it," he said. Simultaneously, there was a lack of health literacy around vaccinations, but also a natural, normal, and healthy skepticism that many people have felt toward the healthcare system more broadly.

It may be hard to draw a clear line between these two issues, Dr. Pyke said. "Some patients have clearly articulated to me their concerns about experiments done on Black people back in their parents' time." A commonly cited example is the Tuskegee Syphilis Study, conducted by the U.S. Public Health Service to observe the natural progress of untreated syphilis in Black men.[1]

"There's been a kind of historical reluctance by some to go down the vaccine path. I would have my patients reference that (history) as a backdrop for why they didn't want the COVID-19 vaccine," he said. "When they would say no, I would usually ask them why, and then I'd need to have a proper discussion with them about that why."

Supporting Immunization

"Many of us on *The Hospitalist's* editorial board feel strongly about supporting vaccines in general," said Richard Wardrop III, MD, PhD, MACP, FAAP, SFHM, a career med-peds clinician-educator and program director for the internal medicine residency program at the University Hospitals Geauga Medical Center in Chardon, Ohio. "And even though we are not primary care physicians, some of us—like me—are pediatricians as well as adult internists. So immunization in the hospital is not a foreign or new concept to us. It is something done regularly in pediatrics," he said.


Dr. Wardrop

"We felt like this is something we should talk about with our hospitalists because of vaccine hesitancy and what's happening nationally around vaccine skepticism," Dr. Wardrop said. "With the emergence of medical concerns like COVID-19 and RSV, it's important for hospitalists to be aware of vaccine development broadly and the role of vaccines in preventing disease. This is meant to be a call for awareness and for the efficacy that we would hope hospitalists can have in immunizing adults and children while they are in the hospital."

Hospitalists, like any physician, have a stake in the health of the patients they take care of in the hospital, Dr. Wardrop said. "And that's one patient at a time. But we, as a group, also have an impact on the health of populations, especially for the population that's seen in the hospital. I think we have a unique and important role, and at times, opportunities are missed. It's another missed opportunity if you don't have the ability to provide the vaccine on demand or the infrastructure in place, or patient educational materials."

Interesting Times

"We live in interesting times," noted Elizabeth Herrle, MD, FACP, SFHM, a hospitalist and physician leader with MaineHealth in Portland, Maine. "I think we're dealing with a lot of issues, such as vaccination rates declining for various reasons. Some of that is inpatient factors, payer factors, or lack of access to care in the populations we care for in the hospital." Some hospitalists have worked in ambulatory care settings more than others and are more practiced in discussing primary prevention and vaccine risks and benefits. But for others, this may be a less familiar skill set, Dr. Herrle said.


Dr. Herrle

Meanwhile, the nature of COVID-19 has evolved, becoming less virulent, with more immunity in the community. "There is less of a sense of urgency around COVID-19 vaccination now. It's shifted to be more in line with how we perceive the flu vaccination. It's a good thing to

do every year, but it's not necessarily something that we need to push because it's an emergency," she explained.

"At my institution, that's really led to more of a focus on immunizing people for COVID-19 in the community rather than in the hospital. So the role of the hospitalist becomes more about making recommendations and encouraging folks to follow up in the community for their vaccination," she said. But many hospitalized patients don't have the opportunity to connect with primary care.

Hospitalists can do right by their patients by making sure they are as protected as possible from preventable diseases. "That's an easy intervention with a lot of payoff, which honestly isn't something we get to do every day as hospitalists. And if you're approaching them just as their doctor in the hospital, with curiosity and care for their health, that can go a long way toward diffusing any tensions that exist around what has sometimes been a challenging conversation," Dr. Herrle said.

Influenza vaccination has been a target for reporting inpatient vaccination rates during flu season to the Centers for Medicare and Medicaid Services through the National Healthcare Safety Network, a program managed by the Centers for Disease Control and Prevention.[2] "So that's probably the one that hospitalists are going to see most often," Dr. Herrle said. Many hospitals have built processes around screening inpatients and administering influenza vaccines through nurse-driven protocols. While hospitalists may not be directly involved in the day-to-day work of those protocols, they can support the quality efforts in their institutions.

The Benefits of Child Vaccinations

Anika Kumar, MD, FAAP, FHM, staff physician in the division of pediatric hospital medicine at Cleveland Clinic Children's Hospital in Cleveland, said childhood immunizations are instrumental to primary care and crucial to pediatric hospital medicine. Vaccines have eliminated a lot of childhood infections.

Dr. Kumar

Many childhood illnesses are rarely seen anymore because of widespread immunizations, but some, like measles, eradicated in the U.S. in 2000, are now making a comeback, Dr. Kumar said. Whether a child is fully immunized or not often influences the choice of antibiotic therapy for common illnesses like meningitis and community-acquired pneumonia. "For me to go to the front lines to practice, I need to know the child's vaccination status," she said.

"For all of us who work in pediatric hospital medicine, one of the things we do when we admit a patient is to review their childhood immunizations," said Dr. Kumar, who described a recent admission of a 4-year-old patient for an asthma exacerbation. According to the hospital records, the patient had not received any vaccines since six months of age and had missed several vaccine milestones.

"I went and talked to the mom and asked when [was] the last time her daughter got shots. And the mom said, 'It's been a really long time, Dr. Kumar.' And I said that's okay," she related. "I said, 'Our job is to make sure your daughter is well cared for, and we want to catch your child up on her vaccines. Is that something you would like us to provide while she's hospitalized? Because we can start the catch-up now,'" she related.

"My job is to educate families, whether they want the immunization or not. I strongly encourage them to get it. And in my documentation, I also document if the vaccine was offered and the family declined, because I think that's important," Dr. Kumar said. The pediatrician can pick up on it when the patient is discharged back to the community.

"What I teach our medical trainees is that we are privileged to have the time to work on these issues. It's part of the medical history of this patient. I say to families: 'This is about me providing the best care I can for your child, and knowing their vaccination status will allow me to do that best. Vaccines are there to help your child and to prevent childhood illnesses.'"

Because vaccinations have been so crucial, they are built into clinical practice guidelines from the American Academy of Pediatrics, the Infectious Disease Society of America, the American College of Physicians, and others. Chapter 3 of the Centers for Disease Prevention and Control's annual pink book, "Epidemiology and Prevention of Vaccine-Preventable Diseases" also includes recommendations for hospitals.[3]

Acknowledging Uncertainty

The world of vaccines has been shaken up by a new administration in Washington, D.C., with new appointees to federal boards that oversee various preventative health and immunization guidelines, such as the Advisory Committee on Immunization Practices. "Unfortunately, they are changing, potentially in the wrong direction," Dr. Somani said. "I think there's just a lot of concern right now among physicians about the misinformation. And now you have people in those seats who raised this misinformation. It's hard to dispel those messages. And there's been a whole movement saying expertise doesn't matter."

Yet, on an individual level, she said, patients still do listen to their physicians. "So physicians still have a role to be very positive and very professional and not condescending, but to really explain that vaccines are safe, they've been used for years, and they are beneficial. I think hospitalists can and should do that, hard as it is," Dr. Somani said.

"I think as a physician, or even as a person, you want to work with those you can possibly convince. And if there's someone who's flat out against it, you don't want to get in a fight. But you can just say, 'Look, let me leave you with this information. Let me at least tell you this. In the end, it's still your decision.'"

Dr. Somani said, "As part of our antimicrobial stewardship efforts, especially, we do what I call 'road-shows', where we try to meet with the hospitalists and let them know current best practices in antibiotics. That also leads to a discussion about vaccines. With the hospitalists, we try to interface and just say these are the things that you need to be aware of," she said.

"I would say that we are at a point where we have to acknowledge that there is a lot of vaccine hesitancy. And the reasons for that are often more social and political than they are medical," said Dr. Somani. "But we also need to recognize and acknowledge that one of the issues with the flu shot, as well as the COVID-19 shot, is that they don't necessarily prevent all vaccinated patients from getting the infection. The flu vaccine makes you less likely to need to be hospitalized or to get very sick from it."

The efficacy rate for the seasonal flu vaccine was 56% in 2024-2025.[4] "So I think we have to be very clear about our messaging. Not overselling it is going to help enhance trust with patients, while still reminding them that these are highly safe, tested on millions of people around the world. There are side effects, but nothing compared to what would make you very sick (from the disease)," she said.

Explaining vaccine choices has to be done with assent and agreement, Dr. Wardrop added. "We don't just jab people in the arm. That's on an individual patient level. But from the standpoint of physicians as scientists and as role models, part of overcoming the geopolitical inertia is to be healthy, to role-model good behavior, including getting immunized myself."

Dr. Wardrop said he respects patient autonomy highly. "I've never been a paternalist, or at least I hope I haven't. But at the same time, I have a PhD in immunology, and I've taught evidence-based medicine, and I consider myself a good user and a contributor to the evidence base whenever possible," he said. "I have seen patients die of vaccine-preventable diseases. I've also seen patients die of diseases that they got vaccines for, or develop Guillain-Barré syndrome secondary to a vaccination."

Explaining the Why

Along with the usual vaccines described above, there are other circumstances where immunizations are absolutely indicated. If somebody comes into the hospital and has their spleen taken out, it's important to make sure they have proper immunizations as part of their care plan," Dr. Wardrop said.

The hepatitis B vaccine is the only available treatment to prevent hepatitis B, which has complications including liver cancer. So that is one of the few vaccines that protects against cancer. *Haemophilus influenzae* type b is a bacterium that causes serious infections in young children, and the vaccine is highly effective and recommended for those under age five.

Dr. Pyke said he tries to work with Jackson's hospitalist workforce, supporting them to get the information they need to answer the questions patients have. "Let's be honest. There are physicians who are able to explain things like this in a way that you can understand, and there are other physicians who struggle with it," he said.

"I recognized that there was not a blanket competence among rank-and-file hospitalists, related to their ability to explain something that's really complex in simple enough terms to get the patient to say yes. Hospitals need to educate them on how to do it—to reach a deep enough understanding to be able to explain the why of vaccines." ■

Larry Beresford is an Oakland, Calif.-based freelance medical journalist.

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A Comparative View of Chinese and American Hospitals

What can we learn from each other?

By Christopher Brodkin, MD

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The hospital experience can be intimidating for the uninitiated. For hospitalists, however, the hospital is a second home—an environment where we manage patient care with familiarity and confidence. In the U.S., many hospitalists have never practiced outside the American system. This can lead to a narrow perspective on how hospitals might function differently across the world.

I recently had the rare opportunity to observe hospital operations in China, engage with physicians nationwide, and witness firsthand the nuanced differences in how inpatient care is delivered. What I discovered were not just procedural variances, but insights shaped by culture, economics, and patient expectations. This article outlines the most notable contrasts—and some surprising similarities—between Chinese and U.S. hospitals.

ED Admissions

Perhaps the most striking difference is the payment model in Chinese emergency departments (ED). In China, a patient's family is required to pay for the initial evaluation and treatment before services can be completed. These payments are typically determined by the patient's presenting condition—such as pneumonia, gastrointestinal bleeding, or a fracture.

In contrast, U.S. hospitals provide emergency care immediately. Financial services may gather insurance details or begin payment discussions early, but treatment is rendered regardless of the patient's ability to pay upfront. Charges are billed and processed later, often on a different calendar day.

Admission practices also differ. In China, admission is based on diagnosis: a patient with heart failure is admitted under cardiology, while one with a GI bleed is admitted under gastroenterology. U.S. hospitals typically admit patients through hospitalists, who then consult specialists as needed.

A notable Chinese innovation is the "Green Channel" system. In life-threatening emergencies like stroke, myocardial infarction, or trauma, hospitals may bypass all financial and family consent procedures to provide immediate life-saving intervention.

Admission and In-Hospital Financial Practices

In Chinese hospitals, admissions require a family member to make an initial down payment based on estimated costs. Additional charges are added throughout the stay, and families can track costs daily using hospital kiosks. Final bills must be paid in full before discharge.

U.S. hospitals generally bill after services are rendered, with insurance adjustments applied post-discharge. While some Chinese hospitals receive government subsidies, patients and families remain primarily responsible for payment.

Clinically, both systems are similar in that urgent orders are relayed directly to nursing staff, while non-urgent orders are placed in the electronic health record (EHR) for scheduled execution.

Consultations and Communication

Consultation protocols are nearly identical: urgent consultations are made by phone or direct communication; non-urgent ones are processed via EHR orders.

However, communication tools differ. U.S. hospitals use HIPAA -compliant systems to protect patient data. Chinese physicians commonly use WeChat—a ubiquitous messaging platform—on private, encrypted channels to discuss patient care.

Daily Care and Discharge Planning

U.S. hospitals rely on multidisciplinary teams—including nurses, aides, case managers, and dietary staff—to manage daily care and discharge planning. Case managers coordinate post-hospital services such as rehabilitation, durable medical equipment, and follow-up visits.

In China, due to limited resources and high patient volumes, family members assume many caregiving duties. They feed, clean, and assist with mobility. Physical and occupational therapy may occur only once, with families expected to continue exercises themselves. Families often bring food from home, and hospitals provide nutritional guidance to ensure balanced diets.

Rehabilitation practices also vary. Stroke patients in the U.S. are often discharged to dedicated rehab centers. In China, patients may stay in the hospital or be transferred to specialized stroke units until discharge home—often within the same hospitalization episode.

Pharmacy and Discharge Medications

One of China's unique features is its integration of Traditional Chinese Medicine into mainstream care. Patients may be prescribed herbal remedies, roots, fungi, and even animal-derived components alongside Western pharmaceuticals.

Discharge medications in China can be obtained through the ED, ordered via smartphone apps (with room delivery), or picked up from in-hospital pharmacies. In the U.S., prescriptions are often sent electronically to a retail pharmacy or delivered bedside through "meds-to-beds" programs.

Discharge Process

The discharge process is similar in both countries. Medication reconciliation, discharge instructions, and follow-up appointments are documented in the EHR. In China, discharge plans may also be linked directly to a patient's WeChat account for easier access and compliance tracking.

Billing Structures

China differentiates between public and private hospitals.

Dr. Brodkin

Dr. Brodkin is a traveling flex medical director, leading care teams across diverse hospital systems, and is actively involved in humanitarian efforts, providing nutrition support and health screenings in underserved international communities. He is deeply committed to cross-cultural learning, healthcare innovation, and delivering compassionate, patient-centered care.

Public hospitals charge less but may have long wait times. Private hospitals offer shorter wait times and enhanced services—at a higher cost.

Basic public medical insurance in China costs approximately 400 renminbi (about 60 U.S. dollars) annually. While this seems affordable, many rural residents opt out due to cultural norms or a lack of awareness. Insurance coverage typically ranges from 20% to 80%.

In the U.S., billing is complex and highly dependent on insurance. Patients may receive a combination of itemized and bundled charges, with multiple bills from providers, facilities, and labs.

Final Thoughts: What Can We Learn?

Though structurally different, both healthcare systems strive for patient-centered, compassionate care. Each has strengths that the other could learn from.

China could benefit from incorporating hospitalists to improve continuity, communication, and efficiency. The U.S., in turn, could explore more holistic treatment approaches, enhance the role of families in patient recovery, and pursue cost-reduction strategies.

Ultimately, what unites both systems is their shared mission: to treat patients with dignity, skill, and compassion. ■

Improving Length of Stay and Physician Performance at Cleveland Clinic Abu Dhabi

By Mohammad Khalil, MD, FACP, FHM

At Cleveland Clinic Abu Dhabi, accurately measuring the length of stay (LOS) and discharge ratios for individual hospitalists has proven to be a significant challenge. The current method of attributing hospital inpatient days to the discharging physician does not provide a precise assessment of each physician's impact on patient flow.[1] Additionally, there was no clear metric in place to track physician-related avoidable days—a crucial factor in reducing LOS and improving discharge efficiency.[2,3] Physician-related avoidable days refer to the days when a patient's discharge could have been expedited or managed more efficiently by the attending physician, thus reducing unnecessary length of stay.

To address these challenges, there was a need for a more accurate way to measure individual physician performance, specifically focusing on timely discharges, and establish a metric to encourage hospitalists to reduce avoidable delays and improve overall discharge practices.[4]

Cleveland Clinic Abu Dhabi

Solution: Building the Initiative and Implementation of the Study

To implement the study, 44 hospitalist physicians participated, with data collected over three months from January to March 2025, with plans to extend it throughout the year. During this period, performance metrics such as discharge ratios, shifts worked, and the LOS ratio were tracked to provide clearer insights into physician performance and identify opportunities to improve discharge efficiency.

Additionally, the healthcare insurance companies follow the ICD-10 coding system for documentation and CPT codes for billing purposes, similarly to those in the U.S. This standardization ensures consistency in medical coding and billing practices across providers and insurers, streamlining the financial aspects of patient care and further supporting the use of these codes to measure the following performance metrics.[2]

Key Points

- LOS projects are crucial: LOS projects are essential for any hospital, and hospital medicine physicians play a key role in improving these metrics.[1,4]
- Better measurement for motivation: Finding a more accurate way to measure LOS for physicians is essential to motivate better discharge planning and establish a key performance indicator for each physician.[2]
- Data is essential: Data-driven insights are crucial to track progress, identify trends, and inform decisions.[1]
- Teamwork is vital: Collaboration within the hospitalist group and with other departments is essential for the success of initiatives aimed at improving patient care and discharge efficiency.[3]
- Continuous improvement: Ongoing evaluation and refinement of discharge processes based on data will lead to continuous improvements in LOS and overall patient flow.[4]

- Discharge ratio: This metric is calculated by dividing the total number of discharge note CPT codes by the total number of progress note CPT codes within the specific time period.
- LOS ratio: The LOS ratio is defined as the total number of progress note CPT codes divided by the total number of discharge note CPT codes.
- CPT codes used: CPT codes 99231, 99232, and 99233 are used for progress notes, representing the daily hospitalist visits and the associated care provided. CPT codes 99238 and 99239 are used for discharge notes, representing the final discharge evaluation and preparation for each patient.[2]

By analyzing these ratios, we aimed to gain a better understanding of physician performance in managing patient discharges and LOS, to identify potential improvements in discharge practices.[1,4]

Outcomes and Impact

We assessed key metrics to evaluate the impact of the intervention:

- The average discharge per shift was 1.09.
- The average number of shifts worked was 29.2.
- The average LOS per patient was 6.38 days.
- The average discharge ratio was 17.41%.

These results provided insight into hospitalist performance and served as a baseline for further improvements.

Limitations

Charge tracking inconsistency: This method tracks charges dropped by physicians, and if there is no consistency in dropping charges, it may affect the accuracy of the results.

External variables: There may be variables, such as patient types or floor assignments, that can affect results. However, these variations tend to become less significant over extended periods of time, such as quarterly or yearly.[1,3]

Week-to-week variability: Variability in discharge ratios can occur from week to week. However, over an extended period, such as quarterly or yearly, these fluctuations tend to be balanced and provide a more accurate reflection of physician performance.[3]

Dr. Khalil

Dr. Khalil is a consultant of hospital medicine at the Cleveland Clinic Abu Dhabi, with over 15 years of experience. He specializes in optimizing patient flow, reducing length of stay, and driving quality improvement initiatives.

Future Directions

This study continues in 2025, with plans to extend it across a longer period. The data gathered will help further refine hospitalist performance metrics and guide future improvements. Additionally, the initiative's success has laid the groundwork for exploring ways to further optimize physician workflows and reduce physician-related avoidable days.[1,2] ■

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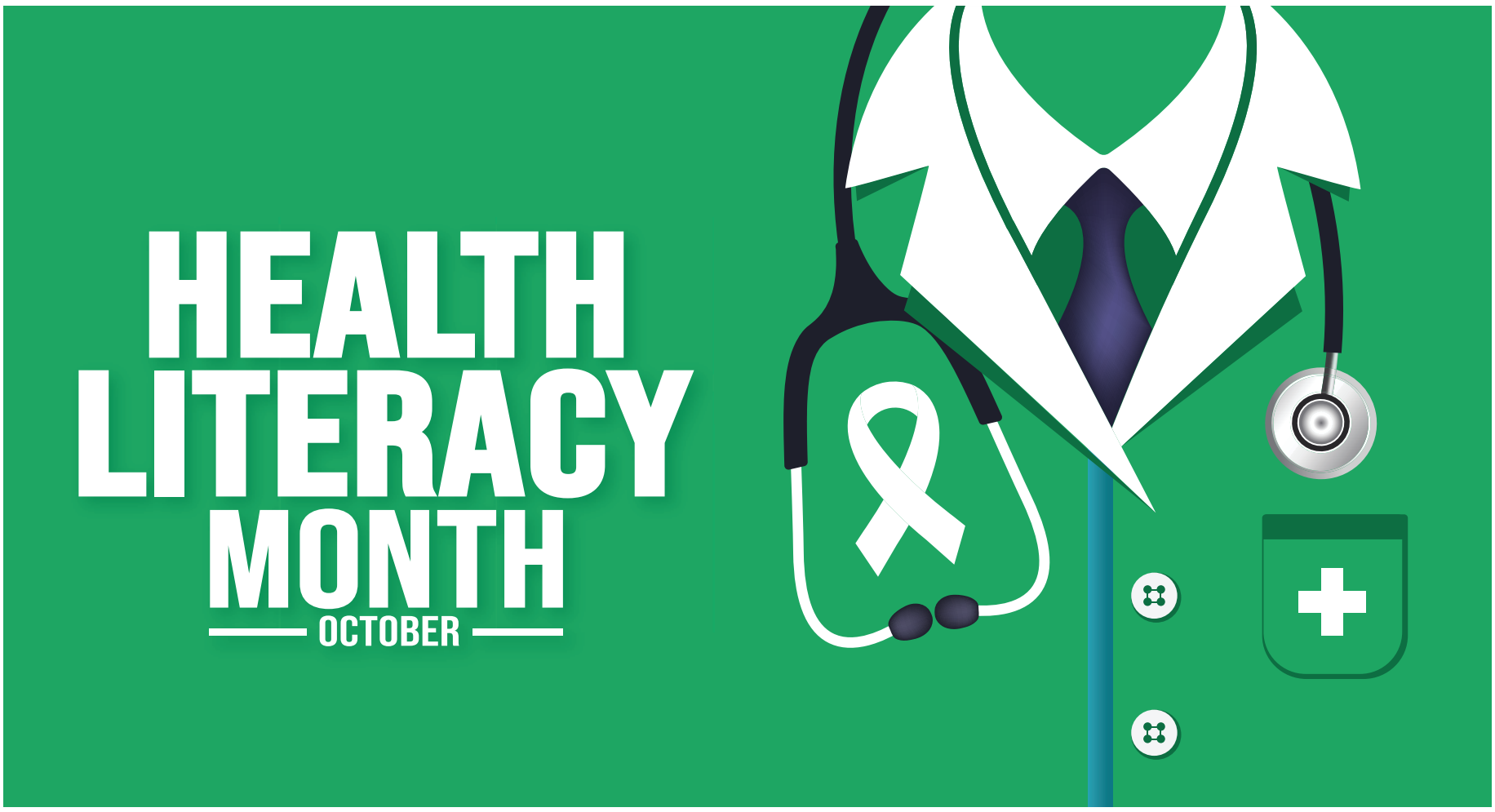

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Poor Patient Health Literacy and Its Impacts

Improving organizational health literacy to empower patients

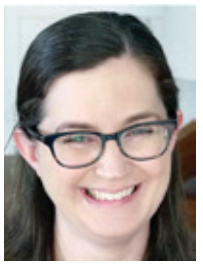
By Ruth Jessen Hickman, MD

Understanding the complexities of health information and traversing the often obtuse, poorly organized, broader healthcare system can be difficult for even the most knowledgeable and educated individuals. For anyone who lacks this background, it can be an even more profound challenge.

Sunil Kripalani, MD, MSc, MHM, FACP, a hospitalist and a professor of medicine and health policy at Vanderbilt University Medical Center in Nashville, Tenn., pointed out, "The healthcare environment is very complicated and difficult to navigate. From insurance to medications—everything about our healthcare system is at a 10 out of 10 level of complexity."

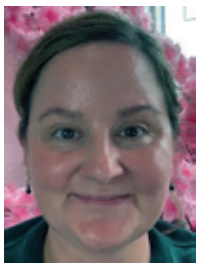

Dr. Kripalani

For the past 20 years, Dr. Kripalani has been working with his healthcare system to reduce this complexity, where possible, to provide more patient-centered care. Such system-level work is key to addressing low health literacy. Although health literacy was originally thought of primarily in terms of patients' abilities and limitations, an equally critical component is "organizational health literacy"—how well health systems implement strategies that make it easier for patients to successfully understand and play an active role in their treatment and health maintenance.


Dr. Press

Valerie Press, MD, FAAP, FACP, MPH, SFHM, is a hospitalist researcher and a professor of medicine and pediatrics at the University of Chicago in Chicago. She underscores that the specific interactions patients have with clinicians and the broader healthcare system can enable or inhibit patients' underlying healthcare literacy. "If we use a lot of jargon in a patient's discharge instructions, and they don't do what we said, we might say they had low health literacy. But we might have just not done a good job on our end of providing helpful instructions."

"We're focused a lot on patient and hospital metrics in hospital medicine, but healthcare literacy is sometimes overlooked, which is unfortunate, as it is probably one of the main contributors to those metrics," said Pahresah Roomiany, MD, MS, FACP, a hospitalist at DukeHealth, and an assistant professor of medicine at Duke University School of Medicine, both in Durham, N.C. "For instance, if people don't understand why they're taking their heart failure therapies and what their heart is doing, they're less empowered and less likely to be invested in their healthcare."


Dr. Roomiany

Causes of Poor Health Literacy

Extending beyond the ability to comprehend written information on medical topics, health literacy can be broadly defined in terms of an individual's ability to obtain, understand, evaluate, and use information related to health, information that can help them act in ways that impact their overall well-being.

Dr. Press notes that a patient's health literacy can be fluid, that a patient may have different abilities to understand and engage with health information in different contexts. For example, some hospitalized patients and family members may have relatively lower capacities to actively take in new information and act on it, just due to the overwhelming and stressful nature of the situation, compared to their capacities at an outpatient clinic visit.

"Still," said Dr. Press, "it's a good opportunity to plant seeds and do some of the education and see how far you can get."

Research has demonstrated that medical providers tend to overestimate patients' true levels of health literacy, which can be defined and measured in different ways. By one estimate, 36% of adults have very limited health literacy skills, while only 12% of adults are considered truly proficient. This leaves a large majority in the middle, with fluctuating levels that vary based on specific context.[1]

Relatedly, one study showed that only 8% of Americans are proficient in the math skills relevant to healthcare decision making.[1] In the modern environment, the challenges of e-health literacy add another layer of complexity.

The causes of widespread low health literacy are multifaceted. In addition to the sheer complexity of the information and environment, the overall educational system in the U.S. fails to provide basic universal education on health concepts, and many people do not pursue additional training on these topics.

Low educational attainment is a risk factor for low health literacy, as are other social determinants of health, such as low income, minority status, community environment, and lack of English proficiency. Thus, low patient literacy may particularly be a factor to consider in hospital settings that serve many patients with such risk factors. In fact, poor health literacy seems to be a major contributing factor and mediator of health disparities associated with income, race, etc.[1]

However, some patients with these risk factors have high health literacy skills, and vice versa. Health literacy doesn't necessarily correlate with a person's level of intelligence or education and thus must be considered in all patient settings.

Another element is the proliferation of internet medical content that is incomplete, misleading, or simply incorrect. Prerak Vipul Juthani, MD, MBA, a new hospitalist and a clinical assistant professor of medicine at Stanford Health Care in California, says some patients, driven by prior internet searches, are progressively funneled by algorithms into widening cycles of misinformation. Thus, providers must contend with both patients who simply lack understanding about their medical conditions and patients who have strongly held but misleading beliefs.


Dr. Juthani

Impacts of Poor Health Literacy

Although certain groups are at higher risk for low health literacy, studies have shown that it is an independent risk factor for poorer overall health and worse patient outcomes on multiple measures. Inadequate health literacy may be a stronger predictor of poor health than age, income, employment status, education level, or race.[2] One study found that compared to those with high health literacy, intermediate levels of health literacy were associated with a 24% increased risk of mortality, and low literacy was associated with a 75% increased risk.[3]

"We have some patients who don't take care of their existing health issues, then just get worse," said Dr. Roomiany. "They know they're supposed to take a lot of different pills, but they don't know why. Maybe if they had been taught more and understood more, maybe some of that could have been prevented."

Limited health literacy is associated with decreased patient safety, higher healthcare costs, and increased healthcare utilization, including increased emergency department visits and hospitalizations.[1] Poor health literacy is also associated with increased hospital length of stay and more readmissions post-discharge.[4,5]

Dr. Kripalani noted, "Awareness of health literacy issues is an integral component of providing patient-centered care. It's very challenging for patients to be active participants in decision making if the information that we provide is overly complex or rushed."

Dr. Kripalani makes health literacy part of teaching rounds with his hospitalist team, like discussing whether a patient's difficulty understanding and following their treatment plan contributed to the hospitalization. "As we prepare patients for hospital discharge, we explicitly talk as a team about how we're going to coach patients on any new instructions."

Best Practices: Employing Universal Precautions

The "universal precautions" approach encourages clinicians to assume that all patients are at risk of low health literacy—that all, at times, may have difficulty taking in information. Accordingly, you should always use communication best practices. This helps ensure that all patients receive clear communication and get the best chance of true participation in shared decision making.

As a key part of the universal precautions approach, all four hospitalists employ the teach-back method, asking patients to describe the information they have been given in their own words. If the patient responds inaccurately or repeats the provider's exact language without demonstrating understanding, the clinician explains in a different way, again assessing for understanding. A variant of this, the "show-back" method, is appropriate for contexts like demonstrating the use of a piece of medical equipment.[1]

Dr. Roomiany added, "The processes you're explaining can be simplified. Patients might not have a medical degree, but they can still learn to understand medical concepts very well. One of our biggest jobs as physicians is to distill information for them."

Another important element is focusing on what to discuss and not overwhelming patients with too much information, noted Dr. Press. "It's best to have no more than two or three take-home points when you're doing teach-backs," she said, "though you might need to touch on additional topics."

Dr. Kripalani also emphasizes the importance of using plain, simple language, avoiding medical jargon where possible, and explaining any necessary terminology.

Dr. Press recommends saying, "What are your questions?" instead of asking patients if they have any questions. "It's a small language tweak, but it implies that I think they'll have questions, giving them permission to take a second and think."

Dr. Roomiany noted that not all patients share the same learning style, and sometimes that requires trying different teaching approaches. And because patients come in with different backgrounds, she starts with a universal precautions approach, but then might move to more technical language for select patients who want that level of detail.

Assessing Health Literacy

Sometimes it becomes obvious during an interaction that a patient may not be fully understanding their illness and treatment. But whether clinicians and/or institutions should proactively and systematically screen for health care literacy remains an open question.

A variety of multi-item tests evaluating health literacy have been developed, such as the Short Test of Functional Health Literacy in Adults, the S-TOFHLA. However, Dr. Press points out that these are primarily used for research and are impractical on the wards. In contrast, very short tools such as the Brief Health Literacy Screen can more easily be employed as part of the overall history.

Some might argue that screening might be unnecessary, given that clinicians should be using "universal precautions" for communication with all patients. However, healthcare professionals who are made aware that their patient may have relatively low health literacy may be more thoughtful about employing such best practice strategies or using other techniques to improve communication.

Dr. Kripalani is a strong proponent of health literacy screening at a systems level, which can then influence how services are allocated. Over a decade ago, his hospital became the first in the country to initiate brief health literacy screenings performed by a nurse as part of patients' initial assessments.

"There are certain resource-intensive interventions that we can deliver as hospitals—like additional medication counseling by a pharmacist—which are difficult to provide for everyone," said Dr. Kripalani. "But if we identify the patients who have low health literacy and direct this type of additional assistance to them, then they have a greater chance of benefiting from it."

For example, at his institution, patients screened as having low health literacy receive extra follow-up from the discharge care center, with extra education, help with navigation on their follow-up plan, etc.

Research supports this strategy. Dr. Kripalani and colleagues performed a study of patients hospitalized for acute cardiovascular conditions, studying 30-day readmission rates. They provided pharmacist counseling, adherence aids, and telephone follow-up post-discharge. These efforts did not make a difference in the overall readmission rate; however, the intervention proved quite effective for individuals within the study who had low health literacy.[6]

Supplemental Tools and Resources

Dr. Press noted that addressing the needs of a patient with low health literacy isn't a one-size-fits-all approach. "Sometimes you can give them a video or module; sometimes it's bringing in family to help with understanding; sometimes it's just giving them more of my time than I can spend with most patients." In some cases, it might mean connecting with other people in the healthcare team who can help with patient education and resourcing, like diabetes educators.

Depending on the context, some supplemental tools and resources are appropriate for all patients. For example, a quick diagram with the patient at the bedside can help with patient education while sustaining overall attention.

Where possible, it's ideal to use techniques of showing and not just telling. For example, Dr. Roomiany is engaged in a research project that involves showing heart failure patients their bedside ultrasound while engaging in patient education. "It's visual and concrete, so it makes a real impression, and they respond more to what we're doing."

High-quality supplementary written materials can also be very helpful for some patients, e.g., at discharge. However, not all patients read well or at all, and many may be unlikely to wade through all that information. Dr. Roomiany noted that when supplying written information, it's key to go through the main points with the patients.

Dr. Juthani shared that many patients respond better to other informational tools, such as links to online reputable videos, like those produced by Stanford. He also noted that, based on patients' ages and the information environment in which they grew up, some may be more receptive to different types of medical education and more influenced by different types of media environments.

Navigating Health Misinformation

Another important aspect of health literacy, especially in the modern environment, is health misinformation. Some patients have very strong beliefs about health and medicine that aren't grounded in the current medical scientific consensus.

Dr. Juthani noted that it's important to take a curious, non-judgmental approach with such patients. Often, he notes, it takes time to understand someone's misinformed health beliefs, which are usually grounded in some sort of personal experience. He said, "To me, health literacy is not necessarily about teaching someone they're wrong; it's more about finding the source of those beliefs and finding ways to meet patients where they are."

Dr. Juthani produces his own medical video content that he shares online and through social media. He encourages other hospitalists to be proactive about combating the misinfor-

mation environment by creating and spreading such quality content, given how many patients get their medical information via the internet.

Institutional Organization

Institutions can invest in putting patients' educational needs more at the forefront of care. Dr. Kripalani shared that at his institution, a strong department of patient education has helped instill and enforce high standards for patient communication throughout the health system, e.g., ensuring high-quality patient education materials and training staff in communication skills.

Outright language barriers are a direct but sometimes overlooked element of health literacy, as some patients do not have enough English proficiency to truly engage with their doctor in shared decision making. Dr. Juthani noted that Stanford has recently tried to make high-quality translation services a top priority, e.g., trying to ensure in-person translation services wherever possible.

Medical institutions can do a lot to make the system more intelligible and accessible for patients, said Dr. Press, including simple things such as using non-technical language on medical signs. As part of that, she argues that non-technology options should still always be available to patients who are not able to negotiate e-health services such as patient portals. While such elements may help improve patient literacy and enhance patient communication in some instances, the way in which they are implemented matters a lot.

While broad institutional priorities can make a big difference, hospitalists should also not underestimate the impact they can have with patients one-on-one.

"Most individuals would benefit from better attention from clinicians in the health system on health literacy—most would benefit from better communication on our end," said Dr. Press. "We owe it to our patients to do everything we can to help them understand and identify if they need additional resources." ■

Ruth Jessen Hickman, MD, is a graduate of the Indiana University School of Medicine in Bloomington, Ind., and a freelance medical writer.

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Recognizing and Addressing Health Literacy Barriers

By Chris Migliore, MD, MS, FACP, FHM

October marks Health Literacy Month, a crucial observance dedicated to highlighting the essential role health literacy plays in patient care, especially within hospital medicine. Health literacy—the ability of patients to obtain, understand, and use healthcare information—directly impacts clinical outcomes, patient satisfaction, and overall healthcare efficiency. For hospitalists, recognizing and addressing health literacy barriers is not merely beneficial but imperative.

Research consistently underscores the gravity of health literacy. A study published in the *Annals of Internal Medicine* demonstrated that limited health literacy is associated with increased hospitalizations, greater use of emergency care, lower adherence to treatment regimens, and poorer overall health outcomes.[1] Specifically, it noted that individuals with inadequate health literacy experience difficulty navigating complex healthcare systems, understanding prescription instructions, and comprehending discharge summaries.

In an *American Journal of Medical Quality* study, the authors reported that nearly half of hospitalized patients could not correctly explain their diagnosis or the necessary follow-up care after discharge, emphasizing the need for clearer patient-provider communication in hospital settings.[2] Similarly, Kripalani S, et al. highlighted that nearly 40% of discharged patients misunderstood the medication instructions provided by their hospital, increasing the risk of medication errors and subsequent readmissions.[3]

Hospitalists can significantly mitigate these risks through focused interventions. A practical and effective approach is the "teach-back" method, a communication technique whereby providers ask patients to repeat back the information conveyed in their own words. A randomized controlled trial conducted by Schillinger et al. revealed that the teach-back method significantly improved diabetic patients' comprehension of insulin management, illustrating its efficacy in clinical practice.[4]

Another influential strategy involves enhancing the readability of written healthcare materials provided to patients. According to a review in *Clinical Orthopaedics and Related Research*, the average readability level of patient education materials is often higher than the recommended sixth-grade reading level, which can pose significant barriers. Their analysis showed that materials written at appropriate reading levels improved patient understanding, adherence, and satisfaction.[5]

Hospital discharge practices represent another critical area where literacy-sensitive strategies are essential. A randomized control trial published in the *Annals of Internal Medicine* demonstrated that through the Re-Engineered Discharge program, which incorporates literacy-sensitive education materials and structured follow-up plans, hospital readmission rates significantly decreased, and patients benefited greatly from clear, straightforward discharge summaries and explicit instructions.[6]

Additionally, digital health interventions, though promising, must consider health literacy. Bailey et al. reviewed digital health platforms and identified that complex language and navigation issues frequently limited patient engagement.[7] Consequently, ensuring these platforms are user-friendly and accessible to diverse literacy levels is paramount for their success.

Cultural competence intersects critically with health literacy. A review by Shaw et al. emphasized that culturally tailored patient education materials significantly improved understanding and adherence among diverse populations.[8] Hospitalists, therefore, must recognize the cultural context of literacy and implement education interventions sensitive to cultural backgrounds.

Hospital medicine programs that integrate health literacy training for clinicians yield positive outcomes. Green et al. described a successful program where hospitalists were educated about literacy-sensitive communication techniques. Post-training assessments indicated improved patient comprehension and satisfaction, affirming the value of continuous provider education on literacy awareness.[9]

In conclusion, health literacy is a determinant of patient safety, quality of care, and healthcare resource utilization. Hospitalists occupy a unique position to influence and improve patient outcomes significantly by addressing health literacy proactively. By adopting evidence-based approaches such as the teach-back method, utilizing clear patient materials, enhancing discharge processes, and emphasizing cultural competence, hospitalists can make substantial progress in mitigating the adverse effects associated with limited health literacy. ■

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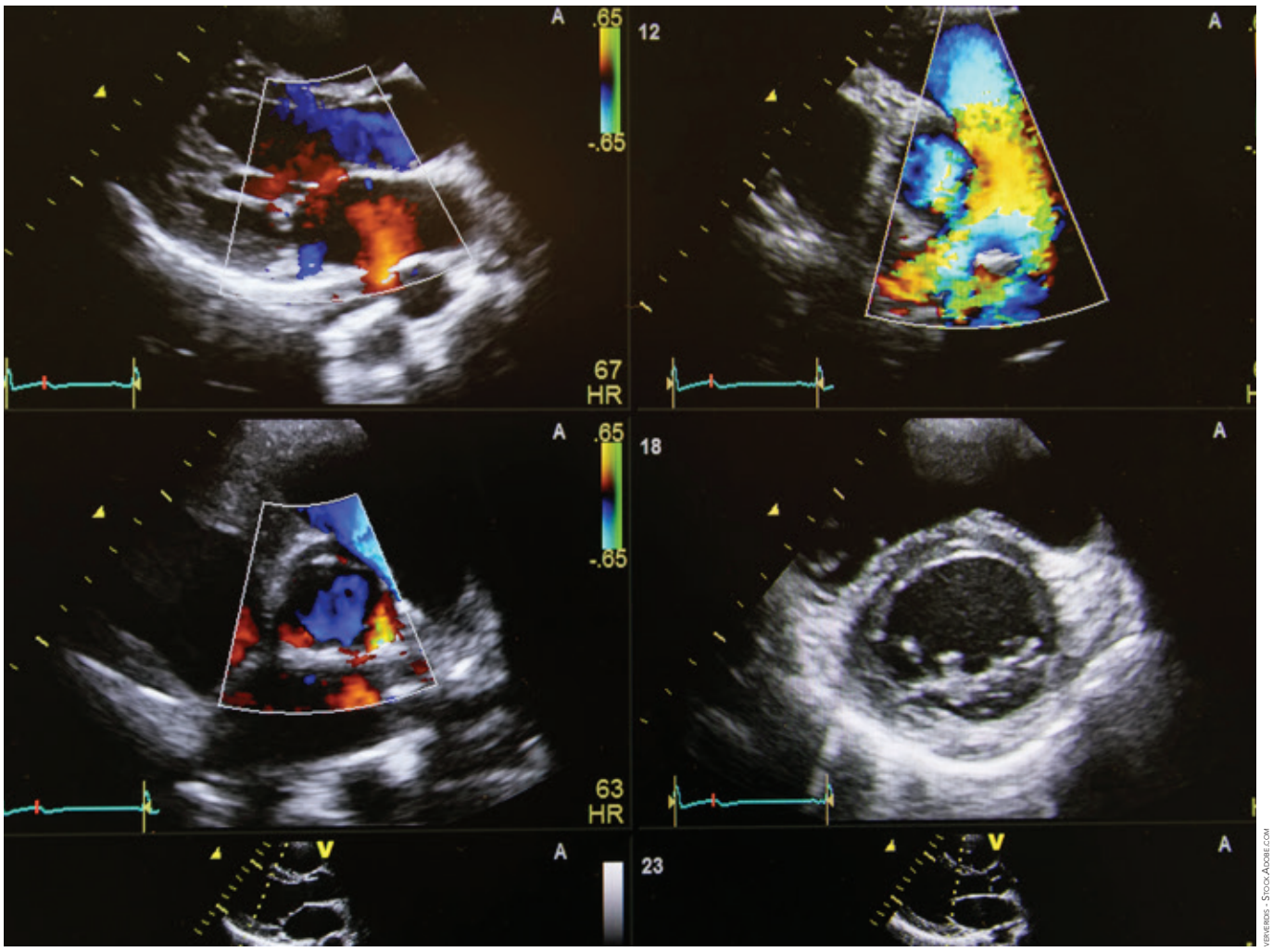
Cardiac POCUS: A Bedside Window View of the Heart

By Elian D. Abou Asala, MD, FRCP, MBA



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In many hospitals across the nation, hospitalists assume leadership roles during rapid response and code blue events, especially in settings where immediate critical care support is limited.[1] Point-of-care ultrasound (POCUS) has become an invaluable extension to the physical exam in cardiac patient assessment, especially in these high-acuity moments, where patients are too unstable to be transferred to a CT scan or too sick to wait for a formal echocardiogram study to be done.[2] POCUS is used as a handy, efficient, and safe tool that allows the assessment of left and right ventricular function, detection of pericardial effusion, and estimation of intravascular volume status.[3]

POCUS plays a critical role in the bedside differentiation of shock or near-shock states, enabling more targeted and timely resuscitation with the additional potential to allow dynamic evaluation of volume responsiveness.[4]

Additionally, in the context of newly detected prominent cardiac murmurs, a focused echocardiogram can provide live visual evidence of significant valvular abnormalities such as regurgitation or stenosis, influencing medication choice and prompting expedited consultation and intervention.

While complete echocardiography includes multiple views, internists can gather the essential information relevant to their scope of practice using just four core cardiac windows:

- Parasternal long-axis (PLAX)—best for left ventricular (LV) systolic function, pericardial effusion, and aortic root assessment
- Parasternal short-axis (PSAX)—best for assessing regional wall motion abnormalities and right ventricular (RV) pressure or volume overload
- Apical four-chamber (A4C)—best for comparing LV and RV size and function, assessing pericardial effusion, valve regurgitation, and aortic velocity-time integral (VTI), which helps assess LV function
- Subcostal four-chamber view—to obtain limited views in critically ill patients or those with emphysema as an excellent alternative when other views are suboptimal; also useful for evaluating pericardial effusion

Introducing the "Pump–Tank–Leaks" framework as a structured approach to cardiac assessment provides a practical and intuitive model for hemodynamic evaluation at the bedside. "Pump" refers to the evaluation of cardiac function, "Tank" pertains to the assessment of volume status, and "Leaks" focuses on the evaluation of valvular integrity and function.

LV assessment

Case: A 72-year-old man undergoing chemotherapy for cancer, presented with nausea and progressive shortness of breath. He was noted to be mildly hypotensive on presentation with a lactic acid level of 5 mmol/L. Physical examination revealed overall clear lungs bilaterally, without clear signs of volume overload or jugular vein distention, making the etiology of his dyspnea unclear. Bedside POCUS using the PLAX view demonstrated a markedly reduced left ventricular ejection fraction with globally diminished contractility. No clear, focal, wall motion abnormality was appreciated on the parasternal short-axis view. The B-type natriuretic peptide was elevated at 920 pg/mL, and troponins were mildly positive, consistent with newly diagnosed heart failure. While IV fluid administration is often the initial intervention for hypotensive patients, in this case, it could have exacerbated the patient's condition. IV fluids were withheld, cardiology was consulted, and the patient was admitted to the cardiac intensive care unit for a milrinone drip. A comprehensive workup for cardiomyopathy was initiated, and after ischemic etiologies were excluded, the patient was diagnosed with chemotherapy-induced cardiomyopathy. Guideline-directed medical therapy was initiated, and the patient was discharged home one week later.

Clinical pearl: A quick eyeball assessment of LV contractility helps differentiate heart failure from other causes of dyspnea. Visual estimation is often enough to change management when time matters.[5,6]

RV assessment

Case: A 55-year-old woman presented with syncope, tachycardia, and mild hypotension. The ECG did not reveal acute changes besides sinus tachycardia. POCUS shows an enlarged RV with septal flattening, also known as the D sign, on PSAX view. Interestingly, POCUS also noted McConnell's sign, which is described in literature as a highly specific sign for pulmonary embolism, and suggestive of right heart strain. The patient underwent CT angiography and was diagnosed with a massive pulmonary embolism. While IV fluid administration often is elected as a first intervention for patients with hypotension, it could have worsened the patient's condition and applied more pressure on a weak RV.

Clinical pearl: RV enlargement and septal flattening are key signs of acute pulmonary embolism, with McConnell's sign as a very specific finding.[7]

Dr. Abou Asala

Dr. Abou Asala is a hospitalist and associate staff physician in the department of hospital medicine of the Cleveland Clinic Foundation, and clinical assistant professor of medicine at the Cleveland Clinic Lerner College of Medicine, both in Cleveland.

Pericardial effusion and tamponade

Case: A dialysis patient presented to the emergency department (ED) for shortness of breath and was found to be in acute hypoxic respiratory failure requiring BiPAP, with tachycardia, hypotension, and lactate of 4 mmol/L on labs. Bedside POCUS was performed. PLAX view could not reveal clear views of the heart due to non-invasive positive pressure ventilation and patient agitation due to subjective shortness of breath.

The subcostal view was attempted and showed a large pericardial effusion with right atrial collapse. Cardiology was urgently called. Pericardiocentesis was performed and led to immediate hemodynamic stability.

Clinical pearl: Cardiac tamponade is a diagnosis not to miss. Bedside POCUS can expose it in seconds. Look for pericardial effusion and chamber collapse (atrial collapse during systole, ventricular collapse during diastole).[8] Note that patients with pulmonary hypertension can have late chamber collapse even in the presence of tamponade, due to higher baseline chamber pressures.[9]

Volume assessment

Case: A 64-year-old woman with pneumonia and hypotension was initiated on IV fluids in the ED and admitted to the floor for sepsis. After blood pressure initially improved, the patient had recurrent hypotension on the floor. The medicine team considered an ICU transfer for initiation of pressors, as they were nervous about giving more IV fluids since the patient received a full sepsis bolus in the ED.

The patient was already requiring six liters per minute of oxygen support due to her pneumonia, and any degree of volume overload could put the patient in a worsening respiratory failure, warranting immediate ICU transfer.

Bedside POCUS was performed and found her LV appearing hyperdynamic and underfilled, with a collapsed inferior vena cava (IVC) and over 50% respiratory variation in IVC diameter. One more liter of IV fluid was ordered, which helped achieve optimal resuscitation and achieved the "stress volume" that resulted in hemodynamic stability and better perfusion and helped the patient avoid an unnecessary ICU admission.

Clinical pearl: Combined LV function with IVC assessment can guide fluid resuscitation. In the absence of certain exceptions, a collapsing IVC plus a small hyperdynamic LV suggests hypovolemia.[10]

Gross valve abnormalities

Case: A 68-year-old man with a history of hypertension presented to the ED for syncope earlier that evening while he was going upstairs. The patient was found to be mildly hypotensive in the ED with a narrow pulse pressure. Initial suspicion was dehydration, and IV fluids were considered. A careful bedside exam was performed and revealed a systolic murmur in the right upper sternal border that was never documented in the chart. PLAX view was performed and revealed a thickened and minimally mobile aortic valve, consistent with severe aortic stenosis with resulting LV outflow obstruction. Cardiology was consulted, and the patient was admitted for a transcatheter aortic valve replacement the next morning.

IVF could have worsened the patient's condition by potentially exacerbating pulmonary edema in the setting of severe aortic stenosis, resulting in decreased cardiac output.

Clinical pearl: While detailed valve assessment requires formal echo, some easy-to-find yet critical valvular problems can be detected on simple bedside POCUS, influencing the treatment plan and potentially avoiding harm.[11]

Summary

Integrating POCUS into cardiac patient assessment has transformed hospital care. Its use provides immediate bedside insights into cardiac function, enabling rapid informed decisions that improve patient outcomes. POCUS also helps in diagnosing conditions like heart failure and guides appropriate interventions, enhancing patient care. ■

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Key Clinical Question

How Should Vitamin D Levels be Interpreted in Patients with IBD?

By Stephen Antonucci, MD, Jonathan McIntyre, MD, Catherine E. Firestein, MD, MPH, FHM, Joseph Avalos, MD, FHM, Nhan Vuong, MD, and Maryann Ally, MD, MPH, FACP, FHM

Case

A 35-year-old male with Crohn's disease (CD) presents with diarrhea, frequent abdominal cramps, and fatigue. He is on a tumor necrosis factor-alpha (TNF-α) inhibitor, infliximab 5 mg/kg infusion every eight weeks. Arthralgia of the hands and knees limits his activity. On exam, he has mild abdominal tenderness. Labs reveal CRP 2.1 mg/L, fecal calprotectin 250 mcg/g, therapeutic trough level of infliximab, and 25-hydroxy vitamin D (25(OH)D) 30 nmol/L. Infectious stool studies, including *Clostridium difficile*, were negative. Colonoscopy demonstrated mild, patchy inflammation throughout the colon. Biopsies obtained during the colonoscopy demonstrated chronic active inflammation. On immunohistochemical stains, cytomegalovirus was negative. He was then started on a short course of steroids followed by a long-term oral vitamin D3 supplement (cholecalciferol) 2,000 IU/day. A year later, his 25(OH) D level improved to 80 nmol/L along with clinical improvement and endoscopic healing.

Vitamin D is traditionally known for its role in regulating calcium and maintaining bone homeostasis.[1] More recently, it has been implicated in a variety of autoimmune, infectious, cardiovascular, and malignant diseases.[2-5] This expanded understanding has led to increased emphasis on assessing and replenishing vitamin D levels.[6] In the immune system, vitamin D exerts immunomodulatory effects through its receptors, which are expressed on key components of the innate and adaptive immune system, including B and T cells, dendritic cells, and macrophages.[2] Vitamin D deficiency has been observed at a higher prevalence among individuals with autoimmune disorders such as inflammatory bowel disease (IBD).[7,8] As of 2020, an estimated 2.39 million individuals in the U.S. were affected by IBD, with associated healthcare costs of around $3 billion annually.[8,9] Growing evidence suggests that IBD patients with vitamin D deficiency experience greater symptom severity and higher disease burden compared to those who are vitamin D-replete.

Overview of the Data

Low vitamin D levels and IBD

Low vitamin D levels have been

associated with relapse of symptoms in IBD patients, which leads to higher utilization of healthcare resources such as hospitalizations and surgeries related to IBD.[7] A low vitamin D level affects the inflammatory pathway, gastrointestinal bacterial flora, and the epithelial integrity of intestinal cells.[7,8] Oral cholecalciferol may reduce inflammation by suppressing activated B cells and decreasing cytokine activity.[7] The pathogenesis of IBD is complex and involves the dysregulation of intestinal mucosa and T-helper lymphocytes and the production of pro-inflammatory cytokines (interferon-gamma and TNF-alpha). The mechanism by which vitamin D modulates the immune response is not well understood. However, cholecalciferol has been shown to downregulate pro-inflammatory cytokines, such as interleukin-6, interferon-gamma, and TNF-alpha and to activate anti-inflammatory T-helper cells. C-reactive protein, a marker of inflammation, has been inversely linked with serum 25(OH)D levels, suggesting vitamin D may lower inflammation.[10] The vitamin D receptor also regulates tight junction proteins, which are integral to the maintenance of the mucosal barrier function.[11,12]

Different professional organizations define vitamin D deficiency and insufficiency variably. 25(OH)D reflects stored vitamin D, while vitamin D 1,25-dihydroxy, aka calcitriol or 1,25(OH)2D, is the biologically active version. The Endocrine Society classifies deficiency as a 25(OH)D level under 50 nmol/L (20 ng/mL) and insufficiency as a 25(OH)D level between 50 and 75 nmol/L (20 to 30 ng/mL).[7] The National Academy of Medicine's cutoff for vitamin D deficiency is under 30 nmol/L (12 ng/mL) and for vitamin D insufficiency is 30 to 50 nmol/L (12 to 20 ng/mL).[7]

Vitamin D can also be found in dietary supplements. Attaining a serum 25(OH)D level of 75 to 125 nmol/L helps to decrease inflammation, thereby leading to decreased IBD activity.[7] One double blinded, placebo-controlled study showed that a 2,000 IU daily dose of oral vitamin D can increase serum 25(OH)D concentration and reduce disease activity in ulcerative colitis (UC) patients, improving their quality of life. The study recommended assessing vitamin D levels in all UC patients because they may benefit from vitamin D therapy.[13]

The target dose of vitamin D supplementation remains unclear, but studies have investigated giving fixed doses versus variable doses of oral vitamin D or weekly intramuscular vitamin D supplementation. Serum 25(OH)D level can be monitored every three to four months. A subtherapeutic level may be due to patient non-adherence to supplementation and/or malabsorption of the supplement. Determining the reason for a low vitamin D level can help the clinician determine how to adjust supplementation dosing. When considering dosing, per the U.S. Preventive Services Task Force, a high dose of vitamin D (500,000 IU annually) leads to increased risk of falls and fractures.[14] Sources of vitamin D include sunlight exposure and diet, such as oily fish (e.g., herring, mackerel, salmon, and sardines), liver, red meat, egg yolks, and fortified foods (e.g., fat spreads and breakfast cereals).

The efficacy of a commonly used IBD medication class, tumor necrosis factor (TNF) inhibitors, can be bolstered when vitamin D levels are optimized to at least 75 nmol/L.[7] Attaining a normal vitamin D level prior to TNF inhibitor treatment can reduce relapses and therefore, lead to sustained remission in three months.[7] A retrospective study showed that higher vitamin D levels before starting an immune checkpoint inhibitor predicted significant endoscopic improvement in UC patients. Improving vitamin D levels also lowered C-reactive protein levels significantly in CD patients and can play a role in improved clinical and endoscopic outcomes in patients with IBD.[15]

Additional Effects of Low and High Vitamin D Levels

In addition to IBD, vitamin D deficiency is frequently observed in celiac disease. A retrospective analysis of 91 patients with celiac disease revealed that 41% exhibited serum 25(OH)D levels below 50 nmol/L. This deficiency is primarily attributed to chronic intestinal inflammation and resultant villous atrophy, which impairs vitamin D absorption. If left untreated, persistent malabsorption may lead to significant metabolic complications, such as osteoporosis.[16] Additionally, emerging evidence suggests that vitamin D supplementation, in conjunction with a gluten-free diet, may facilitate mucosal healing and mitigate disease severity in celiac disease. This effect is likely mediated through its immunomodulatory properties, including the attenuation of inflammation, reinforcement of intestinal tight junction integrity, and modulation of the gut microbiome composition, thereby contributing to improved intestinal barrier function and overall gastrointestinal health.[17]

Vitamin D deficiency has widespread multisystem effects, impacting skeletal, immune, metabolic, and neurological health. Impaired calcium absorption leads to bone demineralization, osteoporosis, and increased fracture risk due to disrupted bone remodeling.

Quiz:

1. Which of the following best describes the relationship between low vitamin D levels and inflammatory bowel disease (IBD)?

a. Low vitamin D levels are only a consequence of reduced sun exposure in IBD patients
b. Vitamin D deficiency is associated with increased intestinal inflammation and disease severity in IBD
c. Vitamin D supplementation has no impact on inflammatory markers or disease activity in IBD
d. Vitamin D deficiency is unrelated to immune dysregulation in IBD and affects only bone health

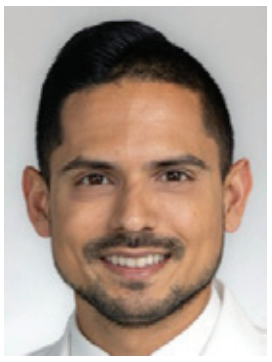
Correct Answer: B. Evidence suggests that low vitamin D levels correlate with greater disease severity, increased inflammation, and a higher risk of relapse in IBD patients. Vitamin D plays a role in modulating the immune system, and its deficiency has been linked to increased pro-inflammatory responses in IBD patients. Some studies also suggest that vitamin D supplementation may help reduce inflammation and improve disease outcomes.

2. What is the most appropriate initial screening test to evaluate vitamin D deficiency?

a. 24, 25(OH)2D vitamin D
b. 25-hydroxy vitamin D
c. Vitamin D-1, 25(OH2D)
d. 7-dehydrocholesterol

Correct Answer: B. 25-hydroxy vitamin D, aka 25(OH)D, is produced in the liver and measures both vitamin D2 and vitamin D3 as an estimate of vitamin D storage. Vitamin D-1, 25(OH2D), the active form, can be normal or elevated in vitamin D deficiency. It can be useful in evaluating patients with renal disease, vitamin D-dependent rickets (in which there is a hereditary deficiency of alpha-hydroxylase or resistance to 1,25-dihydroxyvitamin D), sarcoidosis, or other granulomatous diseases. 24, 25(OH)2D vitamin D is the inactive metabolite after reaching the kidneys that is associated with renal function. 7-dehydrochlesterol is the precursor to 25-hydroxyvitamin D.


Dr. Antonucci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In the immune system, vitamin D modulates immune responses via vitamin D receptors on immune cells, and its deficiency is associated with heightened susceptibility to autoimmune diseases and chronic inflammation. Metabolically, low vitamin D levels contribute to insulin resistance, potentially increasing the risk of type 2 diabetes mellitus. It also plays a crucial role in neuroprotection, with deficiency linked to cognitive decline, mood disorders, and neurodegenerative diseases, likely through its effects on neuronal integrity, neuroinflammation, and neurotransmitter regulation.[18]

Hypervitaminosis D, or vitamin D toxicity, is a rare condition that arises from excessive vitamin D intake, typically due to chronic supplementation exceeding 10,000 IU per day over an extended period. The pathophysiology of this disorder is driven by the resultant hypercalcemia, which manifests in a spectrum of clinical symptoms. Neurological manifestations may include confusion and lethargy, while gastrointestinal disturbances can present as nausea, vomiting, abdominal pain, and constipation. Additionally, hypercalcemia-induced renal dysfunction may lead to polyuria, polydipsia, and nephrocalcinosis. Laboratory findings indicative of vitamin D toxicity include elevated serum calcium, suppressed parathyroid hormone levels, and markedly increased 25-hydroxyvitamin D concentrations (over 375 nmol/L). Management primarily involves cessation of vitamin D supplementation, aggressive hydration to promote calcium excretion, and, in severe cases, administration of bisphosphonates to mitigate hypercalcemia.[19]

Application of the Data to the Original Case

This 35-year-old man had mild to moderate persistent symptoms of his Crohn's disease and had a vitamin D deficiency. He had non-sustained improvement with a TNF-alpha inhibitor.

Supplementation with vitamin D likely contributed to a reduction of his inflammatory cytokines while also taking a TNF-alpha inhibitor. As a result, he had an overall improvement in disease status, symptoms, and management.

Key Points

- Low vitamin D levels may contribute to increased symptoms and relapses in IBD patients.
- Hospitalists should measure serum 25(OH)D in patients with IBD, especially those with poor control of their symptoms.
- Provide vitamin D supplementation to attain a serum 25(OH)D goal above 75 to 125 nmol/L.
- If vitamin D levels are not rising appropriately, consider non-adherence to vitamin D supplementation or malabsorption of the vitamin D supplement as possible reasons.

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Bottom Line

Vitamin D plays a key, though only partially understood, role in reducing inflammation in IBD. Optimizing vitamin D levels in IBD patients is associated with lower disease severity index scores, fewer hospitalizations and surgeries, and better quality of life.[8] ■

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Cystatin C in the Inpatient Setting: Enhancing Kidney Function Assessment

By Eric Signoff, MD, Nandakishor Kapa, MD, and Lucy Shi, MD

A 68-year-old man on chronic steroids for amiodarone-induced thyroiditis presented with pneumonia, hypotension, and encephalopathy. Though the pneumonia resolved, his encephalopathy worsened and he became somnolent. Creatinine was 0.7 mg/dL (normal, 0.7 to 1.3 mg/dL) with an estimated glomerular filtration rate (eGFR) of 91 mL/min/1.73m^2. Cystatin C was 3.86 mg/L (normal 0.61 to 0.95 mg/L), and the recalculated eGFR, incorporating creatinine and cystatin C, was 29 mL/min/1.73m^2.

Brief Overview

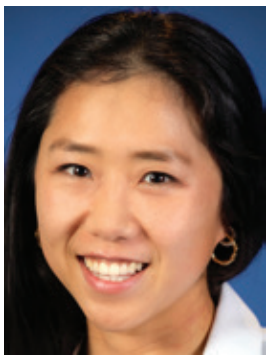
Accurate assessment of glomerular filtration rate (GFR) is essential for diagnosing, staging, and managing acute and chronic kidney disease (CKD), determining medication dosages, and predicting outcomes such as CKD progression, cardiovascular events, and all-cause mortality.[1] Although direct GFR measurement via exogenous clearance markers is the gold standard, it is costly and impractical for routine use.[1]

The most widely used method to estimate GFR is the 2021 creatinine-based chronic kidney disease epidemiology collaboration, or CKD-EPI, equation. Creatinine, a byproduct of muscle metabolism, is filtered and excreted by the kidneys.[1] However, its levels are strongly influenced by muscle mass, diet, age, sex, and chronic illnesses such as advanced heart failure or cirrhosis.[2] Laboratory measurements of creatinine can also be affected by elevated bilirubin, ketones, severe hyperglycemia, and severe acidosis.[3]

Creatinine levels tend to increase after age 70.[1,2] Men generally have higher levels due to greater muscle mass, leading to increased creatinine production.[1,2] Commonly used medications such as anti-retroviral medications for human immunodeficiency virus, H2 blockers, and trimethoprim/sulfamethoxazole inhibit tubular creatinine secretion and artificially raise creatinine levels, leading to an underestimation of glomerular filtration.[2] Conversely, in sarcopenic patients, low muscle mass falsely lowers creatinine levels, leading to an overestimation of kidney function. Other factors frequently encountered by hospitalists, such as fluid overload, liver and heart disease, and dietary variability in meat consumption, also lead to GFR overestimation.[1,2] Additionally, creatinine is not reliable for identifying early kidney disease due to limitations in sensitivity and specificity. It can take 24 to 48 hours to rise after an initial insult, delaying recognition of acute kidney injury.[1]

Dr. Signoff

Dr. Kapa



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Overview of the Data

Cystatin C has emerged as a valuable additional biomarker for estimating GFR. It is a 13-kilodalton protein produced by all nucleated cells and freely filtered by the glomerulus.[2] Unlike creatinine, cystatin C is unaffected by muscle mass or dietary intake, making it a more accurate and reliable measure of kidney function.[1]

In both inpatient and outpatient settings, cystatin C has shown increased sensitivity to early changes in kidney function when compared to creatinine and has been used for early detection of both acute and chronic kidney disease.[2,4] It also provides a more accurate assessment of the true kidney function, especially in populations where muscle metabolism is affected, such as patients with limb amputations, significant muscle atrophy, or altered muscle metabolism.[2,5] This improved accuracy becomes even more pronounced in acutely ill patients, where creatinine production is often unpredictable and variable.[6] Current guidelines recommend the use of cystatin C in conjunction

Additional Reading

- Levey AS, et al. GFR estimation: from physiology to public health. *Am J Kidney Dis*. 2014;63(5):820-834. doi:10.1053/j.ajkd.2013.12.006.
- Peralta CA, et al. Cystatin C identifies chronic kidney disease patients at higher risk for complications. *J Am Soc Nephrol*. 2011;22(1):147-155. doi:10.1681/ASN.2009121242.

Table 1: Creatinine and Cystatin C Comparison Chart

	CREATININE	CYSTATIN C
Source	Muscle metabolism	Produced by all nucleated cells
Elimination	Filtered by kidneys, secreted by tubules	Filtered by kidneys with minimal secretion
Body habitus	Affected by muscle mass	May be higher in obesity due to higher cell turnover
Lifestyle	Affected by diet and meat intake (vegetarian, keto)	Affected by smoking
Co-morbid illnesses	Affected by malnutrition, muscle-wasting diseases, and chronic illnesses such as advanced liver disease, heart failure	Affected by thyroid dysfunction and inflammatory diseases
Medication effects	Affected by drugs that impact tubular secretion (trimethoprim, fenofibrate) or muscle breakdown (statins)	Affected by drugs that affect inflammation (steroids, immunosuppressants)
Laboratory	Elevated bilirubin, ketones, severe hyperglycemia, and severe acidosis may impact laboratory assay measurements	Autoantibodies may impact laboratory assay measurements

with creatinine for more accurate GFR estimation in these populations.[3] See Table 1 for a detailed comparison of the two biomarkers.

Common hospital medications with a narrow therapeutic window, including vancomycin, can be more accurately dosed when using cystatin C versus creatinine.[2,5,6] Cystatin C is not affected by medications that inhibit tubular secretion of creatinine, providing a more accurate eGFR than creatinine.[2]

Limitations

Although cystatin C usage is becoming more prevalent, it is not performed internally at all hospitals, which increases cost and delays results. Cystatin C has wider interlaboratory variability than creatinine, affecting its use when comparing across health systems. However, as cystatin C availability and use increases, variability and cost are expected to decrease.[2,5,6] For example, at our institution, cystatin C is now processed in-house, facilitating turnaround times that are comparable to those for serum creatinine.

Both creatinine and cystatin C can be affected by various factors, although cystatin C levels appear to be affected by fewer factors and to a lesser degree compared to creatinine.[2] In general, conditions and medications that lead to increased cell turnover can elevate cystatin C, leading to an underestimation of GFR.[2] Glucocorticoids and immunosuppressants, as well as states with high cell turnover such as malignancy, inflammatory disease, smoking, and obesity, may falsely increase cystatin C levels.[1,2,7] Thyroid dysfunction can also affect cystatin C levels. Hyperthyroidism increases cystatin C and hypothyroidism lowers cystatin C due to the stimulatory effects of thyroid hormone on cystatin C production.[2,8] Additionally, laboratories that use immunoassay techniques may be affected by the presence of autoantibodies in autoimmune conditions, potentially interfering with assay binding.

How to Use Cystatin C in Your Daily Practice

The eGFRcr-cys equation, which incorporates both creatinine and cystatin C, provides a more accurate and precise assessment of renal function than using either biomarker alone.[1] Current guidelines recommend adding cystatin C to creatinine-based estimates when the creatinine-only eGFR is suspected to be inaccurate. This is particularly relevant in situations where creatinine levels may be influenced by factors such as muscle mass, diet, age, sex, disease states, or medications.[1-3] Using both markers together improves diagnostic confidence and supports more informed clinical decision-making.

Cystatin C obtained early in a patient's hospitalization may lead to more timely identification of acute kidney injury.[4,5] Creatinine lags in the identification of changes; therefore, the addition of cystatin C can provide earlier recognition of changes in kidney function.[1,4,5] Incorporating cystatin C into the eGFR calculation can improve accuracy in patients who have muscle atrophy, limb amputation, prolonged immobilization, liver disease, protein-calorie malnutrition, spinal cord injury, or acute illness, since creatinine alone can be inaccurate.[6] Additionally, obtaining a cystatin C can improve the eGFR calculation compared to creatinine alone and better guide appropriate medication dosing and avoid toxicity when using a medication with a narrow therapeutic window.[2,5,6] It is important to emphasize that cystatin C and creatinine tests are independent and should not be used interchangeably or directly compared.

Application of Data to Case

The patient has multiple factors that could impact both cystatin C and creatinine measurements, including chronic low-dose steroid use, profoundly low muscle mass, and prior thyroid dysfunction. The combined creatinine-cystatin eGFR calculation provides a more accurate representation of his kidney function, revealing a much lower eGFR and exposing cefepime-induced neurotoxicity as the etiology of his ongoing encephalopathy.

Bottom Line

Cystatin C is a reliable biomarker that complements creatinine in estimating eGFR, leading to a more timely and accurate assessment of kidney function. When used alongside creatinine, it enhances both diagnostic and prognostic accuracy—especially in populations where creatinine alone may be less reliable. ■

Quiz:

1. **A 75-year-old woman with a history of poorly controlled diabetes, prior left above-the-knee amputation, and severe protein-calorie malnutrition is admitted for right lower extremity cellulitis. Her serum creatinine is 0.5 mg/dL, corresponding to an eGFR of 105 mL/min/1.73m². However, her cystatin C level is significantly elevated, and her combined eGFR using cystatin C and creatinine is 40 mL/min/1.73m². What is the most likely reason for the discrepancy?**
   a. Overestimation of kidney function by creatinine due to amputation history
   b. Underestimation of kidney function by cystatin C due to poorly controlled diabetes
   c. Interlaboratory variability of cystatin C assay measurement
   d. Hyperglycemia interfering with cystatin C assay

Correct Answer: a. Patients with severe malnutrition or lower muscle mass due to amputations may produce less creatinine, leading to an overestimated eGFR. Cystatin C, which is independent of muscle mass, provides a more accurate measure of kidney function in such patients, revealing significant kidney dysfunction that might otherwise be missed.

While inflammatory conditions may falsely increase cystatin C, leading to an underestimation of eGFR, poorly controlled diabetes has not been seen to have this effect. Interlaboratory variability may impact the ability to directly compare cystatin C levels between institutions but would not explain the discrepancy between eGFR calculations here. Hyperglycemia can interfere with creatinine assay measurements, but cystatin C assays are not similarly affected.

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Treating Influenza: Yay or Nay to Antivirals?

By Arunab Mehta, MD, MEd, FHM, and Weijen Chang, MD, SFHM

Vote Yay for Treating Flu A (Dr. Mehta)

We, as a nation, recently experienced an influenza epidemic that was the worst in 15 years in my state of Ohio. Questions reminiscent of the pre-pandemic era have resurfaced. A hospital leader recently asked me if oseltamivir even works for influenza, suggesting that the benefits might be minimal. This sentiment was echoed in a broader discussion among medical personnel outside the hospital, raising doubts about the efficacy of antiviral agents against influenza. However, is the presence of small efficacy a valid reason to withhold antivirals, especially when no alternative exists for hospitalized patients with influenza A? Should treatment hinge on whether symptoms begin within 48 hours—often with 12 of those hours spent in the ED—or should we adopt a blanket approach to treatment?

I firmly believe that every patient admitted to the hospital with active influenza A should receive antiviral treatment, regardless of when their symptoms begin. Both the latest Centers for Disease Control and Prevention and Infectious Diseases Society of America guidelines recommend initiating antiviral medications for hospitalized patients and those with high-risk features as soon as they are assessed. We have several antiviral agents available that can be administered orally, intravenously, or via inhalation.

While these guidelines are based on the absence of prospective, randomized, placebo-controlled trials of oral oseltamivir or inhaled zanamivir in hospitalized influenza patients, a pooled meta-analysis of observational studies involving individual-level data from more than 29,000 hospitalized patients (86% with laboratory-confirmed influenza, 14% clinically diagnosed) demonstrated a survival benefit from neuraminidase inhibitor (NAI) treatment, primarily oseltamivir, compared to no treatment. The benefit was significantly greater when treatment was initiated early (within two days of illness onset) compared to later initiation (more than two days after onset).[1]

Other observational studies in hospitalized influenza patients have shown that NAI treatment reduces hospitalization duration and the risk of mechanical ventilation in children, and improves survival in adults.[2-4] The majority of observational studies, individual patient-level pooled analyses, and meta-analyses involving patients with lab-confirmed influenza report clinical benefits of NAI treatment (primarily oral oseltamivir) for hospitalized patients, including those at high risk for complications. These benefits extend even when treatment is initiated beyond 48 hours after illness onset. Although the greatest clinical benefit is seen with treatment started within two days of illness onset, evidence of benefit persists when treatment is initiated four to five days—and up to seven days—after illness onset.[5]

A recent study examined patients hospitalized with pneumonia and influenza (median age 71, with at least one non-immunocompromising risk factor—representative of the typical hospitalized patient). This study categorized patients by the timing of antiviral initiation from the day of admission and found a statistically significant increase in 30-day mortality as the delay in starting antiviral therapy increased.[6] To address concerns about hospital metrics, another recent meta-analysis demonstrated a significant reduction in the length of stay (LOS) for patients treated with antivirals, with an average decrease of one day.[7]

Given this data and the evidence I have outlined, I firmly stand by the practice of initiating antiviral therapy for all hospitalized patients with influenza. I respectfully disagree with any approach that opts otherwise.

Oseltamivir for Influenza? Hold that Click. (Dr. Chang)

While I respect the opinion of my highly esteemed colleague from the great state of Ohio, I must temper his exuberant support for the use of oseltamivir in the treatment of hospitalized patients. I also recognize that he is hamstrung by the innate tendencies of his internal medicine training to "do something," while those trained in the magical arts of pediatrics, grizzled veterans of the virus wars that we are, know that the best treatment is often tincture of time, with a swirl of honey.[8]

Why might you, dearest reader, be tempted to click on the oseltamivir order for your hospitalized patient? As Dr. Mehta has espoused, because everyone tells you to—the CDC, IDSA, AAP, and any number of reputable organizations. But drill down into these recommendations, and you might find that your palace of intervention is built on quicksand. Let's take, for instance, the CDC Clinical Guidance, which states, "Antiviral treatment is recommended as soon as possible for any patient with suspected or confirmed influenza who is hospitalized; has severe, complicated, or progressive illness; or is at higher risk for influenza complications."[9] Yet a few flicks on your touchpad will bring you down to this statement: "No completed, sufficiently powered, randomized, placebo-controlled clinical trials have been conducted of monotherapy with neuraminidase inhibitors for treatment of influenza in hospitalized patients; studies supporting the licensure of oral oseltamivir, inhaled zanamivir, intravenous peramivir, or oral baloxavir were conducted in outpatients, primarily among previously healthy persons with uncomplicated illness."

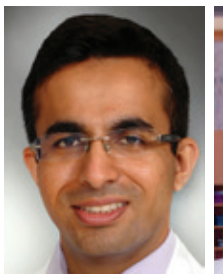
One might ask, why has there not been an appropriately powered RCT assessing the efficacy of oseltamivir in hospitalized patients? The phrase "don't ask questions you don't want the answers to" comes to mind. No doubt Roche, which originally sought and obtained the U.S. Food and Drug Administration (FDA) approval for oseltamivir, is happy to have escaped the FDA-approval process with a win at all, given the controversy generated when Roche was found to have withheld complete trial datasets of oseltamivir for years.[10] These were only obtained after the Cochrane Acute Respiratory Infections (ARI) Group refused to conclude oseltamivir's effectiveness until Roche released the full data sets under massive public pressure from Cochrane, the *BMJ,* and even the U.K. parliament.[11]

Without the financial backing of Big Pharma powering RCTs of oseltamivir in hospitalized patients, well-meaning, curious researchers have attempted to take a lower-cost approach to answering this question, including a large Canadian retrospective cohort study and a prospective U.S. multicenter observational study, which show that oseltamivir treatment is associated with lower risk of in-hospital disease progression and mortality, earlier discharge, and lower readmission rates.[12,13] But the results of retrospective cohort studies as massive as the one performed by our Canadian colleagues, even after the statistical hocus-pocus of propensity score weighting, are suspect due to residual confounding, selection bias, and misclassification. In the case of the Canadian study, over a quarter of the patients in the "supportive care" group ultimately received oseltamivir, forcing the authors to perform a per-protocol analysis, which analyzed patients according to whether they had received oseltamivir at all, in addition to the modified intention-to-treat analysis. Per-protocol analyses, however, have their own problems, including selection bias and loss of generalizability. Additionally, the study relied on administrative coding rather than microbiological confirmation.

In the case of the study done by our U.S. colleagues, more statistical magic was needed to compensate for possible indication bias—clinicians may have treated sicker patients earlier and conversely may have withheld antivirals in less severe cases. These statistical adjustments for baseline severity and demographics cannot escape the clutches of possible residual confounding, however.

And then we have meta-analyses referenced by Dr. Mehta, which come to the same conclusions. This brings to mind another well-worn phrase—"garbage in, garbage out". At the end of the day, there is no substitute for the causal certainty only RCTs can provide, the lack of which, given the financial means of Big Pharma, should leave our readers with suspicion.

These same ills plague studies attempting to discern whether oseltamivir benefits hospitalized children. A 2022 multicenter retrospective analysis of more than 55,000 children hospitalized with



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influenza found that those who received early oseltamivir (on hospital day 0 or one) had a reduced LOS, all-cause seven-day hospital readmissions, late ICU transfer, and composite outcome of death or ECMO use.[14] The crutches of propensity score-weighting and use of administrative claims data (not microbiologic diagnosis) also propped up the efforts of these authors to make up for the lack of a true RCT.

So where does that leave the lonely hospitalist, long on admissions and short on time, cursor hovering over the checkbox for oseltamivir? I can't offer them the interventional certitude that Dr. Mehta provides, nor can I offer them laissez-faire minimalism. The benefit/harm ratio makes oseltamivir treatment compelling for patients at the highest risk (over 65 years old with multiple or severe comorbidities, immunocompromise, pregnant/postpartum, extreme obesity, residents of nursing homes/chronic care facilities, critically ill patients, under 5 years old, children receiving long-term aspirin, and American Indian/Alaska Native populations).[18] Those not in high-risk categories should be given, if feasible, the benefit of shared decision-making regarding the scarcity of RCTs showing benefit in hospitalized patients like themselves, versus the risk of harm in the form of gastrointestinal adverse effects, for which the number needed to harm is in the 20s for adults and children—not an insignificant number.[15-17]

As always, think critically and follow the conclusions you can draw from high-quality evidence performed by respected researchers. ■

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