HealthCatalyst®
ignite outcomes improvement

$17.4M Saved Through Analytics-Driven Patient Blood Management Improvements

UnityPoint Health

HEALTHCARE ORGANIZATION

Integrated Delivery System

PRODUCTS

- Health Catalyst® Data Operating System (DOS™) platform
- Blood Utilization Analytics Accelerator

SERVICES

- Professional Services

EXECUTIVE SUMMARY

UnityPoint Health recognized that more than 10 percent of its inpatients received red blood cell (RBC) transfusions annually, at the expense of more than $12 million each year. The organization created a task force to develop and implement a plan for maximizing blood management, plus establishing best practices.

To support this initiative, the task force incorporated decision support to improve transfusion ordering in alignment with the transfusion standards. An analytics platform has also been leveraged, which monitors the utilization of blood products, including predictive modeling to risk-adjust blood utilization specific to patient case-mix, and data down to the ordering provider level. Results include:

- $17.4M reduction in direct costs over six years, the result of decreasing unnecessary RBC transfusion.

- 58,089 fewer units of RBC transfused over six years.

- 15,601 patients avoided exposure to red blood cells by transfusion.

RED BLOOD CELL TRANSFUSION IN THE U.S.

Across the country, 14 million units of RBCs are transfused annually. An average of three units are used per transfusion, at the cost of $300 per unit.[1,2] RBC transfusion can be life-saving, although sometimes it can also cause harm. This treatment is strongly associated with prolonged hospital stays as well as increased costs, morbidity, and early and late mortality.[3]

UnityPoint Health is committed to providing outstanding care across Iowa, western Illinois, and southern Wisconsin. Its network includes hospitals, clinics, and home care services, with over 6.2 million annual patient visits, providing a full range of care to patients and families using innovative advancements to deliver the best outcome for every patient, every time.

> "The success of the UnityPoint Health blood management program reflects our commitment to continually improving patient safety while ensuring the best outcome for every patient."
>
> Michael Kafka, MD, FACP
> Medical Director, Quality and Patient Safety
> UnityPoint Health

RBC TRANSFUSION IMPROVEMENTS HINDERED BY DATA SHORTAGE

UnityPoint Health recognized that more than 10 percent of its inpatients received transfusions annually, costing the organization more than $12 million each year. One critical initiative identified to improve the quality of care and safety of RBC transfusion, and reduce cost, was blood management. These improvement efforts were hindered, however, by a lack of specific, actionable data, to generate insight into blood management improvement opportunities.

The organization needed a comprehensive, data-driven approach to improve the effectiveness of blood management. It also worked toward decreasing unwarranted variation to improve patient safety, conserve a valuable, limited resource, and drive down costs.

ANALYTICS DRIVE BLOOD MANAGEMENT PROCESS IMPROVEMENTS

To improve blood management, UnityPoint Health created a task force, directing the team to develop and implement a plan to maximize blood management. The task force was instructed to establish a culture promoting best blood management practices and non-punitive process improvement.

UnityPoint Health focused its improvement efforts on engaging providers in transitioning to the American Association of Blood Bank (AABB) transfusion standards, and implementing decision support to improve transfusion ordering in alignment with the transfusion standards. The organization implemented:

- A restrictive transfusion strategy for inpatients by hemoglobin (Hgb) level.

- Promoted processes to ensure a preoperative anemia assessment and treatment before elective surgery.

- Procedures for improved surgical hemostasis, intraoperative bleeding management, and perioperative blood salvage – recovering the patient's own blood, which is then filtered, washed, and returned to the patient.

> "Two key factors integral to the program's success are 1) real-time decision support as providers enter orders for a red blood cell transfusion into the EHR, and 2) the availability of robust predictive analytics tools that allow risk-adjusted, peer comparison for each of a provider's RBC transfusion orders.
>
> Michael Kafka, MD, FACP
> Medical Director, Quality
> and Patient Safety
> UnityPoint Health

❯ RBC ordering decision support – when a provider enters an order for RBC transfusion, which requires one order for each unit of RBC and the assessment of Hgb between transfused units, the decision support tool checks for the most recent Hgb within the last 24 hours.

- › The provider is informed if there is no Hgb, then prompted to order and review the Hgb before ordering a transfusion.

- › If Hgb is less than 7g/dL, there is no alert.

- › If the Hgb is greater than 7-8g/dL, the alert encourages the provider to reconsider transfusion, indicating transfusion is not recommended in hemodynamically stable patients.

- › If the Hgb is 8.1-9g/dL, the alert outlines the circumstances where transfusion is appropriate.

- › The alert can be bypassed if an emergent/massive transfusion is required.

UnityPoint Health provided its interdisciplinary team education, increasing awareness of the risks of blood transfusions, the changes in related guidelines compared to what many were taught during medical or nursing school, and the improved patient outcomes associated with the AABB guidelines. The organization also leverages the Health Catalyst® Data Operating System (DOS™) and a robust suite of analytics applications for its data and analytics needs, and uses the Blood Utilization Analytics Accelerator to monitor the utilization of blood products, including data down to the ordering provider level (see Figure 1).

1 Tabs to select data of interest, including summary level data, blood product utilization by month, attending physical level data, and physician-specific data.

2 Regional utilization data, including number of cases, case mix index (CMI), total blood products used, overall inpatient (IP) cases transfused (Txd), units transfused, and units per case.

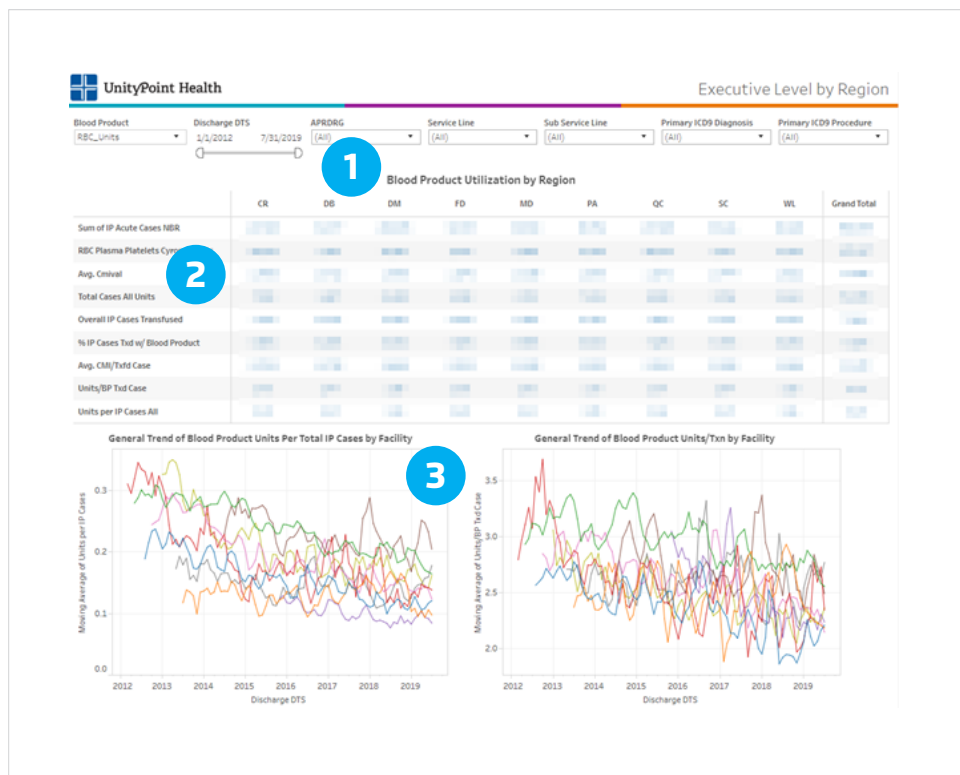**3** Trend of units per total IP cases and units by facility.

Figure 1: Blood Utilization Analytics Accelerator sample visualization

The analytics accelerator is designed to monitor the effectiveness of UnityPoint Health's blood management initiatives, and uses both historical descriptive statistics, and predictive modeling to risk-adjust blood utilization specific to patient case-mix.

The risk-adjustment model includes consideration of:

- First and lowest Hgbs on record.
- Hgb at the time of transfusion order.
- Diagnosis-related group for the patient's illness.
- Severity of patient's illness.
- Patient age.
- Patient gender.

Using the risk-adjusted data in the analytics accelerator, UnityPoint Health is able to visualize utilization of RBCs, and is able to attribute variation in RBC transfusion to patient factors that necessitate higher utilization, or to variation in provider practice. The organization is then able to control for deviation in patient factors and isolate variation in provider practice to identify potential over-utilization of RBCs. Transfusion scenarios that may

not have been appropriate can easily be identified and visualized. It can visualize patients who were transfused at Hgb levels far above the current guidelines, and also identify patients who were transfused at minimum Hgb closer to guidelines, but with a last Hgb that was much higher than transfusion thresholds (see Figure 2).
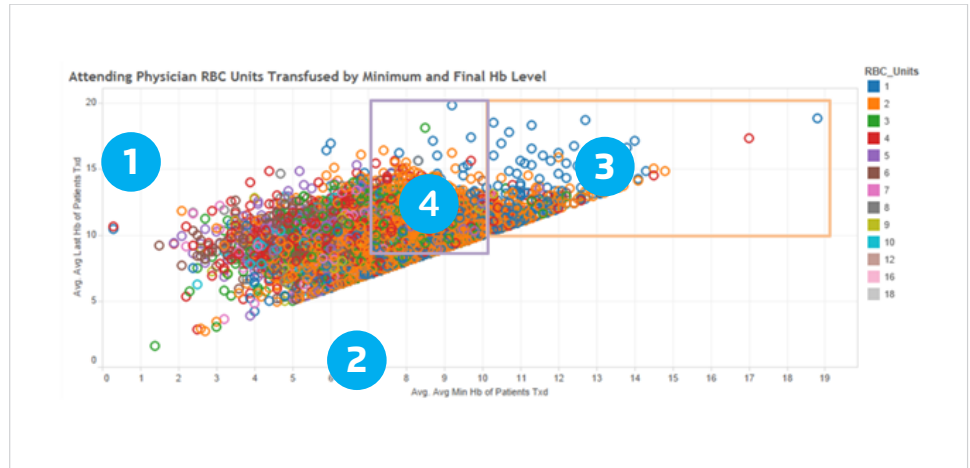
Figure 2: Attending physician RBC units transfused by minimum and final Hgb level sample visualization

UnityPoint Health leaders can use the analytics accelerator to review individual patient cases that were transfused with RBCs without logging into the EMR. The data can be filtered by ordering provider, so all patients that contributed to a particular actual/expected ratio can be viewed in one location.

The analytics accelerator data are updated monthly and available for hospital transfusion reviewers and providers giving them the ability to compare their transfusion performance with their peers. Leaders engage with providers to understand cases of overuse, identifying if the use was appropriate, and if not, working with the provider to change practices and adhere to the transfusion guidelines and most recent best practices, safeguarding the best possible patient outcome.

RESULTS

UnityPoint Health's data-driven patient blood management improvements have helped improve patient safety by decreasing unnecessary RBC transfusion, ensuring patients receive care aligned with the most recent evidence. These efforts have also positively impacted financial performance across the system, including:

- ❯ $17.4M reduction in direct costs over six years, a result of decreasing unnecessary RBC transfusion.

- ❯ 58,089 fewer units of RBC transfused over six years.

- ❯ 15,601 patients avoided exposure to red blood cells by transfusion.

WHAT'S NEXT

UnityPoint Health plans to expand its use of predictive analytics to continue improving the care it provides patients. ◊

REFERENCES

1. Society for the Advancement of Blood Management. (2018). *Transfusion overuse - Exposing an international problem and patient safety issue.* Retrieved from https://www.sabm.org/wp-content/uploads/2018/08/Transfusion-Overuse.pdf

2. American Red Cross. (2019). *Blood needs & blood supply.* Retrieved from https://www.redcrossblood.org/donate-blood/how-to-donate/how-blood-donations-help/blood-needs-blood-supply.html

3. Murphy, G. J., Reeves, B. C., Rogers, C. A., Rizva, S. I. A., Culliford, L., & Angelini, G. D. (2007). Increased mortality, postoperative morbidity, and cost after red blood cell transfusion in patients having cardiac surgery. *Circulation, 116*(22), 2544–2552. Retrieved from https://www.ahajournals.org/doi/10.1161/CIRCULATIONAHA.107.698977

> "
> I am proud to have had the opportunity to work with such dedicated and talented colleagues across UnityPoint Health on this Blood Management initiative. It is truly rewarding to know that we are now providing better patient care, in a more cost-effective way.
>
> Carol Collingsworth
> Laboratory Services Director,
> System Services
> UnityPoint Health

ABOUT HEALTH CATALYST

Health Catalyst is a leading provider of data and analytics technology and services to healthcare organizations, committed to being the catalyst for massive, measurable, data-informed healthcare improvement. Our customers leverage our cloud-based data platform—powered by data from more than 100 million patient records, and encompassing trillions of facts—as well as our analytics software and professional services expertise to make data-informed decisions and realize measurable clinical, financial, and operational improvements. We envision a future in which all healthcare decisions are data informed. Learn more at www.healthcatalyst.com.

Visit www.healthcatalyst.com, and follow us on Twitter, LinkedIn, and Facebook.