



SABM[®]

SOCIETY FOR THE ADVANCEMENT
OF PATIENT BLOOD MANAGEMENT

April 2024

NEWSLETTER

Letter from the President



As I draft this President's Letter, the 2nd Annual World Anemia Awareness Day, February 13th, has passed. The multitude of creative activity and messaging was truly inspiring from so many individuals, institutions, societies, and industry partners. There were stand-alone images and

messages, videos, also testimonials, all of which were linked showing the value of crosspollination between professional and public-facing sites. This was not only necessary, but quite impressive, highlighting how PBM is truly growing and expanding its sphere.

Within the backdrop of this energy, preparation, and execution surrounding World Anemia Awareness Day, I shall share a personal story – it truly hit home:

Approximately two months ago I was admitted to the hospital for emergency abdominal surgery. An unexpected event and scary to say the least, but all ended well (thank goodness) and I was discharged home after five days, two of which were in the ICU. During this stay, my Hgb fell from 13.8 @ admission to 9.0. Thus, I became an official member of the "One-In-Every-Four-People-Is-Anemic" Club. No, I was NOT

transfused. Thankfully, my internist and surgeon both embrace restrictive transfusion practice and transfusion alternatives, and we had a solid discussion re: my acute anemia. Although I was tired (still am a bit), I was otherwise stable, with a healthy marrow and without any other health issues, so we agreed that the course of action should be general rest, robust nutrition, and iron supplementation to see me toward normal activity and a normal Hgb over the 8-12 weeks post-op. Aren't I lucky and blessed to have had these two clinicians who are aware of PBM and supported my blood health in such a patient-centered way! Not everyone has this luxury, YET...


This event reinforces that each of us, someone we love, or someone we know will become a patient someday. So, regarding the "YET", this is the reason we strive every day to be examples to our colleagues and empower our patients, securing blood health through the SABM foundational pillars, alongside our global partners and professionals. All the activities around World Anemia Awareness Day – let them not stop! Keep this forever moving forward. PBM for all is, indeed, within our reach. We soldier on.

My best,

Carolyn Burns, MD

BTW, not so tired and Hgb rising. That iron works!

Confident care starts with the complete picture



TEG[®] 6s
Hemostasis Analyzer System

TEG systems help guide clinicians in determining what, if any, blood products or therapies are needed to restore patient hemostasis.

Count on the TEG 6s hemostasis analyzer system to deliver accurate, actionable information in as little as 10 minutes, so you can respond with confidence and optimize patient care.

To learn more, please contact your Haemonetics Account Manager or Customer Service at 1.800.537.2802, Option 3.

RxOnly

For a list of worldwide office locations and contact information, visit www.haemonetics.com/officelocations

© 2017, 2020-2021 Haemonetics Corporation. Haemonetics and TEG are trademarks or registered trademarks of Haemonetics Corporation in the USA, other countries, or both. 06.2021 USA. Excerpted from COL-AD-000216-US(AB)

HAEMONETICS[®]

**SABM NEWSLETTER
APRIL 2024
ISSUE**

Donate to SABM

Please consider making a donation to SABM. Your donations will help us to improve the lives of people throughout the world through Patient Blood Management.

**SABM 2024 Newsletter
Publication**

Editor

Majed Refaai, MD

Associate Editor

Kevin T. Wright

Contributors

Anne Burkey, RN
Tiffany Hall, RN
Worasak Keeyapaj, MD
Sherri Ozawa, RN
Jesse Qiao, MD
Sarah Walbolt, RN

International Correspondents

AFRICA: Nathaniel Usoro, MD
ASIA: Ananthi Krishnamoorthy, MD
EUROPE: Lara Oller, MD
OCEANIA: Kevin Trentino, MPH, PhD

Marketing

Ann Marie Gordon, PA-C, MLS
(ASCP), MHA

[SABM Board of
Directors](#)

Featured Affiliates

Gold Level Corporate Affiliate Member



Table of Contents

- 2 Letter from the President
- 3 Featured Affiliates and Table of Contents
- 4 SABM News
- 5 SABM Breaking News
- 7 Empowering Leadership in Medicine
- 8 Embracing the Role of PBM Nurse
- 9 Should PBM Nursing Be Recognized As a Specialty?
- 10 Hypofibrinogenemia in Bleeding Cardiac Surgery
- 11 Spotlight on PBM Laboratory Testing
- 12 Recent Scientific Articles

Cover photo by Miguel Delmar on Unsplash



ANESTHESIA & ANALGESIA

Consider submitting your future manuscripts in PBM for peer review and publication in this new section. The success of this endeavor will depend on the provision of material to make it lively and attractive to our colleagues and other professionals in the field.

Members Invited to Submit Papers [CLICK HERE](#)

Looking for Newsletter Content

SABM members want to know:

- Do you have an interesting case study?
- News about your patient blood management program?
- News about a new program at your institution?
- Have an article about some of the latest technology?
- Submitted an article to a journal for publication?

Deadline for the Summer 2024 issue is June 1, 2024.

Don't wait! Send your articles today to the Newsletter Editorial team at info@sabm.org

Call for Interesting Case Studies

Authors: Can be submitted by any discipline (MD's, RN's, technologists, perfusionists, students)

Description/Format/components:

- Patient history and diagnosis
- Problem statement
- Relevant laboratory results or tests
- Medical management
- Follow up
- Brief discussion of the disease/problem/condition with up-to-date literature
- Provide 3-4 multiple choice questions
- Answers to questions to be provided on SABM website 2-3 weeks after publication
- Tables/Figures/images are welcome
- 5-10 annotated references

Call for Member Accomplishments

If you have been given an award, received recognition, or have been recently published, we would like to publish it in the next issue of the SABM newsletter.

Please send an e-mail with the details to info@sabm.org. Be sure to include your full name and details regarding the award, the recognition you received, or the publication citation.

Call for Book Reviewers!

The newsletter editorial team is looking for members to review books. You can choose to review a book that you already have, or volunteer to review a book of SABM's choice. If you have a book that you would like to submit a review for, or to be considered as a book reviewer, you can send an email to info@sabm.org with your request for consideration.

SABM 2024 Annual Meeting Phoenix, AZ September 12 – 14, 2024



We are excited to invite you to join our SABM Annual Meeting September 12-14, 2024 in Phoenix, AZ, USA. The program will be rich with content that reinforces the clinical importance of Patient Blood Management (PBM), in line with the new Global Definition of PBM which emphasizes optimizing the care of our patients' own blood as a renewable and vital resource, with the goal of improving safety and outcomes. Presentations and content from global PBM experts will expand our comprehension of how PBM, an urgent international public health initiative, can be promoted and implemented, with critical social, economic, and clinical implications. By doing so, we can improve the lives of millions of people worldwide. Our target audience includes a range of multidisciplinary healthcare professionals, including but not limited to physicians, nurses, perfusionists, laboratorians, administrators, clinical quality and safety specialists, and patient advocates. There will be outstanding opportunities for collaboration, networking, and mentorship connections. Our meeting attendance reflects our diverse membership, and we warmly welcome you to join us. Registration will open soon.

Blood Conservation Coordinator and our program grew and expanded to pre-surgical anemia management and eventually implemented a bloodless medicine and surgery program. My title evolved to PBM Coordinator as my nursing roles and responsibilities changed and as the profession evolved. My second position was a challenging opportunity to move to a large multi-hospital system that was recruiting for a new Blood Management Program and wanted a Transfusion Safety Officer (TSO) to support the program development and implementation. I accepted the position of TSO, with a condition that they would change my title and role to be the Clinical Director of PBM and TSO. I explained the importance of PBM from the patient focused lens and my role could also support transfusion safety as part of a comprehensive PBM program. Having the experience as a PBM nurse leadership role impacted my professional development and desire to shift my focus more on what we as nurses can do to support the new modern day PBM and blood health. Currently I have been provided the opportunity to impact the field of PBM by supporting implementation of anemia management for hospitals and health systems around the country and a Clinical Director for a Healthcare Improvement company.

My professional growth has been enriched by my SABM membership since 2008. I began as a member of a nursing workgroup, then co-chair of marketing and communications, mentorship and membership, co-editor of the newsletter, co-director of the certificate course, and proud to serve our

membership as a nursing representative on the board of directors.

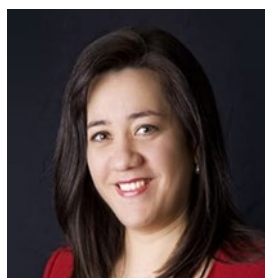
Some key reflections for professional success and growth from my own person PBM Nurse Professional journey:

- Nursing empowerment is important for professional growth in PBM.
- Have the vision to see obstacles as opportunities.
- The patient is their own best blood bank.
- Change management and project management skills are necessary.
- Adding the word “Patient” before blood management differentiates the concept from donor blood management.
- Start with the right attitude... I know everything will not be perfect each day, but when I remind myself about my passion and purpose for the patient, I find meaning and fulfillment.
- Surround yourself with passionate people, it is contagious!
- Be an active member of this society, serve, serve, serve! Join a committee, grow within this society into a leadership role and be active in mentorship along your journey.

Remember the history of PBM and the evolution of the PBM Nurse Professional is still being written.

Contributor: Tiffany Hall, RN

Nursing’s Contribution to PBM



While it is now known that all proudly acknowledge that PBM is multidisciplinary, what many may not know is that the earliest days of organizing the concepts of PBM and the formation of SABM saw a very different culture.

SABM was originally conceived as a “physician led organization” and indeed full membership was open only to physicians. However, over the course of several years, SABM leaders carefully considered the true patient centered nature of PBM and not only acknowledged but embraced the role of non-physicians in the evolution of the field. This includes a variety of concentrations, but one field with a large contribution is that of the field of nursing.

Nursing plays a large role in the implementation of PBM in hospitals around the world, as these workers spend the most time with patients on a day-to-day basis. Nurses are the workers that put into practice many of concepts that are practiced in PBM, especially anemia management.

Every shift, nurses have the responsibility in assessing their patients, including their physical assessment, medication reconciliation, and lab value result review. This gives them the opportunity to get a complete picture of the patient’s condition. As such, nurses play a vital role in recognizing, reporting, and initiating treatment for management of anemia in collaboration with the multidisciplinary team. Through the nursing process, nurses provide all the steps necessary to

provide proper anemia management, even more so than physician counterparts.

Though only one of many activities, anemia management through nursing is only a small part of the role nurses play in the organization. At a practical level, it is obvious that nurses have the best perspective of the patient and how to best provide care. However, nurses also play a role at the organizational and leadership level.

As SABM has evolved, leadership positions have shifted from primarily physicians to a slew of other specialties including nurses. This is not limited to the organization – nurses have taken leadership roles in PBM across the globe, including those developing, implementing, and leading their own programs.

As SABM and the field of PBM continues to grow, it is evident that nurses will always be involved and push the importance of the field to hospitals and major stakeholders, ultimately making PBM an important part of every hospital and better serving all patients.

The evidence for PBM has already been clearly stated – better outcomes for patients – and it is important that the healthcare field has leaders that can continue to emphasize PBM in every clinical setting. Nurses, being as widespread as they are, currently and will continue to fulfill this role, serving as the glue to comprehensive organizations, programs, and processes for the multidisciplinary team.

Contributor: Sherri Ozawa, RN

Empowering Leadership in Medicine: Guiding Principles for Patient Blood Management



In the ever-evolving landscape of medicine, leadership stands as a cornerstone for successful implementation and change. In recent years I see leaders emerging in the realm of Patient Blood Management (PBM) but there is a

need for more. All of us in PBM today are leading the way to a future where PBM is a standard of care. If you are involved in PBM for in your organization, I urge you to embrace your leadership role! Leaders in this field play a pivotal role in shaping healthcare practices, ensuring optimal patient outcomes, and fostering a culture of collaboration. Let's delve into the indispensable need for leaders, the defining characteristics that set them apart, the goals they aspire to achieve, and how every individual can contribute to leadership in their unique way.

The Need for Leaders in Patient Blood Management:

PBM is not just a set of medical protocols; it's a holistic approach to patient care that demands strong, visionary leaders. It is far different from the siloed specialties current ways of practice. Leaders are essential to navigate the complexities of healthcare systems, drive innovation, and advocate for patient-centered practices. Organizational leadership most often have no specific knowledge or training in PBM; this means they need strong influencers (aka leaders) to show them the value of PBM for both patients and organizational outcomes. The evidence, ethics and economics must be thoughtfully explained and continuously highlighted. If you are the sole staff member withing your organization assigned to a PBM focus, embrace the challenging leadership role you have been assigned. As a steward of change work to inspire & build a PBM team that prioritizes patient well-being. Foster a culture that values efficiency, safety, and ethical decision-making.



Characteristics of Leaders in Patient Blood Management:

Effective leaders in PBM exhibit a myriad of qualities that distinguish them in the healthcare landscape. Compassion, empathy, and a deep commitment to patient welfare are foundational traits. These leaders are adept at communication, fostering transparent and collaborative relationships with colleagues, patients, and stakeholders. They embrace adaptability, navigating the dynamic nature of healthcare with resilience and a solutions-oriented mindset.

Goals of Leadership in Patient Blood Management:

Each of us is gifted in leadership in various ways. Play to your personal strengths to influence greater implementation of PBM. While researching effective leadership strategies, develop those that are conducive to your personality. Are you a cheerleader? Try building trusting relationships by encouraging others to share their thoughts and ideas and motivations; use what you have learned to help them make change and show that their thoughts and ideas matter. Do you like to teach? Prepare presentations and look for opportunities to share PBM knowledge and awareness. Do you like to write? Organize projects? Conduct research? Etc. Each person's leadership style should reflect their individuality and interests. Find talented people within your organization who possess their own unique skillsets to impact change. Always be on the lookout for potential leaders you can mentor and promote.

Leaders in PBM aspire to achieve multifaceted goals that extend beyond procedural excellence. They aim to enhance patient safety, and improve the patients experience and clinical outcomes. Additionally, these leaders seek to establish standardized protocols, educate healthcare professionals, and promote research to continually advance the field. By championing evidence-based practices, they contribute to a healthcare ecosystem that prioritizes both quality and efficiency.

Everyone Can Lead:

Leadership in PBM is not confined to hierarchical roles; it is a collective responsibility. Every individual, regardless of their position, can contribute to the culture of leadership. Nurses, technicians, administrators, and even patients themselves can influence positive change. Advocating for evidence-based practices, participating in quality improvement initiatives, and fostering a culture of open communication are ways in which everyone can play a role. Regardless of your title or position within a healthcare organization, you can embrace your leadership in promoting PBM. Many great leaders in PBM today are not even medically trained professionals. An example comes to mind on Guilherme Rabello, and Engineer from Brazil who became interested in PBM and soon put his engineering skillset to work to advance PBM in his local area. Today Guilherme is one of the most successful leaders in PBM implementation and his guidance is often sought in the Latin American countries.

Where to Start:

Want to lead but are unsure how to begin? Become more actively involved in SABM. Networking with like-minded individuals and mentorship will be of great assistance to keep you motivated and you will not feel so alone in your leadership. Is your healthcare organization a hospital affiliate of SABM? A first goal would be highlighting the benefits to

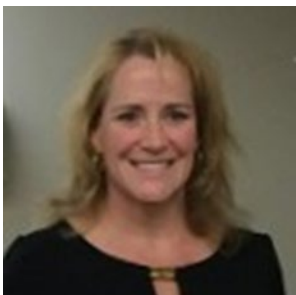
your organization in becoming a hospital affiliate member. Their association allows you to participate in leadership mentorship training in PBM. Once you are a member, reach out to info@sabm.org and express your interest to become more involved.

In the realm of PBM, leadership is not an option but a necessity. As we navigate the challenges of modern healthcare, leaders in PBM serve as beacons of inspiration, guiding the way towards better patient outcomes. By

embodying the essential characteristics of leadership, pursuing impactful goals, and recognizing that leadership is a shared responsibility, we can collectively shape a healthcare landscape that prioritizes patient well-being and continuous improvement. Inspiring leaders are emerging, and yet there is such a need for more in all areas and specialties. Come join us as we influence change in medical practice and improve patient care.

Contributor: Sarah Walbolt, RN

Embracing the Role of Patient Blood Management Nurse: Advocating for Quality Care and Patient Choice



In the complex web of healthcare and nursing, certain roles stand out as both emerging and unique. Among these is the Patient Blood Management (PBM) nurse. With almost ten years of experience in this field, I have come to

understand the profound impact and rewarding nature of this role, which extends beyond traditional nursing duties.

PBM nurses serve as guardians of best practices and advocates for optimal patient outcomes related to the patient's "Blood Health." Their primary focus revolves around ensuring that patients receive the highest quality of care while preventing unnecessary blood transfusions. This involves implementing evidence-based strategies to manage anemia, reduce bleeding, and optimize the patient's own blood health and resources.

My journey in PBM began as I searched for a role that would allow me to use both my clinical experience and my passion for quality and patient safety. The journey has been marked by a steep learning curve, filled with challenges and triumphs. From mastering the intricacies of transfusion guidelines to using the communication skills necessary for collaborating with multidisciplinary teams across the health system, every experience has contributed to my growth as a healthcare professional.

One of the most gratifying aspects of being a PBM nurse is witnessing the tangible impact of our interventions on patient well-being. I may not be at the bedside caring for a patient every day, but I am assisting those nurses and providers by implementing proactive measures to address anemia and optimize hemostasis. Through these measures, we can often spare patients from the risks associated with unnecessary transfusions. This not only improves clinical outcomes but also enhances patient satisfaction and reduces healthcare costs.

Moreover, as the field of PBM continues to gain recognition worldwide, the community of PBM professionals is expanding. This growth is fueled by a shift towards a more patient-centered approach to blood health, where the emphasis is placed on individualized care and shared decision-making, patient choice.

As advocates for bloodless medicine and patient choice, PBM nurses play a pivotal role in empowering patients to make informed decisions about their healthcare. By providing education, support, and alternatives to traditional blood transfusions, we enable patients to participate actively in their treatment plans and respect their preferences regarding blood products.



In essence, the PBM nurse's role embodies both my traditional nursing experiences and practice and the essentials of quality and patient safety. It requires a unique blend of clinical expertise, critical thinking, a thirst for learning, and commitment to compassionate care. Through my journey in PBM, I have discovered not only the challenges but also the unparalleled rewards of serving as a champion for patient-centered blood management. As we continue to advocate for quality care and patient choice, the impact of PBM nurses on the healthcare landscape will undoubtedly continue to grow, ensuring better outcomes for patients around the world. I am honored to be a part of that.

Contributor: Anne Burkey, RN

Should Patient Blood Management Nursing Be Recognized As a Specialty?



What it is and why it matters.

For the past two years, a dedicated team of nurses has been working to obtain formal recognition of Patient Blood Management (PBM) as a unique area of nursing practice. Work has entailed twice-weekly work-sessions, regular and ad-hoc meetings, Board presentations, and countless hours of additional time spent collecting information, consulting experts, and drafting the formal application.

Despite this work, it's fair to say that this project has been in development for numerous years prior, thanks to the efforts of nurses around the globe who have dedicated their careers to the development and implementation of PBM...formal recognition is due.

What IS a 'Nursing Specialty'?

To provide some context for non-nursing readers: the American Nurses Association (ANA) publishes a 'Nursing Scope & Standards of Practice' by which ALL practicing nurses in the US must adhere. Nurse associations around the world likewise establish standards that all nurses practicing in that country must meet.

These 'Standards of Practice' list expectations for nurses to meet in areas that include Leadership, Assessment, Planning, Outcomes Identification, Health Teaching & Promotion, Advocacy, and more.

Like other nursing associations around the world, the ANA also recognizes unique or 'specialty' areas of nursing practice. Each of these 'Nursing Specialty' areas are well-defined by a unique Scope and Standards of Practice specific to that care area.

Examples of formally recognized Nursing Specialty areas include Critical Care, Palliative Care, Oncology, Perioperative, Wound Care, and Informatics, to name only a few. There are nearly 30 Nursing Specialty areas of practice recognized globally.

Why pursue formal recognition of a 'PBM Nurse Specialty' practice area?

You would be hard-pressed to find healthcare personnel or members of the public who weren't familiar with 'Emergency' nursing—it's a well-defined area of nursing practice that is unlikely to get confused with Home Care or Primary Care nursing.

To date, the practice of 'PBM' nursing is not formally defined or recognized as a Nursing Specialty. Because of this, "PBM Nursing" is at risk of being defined as 'transfusion-focused',

'transfusion safety focused', and other. In fact, such an incorrect definition was found recently on the website of a leading healthcare organization. The organization was not previously associated with PBM but thankfully, they were receptive to feedback provided by SABM members and the featured description now aligns with accepted definitions of PBM.

Goals of the PBM Nursing Specialty project:

- To establish a "PBM Nursing Scope & Standards of Practice" that clearly defines the unique practice setting of PBM and the activities of nurses practicing in this area, each aligning with the *global definition of PBM*.
- To achieve formal recognition of PBM as a unique Nursing Specialty area of practice.



What is the process to recognizing a 'Nursing Specialty'?

The SABM workgroup has been pursuing the application process as governed by the American Nurses Association.

Invitation to apply: (January 2022) To be considered eligible to apply, the group had to lay the groundwork in establishing the existence and validity of the PBM Nurse Specialty. The ANA accepted the submission and permission was granted to apply; all application materials were provided to the workgroup.

Approval and endorsement by SABM Board: (February 2022) SABM Board provided approval to proceed with the project and be listed as sponsoring organization.

Development of application: (to February 2024) Development of application addressing all requirements including detailed description of the practice area, development of practice standards, opportunity for a 30-day public comment period that will be shared widely beyond SABM membership with help from the ANA, our global PBM partner organizations, social media, and other means until March 1, 2024.

Submission to ANA Board of Directors: (2024)—review and decision; notification of result.

Is formal recognition of the PBM Nursing Specialty really worth all this work?

Achieving formal recognition of PBM as a Nursing Specialty is an important first step in improving quality of practice in PBM nursing and raising awareness about the field. With formal recognition established, next steps can include further enhancement or certification within the practice, by way of education standards, qualifying exams, minimum hours of practice, and more.

SABM's initial endorsement of this project has enabled its positioning as the leading organization by which practicing nurses (and others) will look to for PBM information, education, and more. All SABM members are invited to learn more about this initiative and help support on-going development of practice in PBM.

Thank you to all the team members who tirelessly worked on this project:

Rebecca Rock, RN, *Contributor*

Joshua Ozawa-Morriello, BSN, RN

MaryAnn Sromoski, MSN, RN, CCRN, CNE

Kelly Martin, BA, BSN, RN

Sarah Walbolt, BSN, RN

Christine M. Cahill, MS, BSN, RN

Heather E. Mingo, PhD, MSN, BSN, RN

Elora Thorpe, MSN, RN, NE-BC

Deborah Tolich, DNP, MSN, RN

Hypofibrinogenemia in Bleeding Cardiac Surgery: A Problem in Disguise

Excessive post-operative hemorrhage in cardiac surgery is known to result in substantial increases in post operative complications such as need for re-exploration, prolonged ICU stay, ventilation for >24 hours, need for any kind of blood products and associated risks, and increased mortality.¹ Several professional societies have published protocols for assessing coagulopathy and optimizing blood component replacement aiming to stop bleeding as quickly as possible. A 1:1:1 transfusion ratio of red cells to platelets to plasma shows a benefit for massive hemorrhage treatment in cardiovascular surgery.² A targeted (goal directed) transfusion algorithm promotes individual component therapy with concentrated clotting factors instead of a fixed ratio transfusion in cardiac surgery. Fibrinogen, the precursor for fibrin, a key protein in clot formation, is the first clotting factor to reach critically low levels during hemorrhage.³ Pre-operative fibrinogen levels in cardiac surgery are independently associated with post-operative blood loss and re-exploration.⁴ Similarly, post-operative fibrinogen levels below 200 mg/dL are an independent risk factor for severe hemorrhage.⁵

Early identification and prompt treatment of hypofibrinogenemia by viscoelastic testing or laboratory testing is associated with reduced blood component utilization and improved mortality rates in cardiovascular surgery.^{6,7} The common treatments for acquired hypofibrinogenemia are Cryoprecipitated AHF and fibrinogen concentrate. Cryoprecipitated AHF⁸ replenishes fibrinogen as well as von Willebrand factor (vWF), factor VIII and factor XIII, whereas fibrinogen concentrate contains only fibrinogen.^{9,10} Risk of infection transmission delaying treatment due to thawing time and high wastage due to its short shelf-life (4-6 hours) are limitations of Cryoprecipitated

AHF. The high cost and lack of other clotting factors are the drawbacks of fibrinogen concentrate. Factor XIII promotes the cross-linkage of fibrin monomer into fibrin polymer and strengthens the blood clot. The result of FIBRES trial showed the efficacy of fibrinogen concentrate was non-inferior to Cryoprecipitated AHF in bleeding cardiac surgical patients with hypofibrinogenemia.¹¹ However, the REPLACE trial showed fibrinogen concentrate administration in bleeding cardiac surgical patients was associated with increased allogenic blood transfusion.¹² Recently, pathogen reduced Cryoprecipitated fibrinogen complex (Cerus®, Concord, CA) has been introduced as an alternative treatment option for hypofibrinogenemia. It can be stored in thawed-form, ready-to-transfuse, for up to 5 days and in addition to fibrinogen, contains other clotting factors such as vWF and factor XIII.¹³

Early detection and prompt treatment of acquired hypofibrinogenemia in bleeding cardiac surgical patients with a concentrated source of fibrinogen may reduce adverse outcomes associated with hemorrhage.

Contributor: Worasak Keeyapaj, MD

REFERENCES

1. Christensen MC, Krapf S, Kempel A, von Heymann C. Costs of excessive postoperative hemorrhage in cardiac surgery. *The Journal of Thoracic and Cardiovascular Surgery* 2009;138(3):687-693. DOI: <https://doi.org/10.1016/j.jtcvs.2009.02.021>.
2. Delaney M, Stark PC, Suh M, et al. Massive Transfusion in Cardiac Surgery: The Impact of Blood Component Ratios on Clinical Outcomes and Survival. *Anesthesia and analgesia* 2017;124(6):1777-1782. (In eng). DOI: 10.1213/ane.0000000000001926.

3. Hagemo JS, Stanworth S, Juffermans NP, et al. Prevalence, predictors and outcome of hypofibrinogenaemia in trauma: a multicentre observational study. *Critical care* 2014;18(2):R52. (journal article). DOI: 10.1186/cc13798.
4. Waldén K, Jeppsson A, Nasic S, Backlund E, Karlsson M. Low Preoperative Fibrinogen Plasma Concentration Is Associated With Excessive Bleeding After Cardiac Operations. *The Annals of Thoracic Surgery* 2014;97(4):1199-1206. DOI: 10.1016/j.athoracsur.2013.11.064.
5. Ranucci M, Pistuddi V, Baryshnikova E, Colella D, Bianchi P. Fibrinogen Levels After Cardiac Surgical Procedures: Association With Postoperative Bleeding, Trigger Values, and Target Values. *The Annals of Thoracic Surgery* 2016;102(1):78-85. DOI: 10.1016/j.athoracsur.2016.01.005.
6. Pearse BL, Smith I, Faulke D, et al. Protocol guided bleeding management improves cardiac surgery patient outcomes. *Vox Sang* 2015;109(3):267-79. (Research Support, Non-U.S. Gov't) (In eng). DOI: 10.1111/vox.12279.
7. Hinton JV, Xing Z, Fletcher CM, et al. Association of perioperative cryoprecipitate transfusion and mortality after cardiac surgery. *The Annals of Thoracic Surgery* 2023. DOI: 10.1016/j.athoracsur.2023.02.054.
8. AABB. Circular of Information for the Use of Human Blood and Blood Components. Bethesda, MD: AABB; 2021.
9. FIBRYGA®, Fibrinogen (Human) Lyophilized Powder for Reconstitution [package insert]. Paramus, NJ: Octapharma USA, Inc; December, 2020.
10. RIASTAP, Fibrinogen Concentrate (Human) Lyophilized Powder for Solution for Intravenous Injection. Kankakee, IL: CSL Behring LLC; July, 2021.
11. Callum J, Farkouh ME, Scales DC, et al. Effect of Fibrinogen Concentrate vs Cryoprecipitate on Blood Component Transfusion After Cardiac Surgery: The FIBRES Randomized Clinical Trial. *JAMA* 2019;1-11. (In eng). DOI: 10.1001/jama.2019.17312.
12. Rahe-Meyer N, Levy JH, Mazer CD, et al. Randomized evaluation of fibrinogen vs placebo in complex cardiovascular surgery (REPLACE): a double-blind phase III study of haemostatic therapy. *British journal of anaesthesia* 2016;117(1):41-51. (In eng). DOI: 10.1093/bja/aew169.
13. INTERCEPT Blood System for Cryoprecipitation [Package Insert]; For the manufacturing of Pathogen Reduced Cryoprecipitated Fibrinogen Complex. Concord, CA: Cerus Corporation; January 20, 2021.

Spotlight on PBM Laboratory Testing: Mean Corpuscular Volume (MCV)

What does the test measure?

- The Mean Corpuscular Volume (MCV) measures the volume of individual red blood cells in a patient sample. The unit of measurement is expressed in femtoliters (fL), which is 10⁻¹⁵ L. While the reference (“normal”) range for MCV is usually between 80 to 100 femtoliters (fL), population specific reference ranges may vary slightly by geographic region, according to the local normal population (typically 40 health volunteers) used to calculate the reference range.
- The development of automated hematology analyzers in the mid 20th century contributed to the development and widespread use of complete (or full) blood count (CBC or FBC) parameters, which includes the MCV. Today, the test is used to help diagnose various types of anemia and other blood disorders.

What patient and clinical features are associated with test usage?

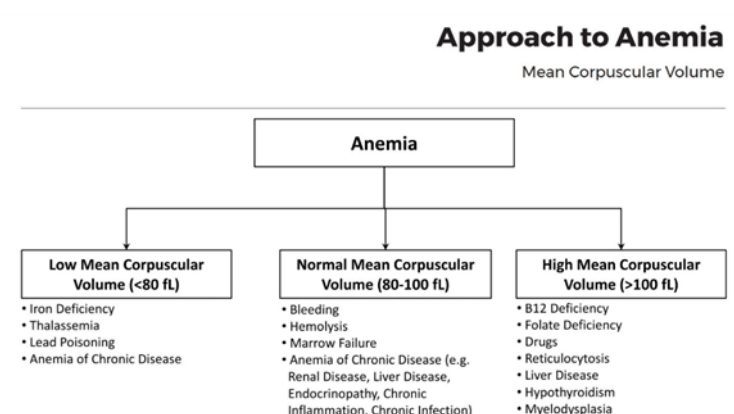
Since this test is used to triage anemia and/or micronutrient deficiencies, patients may present with non-specific symptoms related to anemia. These include but are not limited to fatigue, pallor, difficulty with exertion, and nonspecific neurocognitive symptoms. Patients with underlying bone marrow disorders may also experience bleeding tendencies with platelet dysfunction.

How should this test be interpreted?

Numerous references in the literature are available regarding microcytic, normocytic, and macrocytic anemia (low, normal,

and high MCVs, respectively). Commonly encountered (but not limited to) diagnoses:

- Microcytic pattern – Iron deficiency, lead poisoning, thalassemia
- Macrocytic pattern – Vitamin B12 deficiency, folate deficiency, myelodysplasia, medications
- Normocytic pattern – chronic kidney or liver disease, inflammatory conditions, recent RBC transfusions or blood loss, bone marrow failure



Hematologic

42

<https://blackbook.ucalgary.ca/schemes/hematologic/approach-to-anemia-mean-corpuscular-volume/>

Relevance of this test in relation to PBM:

- Since this parameter is already included in a CBC/FBC result, the MCV aids the clinician, in conjunction with patient clinical symptoms, to the next steps in the workup of anemia or micronutrient deficiency.

- Commonly ordered subsequent tests ordered include the iron panel, vitamin B12/folate levels, peripheral smear examination, and/or evaluation for bone marrow disorders
- Review of laboratory MCV trends over a time interval during routine follow up may point to the possibility of a micronutrient deficiency, most notably iron deficiency.

How should the test be interpreted with caution?

- Clinical signs and symptoms of iron deficiency may occur before red blood cell indices become abnormal (reflection of decreased iron utilization in hemoglobin production). Therefore, normal or near-normal CBC/FBC parameters do not exclude early manifestations of iron deficiency.
- Do not jump conclusions on one “normal” result! One “normal” MCV value represents only a “snapshot” of the patient. The patient may be truly normal, or on the verge of developing iron or vitamin B12/folate deficiency. Therefore, reviewing laboratory trends is equally important as single laboratory values alone.

- A concurrent vitamin B12/folate deficiency with iron deficiency may present with MCV in the “normal” ranges.
- When evaluating iron deficiency anemia in the inpatient setting, keep in mind that patients who received several units of RBC transfusions may have a “normalized” MCV. In such instances, review the first CBC/FBC prior to RBC transfusions. If these are not available, move forward to the iron panel or reticulocyte hemoglobin testing.
- The MCV provides average red blood cell volumes. Significant variations of red blood cell size (anisocytosis) will not be reflected in the MCV. Hemolysis with compensated reticulocytosis or recent RBC transfusions in a patient with microcytic anemia may produce this pattern. The red cell distribution width (RDW) or examination of the peripheral smear may provide additional diagnostic insight.

Contributor: Jesse Qiao, MD

REFERENCES

<https://www.ncbi.nlm.nih.gov/books/NBK545275/>

Recent Scientific Articles (adopted from NATA Scientific Newsletter)

Clinical Outcomes, Blood Utilization, and Ethical Considerations For Pediatric Patients In a Bloodless Medicine And Surgery Program

Lo BD, et al. Anesth Analg 2024; 138:465-474.

Population: Pediatric inpatients (<18 years of age) who requested bloodless care.

Intervention: Bloodless care, where all available measures were undertaken to avoid blood transfusions, although transfusions were administered if the child's life was threatened as per legal obligation.

Comparison: Pediatric patients receiving standard care, including transfusions if deemed necessary by the clinical team.

Outcome: The primary outcome was composite morbidity or mortality. Secondary outcomes included the percentage of patients transfused, individual morbid events, length of stay, total hospital charges, and total costs.

Summary: A retrospective cohort study assessed 196 pediatric inpatients requesting bloodless care between June 2012 and June 2016. The study found that 6.1% of pediatric patients receiving bloodless care received an allogeneic blood component, compared to 9.1% in the standard care group (P = .14). Pediatric patients receiving bloodless care exhibited lower rates of composite morbidity compared to standard care (2.6% vs 6.2%; P = .035), with no deaths in the bloodless cohort. Individual morbid events, length of stay, and total hospital charges/costs did not significantly differ between the two groups. Multivariable analysis showed that bloodless care was not significantly associated with composite morbidity or mortality (odds ratio [OR], 0.37; 95% confidence interval [CI], 0.12-1.11; P = .077).

Conclusion: Pediatric patients receiving bloodless care showed similar clinical outcomes compared to those receiving standard care. However, larger studies with adequate power are needed to confirm these findings. Notably, no mortalities were observed among the pediatric bloodless cohort, and blood transfusions were safely limited when delivered in a collaborative and patient-centered manner.

Cost-effectiveness Analysis of Parenteral Iron Therapy Compared To Oral Iron Supplements In Managing Iron Deficiency Anemia Among Pregnant Women

Saha S, et al. Health Econ.

Population: Pregnant women in their 14 to 18 weeks with moderate and severe iron-deficiency anemia (IDA) enrolled from two districts of Gujarat, India.

Intervention: Intravenous iron sucrose (IVIS) therapy.

Comparison: Standard regimen of oral iron (OI) therapy.

Outcome: The primary outcome was the change in mean hemoglobin (Hb) level from baseline, with the incidence of morbidity and mortality as secondary outcome measures.

Summary: A prospective cost-effectiveness study compared IVIS therapy to OI therapy for managing IDA among pregnant women in Gujarat. A total of 188 pregnant women were enrolled, with 82 receiving IVIS and 106 receiving OI therapy. The mean change in Hb level from baseline was significantly higher in the IVIS group compared to the OI group. IVIS therapy showed a significant increase in mean Hb level from 8.2 g/dl to 11.45 g/dl, while the OI group's mean Hb level decreased from 9.99 g/dl to 9.55 g/dl. The cost per beneficiary for IVIS was higher than OI, with an incremental cost-effectiveness ratio (ICER) of US\$ 9.84, which is 0.049% of India's per capita GDP. The study concluded that IVIS therapy was more clinically effective and cost-effective than OI therapy for managing moderate and severe anemia in pregnant women.

Orthopedic Trauma and Anemia: Conservative Versus Liberal Transfusion Strategy: a Prospective Randomized Study

Mullis BH, et al. J Orthop Trauma 2024; 38:18-24.

Population: Trauma patients aged 18-50 with musculoskeletal injuries and hemoglobin (Hgb) less than 9 g/dL or expected to drop below 9 g/dL with planned surgery, who were stable and no longer being actively resuscitated

Intervention: Conservative packed red blood cell transfusion threshold of 5.5 g/dL for asymptomatic musculoskeletal injured trauma patients.

Comparison: Liberal transfusion threshold of 7.0 g/dL for asymptomatic musculoskeletal injured trauma patients.

Outcome: Postoperative infection, other post-operative complications, and Musculoskeletal Functional Assessment scores obtained at baseline, 6 months, and 1 year were

compared for both liberal and conservative transfusion thresholds.

Summary: A prospective, randomized, multicenter trial conducted in three level 1 trauma centers compared a conservative transfusion threshold (5.5 g/dL) with a liberal threshold (7.0 g/dL) for trauma patients with musculoskeletal injuries. Sixty-five patients completed 1 year of follow-up. The study found a significant association between the liberal transfusion strategy and a higher rate of infection ($P = 0.01$), with no difference in functional outcomes at 6 months or 1 year. The study was adequately powered to detect a difference in superficial infection but underpowered to detect a difference in deep infection. The conclusion was that a conservative transfusion threshold of 5.5 g/dL in asymptomatic young trauma patients with associated musculoskeletal injuries leads to a lower infection rate without increasing adverse outcomes and with no difference in functional outcomes at 6 months or 1 year.

Restrictive or Liberal Transfusion Strategy In Myocardial Infarction and Anemia

Carson JL, et al. N Engl J Med 2023; Nov 11 [Online ahead of print].

Population: Patients with acute myocardial infarction and a hemoglobin level of less than 10 g per deciliter.

Intervention: Liberal transfusion strategy with a hemoglobin cutoff of <10 g per deciliter.

Comparison: Restrictive transfusion strategy with hemoglobin cutoffs of 7 or 8 g per deciliter.

Outcome: The primary outcome was a composite of myocardial infarction or death at 30 days.

Summary: In a phase 3 interventional trial, 3504 patients with acute myocardial infarction and anemia were randomly assigned to either a restrictive or liberal transfusion strategy. The mean number of red-cell units transfused was significantly lower in the restrictive-strategy group compared to the liberal-strategy group. However, the mean hemoglobin level was lower in the restrictive group during days 1 to 3 after randomization. The primary outcome of myocardial infarction or death at 30 days occurred in 16.9% of patients in the restrictive group and 14.5% in the liberal group, with no significant difference between the groups. Both death and myocardial infarction rates were slightly higher in the restrictive group, although not statistically significant. The study concluded that a liberal transfusion strategy did not significantly reduce the risk of recurrent myocardial infarction or death at 30 days in patients with acute myocardial infarction and anemia. However, potential harms of a restrictive transfusion strategy could not be excluded.