Blood Conservation: The CEO Perspective

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THE PENNSYLVANIA HOSPITAL is part of the University of Pennsylvania Health System that includes the School of Medicine, Hospital of the University of Pennsylvania, and a number of hospital and network affiliates, including Pennsylvania Hospital. The Health System has more than 12,600 employees and a total operating revenue exceeding $1.6 billion. The Pennsylvania Hospital is a 515-bed facility that performs more than 18,000 surgical cases per year, evenly divided between outpatient and inpatient surgeries. Blood and blood product expenditures for Pennsylvania Hospital exceed $2.5 million per year. As expected, red blood cells comprise the significant majority of all costs associated with the blood bank expenditures (Table 1). Importantly, the costs shown are hospital acquisition costs and do not include other costs associated with administration of blood products within the institution (ie, in-hospital administrative costs, typing, cross-matching).

The role of the chief executive officer (CEO) includes managing budgetary expenditures and costs but also balancing issues related to patient safety and outcomes within the institution. Thus, the CEO is accountable to the staff, patients, and the public at large. Headlines regarding the US blood supply have appeared in various forms of media with increasing frequency over the last several years: "safety not assured," "supplies going down," "prices going up," and "fears run high." The current review will address these issues from the perspective of the hospital CEO.

KEY ISSUES RELATED TO BLOOD SUPPLY AND DEMAND

Without a doubt, the US blood supply is the safest in the world. Nevertheless, issues related to the blood supply impact patients and hospitals in a negative way. As advances to improve the safety of the blood supply are implemented, costs associated with improvements in safety directly impact the hospital bottom line. For each incremental improvement in technology to maximize patient safety with respect to transfusion, direct costs of the deliverable product have risen commensurately. Nucleic acid testing for West Nile virus has added approximately $10 per unit of blood, whereas pathogen inactivation adds $150 to $200 per unit (Fig 1). In addition to the expenditures associated with the acquisition costs of blood and blood products, in-house costs (eg, blood bank administrative costs, type, and cross-match) must also be taken into account to determine the true cost of these products to the recipient. When summing the in-house costs, the overall expenditure by a hospital to administer a unit of blood to a patient may be upwards of 3 times more than the base acquisition cost. By using the numbers associated with the Pennsylvania Hospital, the $2.5 million expenditure per year for blood and blood products may actually exceed $5 to 7 million per year in actual cost to the hospital in providing this intervention to the patient. This large dollar amount is certain to capture the attention of the hospital CEO and warrants closer examination.

Another key issue of concern to the hospital CEO is the availability of blood and blood products. Because supplies of blood may be down throughout the country, subsequent regional, then local, shortages may lead to cancellation of surgeries. Cancellation of surgery results in both patient and surgeon dissatisfaction in addition to increased hospital costs because the patient may spend an extra day(s) in the hospital awaiting adequate shipments of blood and blood products for the procedure. Furthermore, with an appreciation of the current blood supply, one must question overall readiness for the next big disaster. From the author's perspective, the answer is "no, we are certainly not ready in the city of Philadelphia." In fact, the American Red Cross stopped blood delivery to hospitals in the area for a 3- to 4-day period last summer, which resulted in very low and dangerous levels of blood and blood products. As such, mechanisms to eliminate the effect of the tenuous blood supply on the activity of an individual institution must be considered. Furthermore, improved management of blood and blood products by hospitals in general may help to alleviate supply issues nationally.

Patient safety with respect to transfusions and their related risks can be significant. Administrative errors, most of which occur outside the hospital blood bank, include patient identification errors (37%), testing errors (18%), phlebotomy errors (13%), wrong unit issued (10%), wrong unit tagged (10%), incorrect order (5%), clerical error (2%), and miscellaneous error (8%). Errors such as these, particularly the significant incidence of patient identification errors, continue to occur and often lead to patient morbidity and mortality. A CEO is concerned not only for the welfare of the patient but also liability, malpractice filings, and claims paid within an institution. Litigation and payout may severely impact the standing of the hospital within the community, including public relations concerns. If the public loses confidence in the ability and safety record of the hospital, patients may choose other institutions for their health care.

SELLING A PROGRAM TO THE CEO

When approaching a CEO to establish a blood management, blood conservation, or bloodless medicine program, specific information is critical (Table 2). For instance, a widely accepted technique for limiting blood utilization in certain surgeries is the institutional adoption of cell salvage. To implement institutionalization of this practice, clear advantages were conveyed to the CEO, such as using the patient's own blood, minimizing the cost of blood acquisition and testing, and minimizing the errors outlined previously. Even saving 2 to 2.5 units of blood or blood product per case may be very significant. The disadvantages were also discussed, such as capital equipment outlay. A "break-even" point was determined; that is, the number of cases that must be performed to cover the costs of the product, change in practice, or improved technology. An assessment of the number of cases fully burdened...
Table 1. Breakdown of Blood, Blood Product and Testing Expenditures at Pennsylvania Hospital

<table>
<thead>
<tr>
<th>Blood Product</th>
<th>Expenditures (% total)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red blood cells</td>
<td>63</td>
</tr>
<tr>
<td>Platelets</td>
<td>18</td>
</tr>
<tr>
<td>Plasma</td>
<td>8</td>
</tr>
<tr>
<td>Miscellaneous (tests)</td>
<td>8</td>
</tr>
<tr>
<td>Whole blood</td>
<td>2</td>
</tr>
<tr>
<td>Cryoprecipitate</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

*Total cost exceeds $2.5 million only.

(Using blood transfusion) versus the number of cases fully allocated (no transfusion, cell saver use) was performed for justification of the practice. Furthermore, within a multiple modality approach to bloodless medicine, net savings for the program per 1,000 patients may exceed $400,000 per year. The gravity of these savings should capture the attention of the hospital administrator.

One of the most important decisions that a CEO will weigh is whether acceptance of a new approach, program, or technology is worth the change. The business plan is very important in these deliberations. CEOs are confronted with the “next best thing” on a regular basis, including concepts such as bloodless medicine or technically oriented procedures such as laser and laparoscopic surgery. The CEO, with input from hospital staff and knowledge of limited hospital resources, must determine how to fund these new endeavors while balancing politics of the hospital and the potential impact on patients. The following factors must be weighed: What is the best for the patients? What is the proper case mix and volume for the institution? How readily can the medical and ancillary support staff adopt new thought processes, procedures or skills? Can patient outcomes be monitored to prove cost justification? and What approach will achieve the best return on investment? Programs may be adopted and run for months to years; however, if the cost and outcome justifications are not realized, then the programs will likely lose funding.

CHALLENGES

One of the key challenges when working toward establishing a blood management program is medical staff acceptance. Pennsylvania Hospital was fortunate in having a champion in Pat Ford, MD. She, along with her coordinator and staff, made inroads into cardiac surgery, urology, and areas of general surgery. Having a champion gain the respect and resultant acceptance by the medical staff is absolutely critical to bringing these programs forward.

Throughout the hospital, budgetary issues confront individual departments. The challenge for the CEO is to determine which budgets will be responsible for which allocations to patients. Whether expenditures are incurred by anesthesiology, laboratory medicine, or pharmacy services, the CEO is able to evaluate overall expenditures and can rationalize overruns in certain departments, if overall savings are achieved for the institution. With this in perspective, establishment of a blood management program must be collaborative, and, importantly, incentives should be structured such that individual departments are not driven to a certain budgetary number at the expense of negating or preventing savings in other departments.

Finally, skepticism and professional reluctance in changing established processes and procedures must be overcome. As such, development of other “supporting champions” to include nursing, pharmacy services, and house staff is very important. Nurses are involved at the patient bedside and can influence the success of the program. Residents are often involved in getting informed consent from patients and answering their questions.

![Graph showing rising costs of blood](image-url)
Table 2. Reasons for Establishing a Blood Conservation Program

- Growing public concern of blood safety
- Blood shortages
- Improved technology, devices, and pharmacologic agents
- Need to reduce health care costs
- Need to increase hospital revenues
- Improved physician skills and available techniques
- Improved patient care
- Expanded hospital services to the community
- Need to reduce length of hospital stay
- Commitment to provide the best possible medical care
- Desire to stay on the cutting edge

regarding blood conservation or bloodless medicine programs; they also order blood and blood products. Pharmacy may be asked to shoulder the cost of certain drug products that can offset the costs of blood and blood products. For instance, agents such as the serine protease inhibitor aprotinin fall under the pharmacy budget, yet can reduce blood bank expenditures.

THE BEST APPROACH

The best approach is an internal one. A champion from within the institution is needed, usually an influential physician who can spearhead the program. By using the blood conservation or bloodless medicine program approach, the champion should work with key health care practitioners and departments including surgery, anesthesiology, house staff, nursing, pharmacy services, and laboratory medicine. In addition, or as an alternative approach, outside expertise may be sought. The culture of the hospital and/or timing of program development may dictate how this external support is brought forward, depending on the particular environment within the institution. One may consider having a speaker address the key groups, a program director share their experience, or an outside consultant guide the process. The consultant, for instance, can ask the tough questions and work through difficult issues without getting involved in the day-to-day interactions of the staff to minimize undesirable working interactions.

The program must be evaluated as it is developing. Preliminary results should be recorded. For instance, preliminary data at Pennsylvania Hospital indicate that the Bloodless Medicine Program has led to a 10% reduction in blood costs and a 13% reduction in length of stay. These are preliminary results, and they will be scrutinized as the program progresses. In addition, improving patient care quality, minimizing errors, and controlling future costs are all parameters important to the CEO and will be assessed.

Although cardiac surgery (coronary artery bypass grafting, valve replacement) dominates surgical blood use in most institutions, major blood cost savings can be achieved in other settings. As such, the application of blood management approaches should be considered for other disciplines including vascular surgery, orthopedic surgery (including spine), general surgery, and genitourinary surgery.

SUMMARY

Hospital CEOs are concerned about more than just costs of services to their patients. The advancement of patient care along with maintaining or improving patient safety are also key elements to the CEO, to limit patient risks, hospital liability, and negative public relations. The CEO is accountable to the hospital staff, the patients, and the general public.

Establishing programs such as blood management or bloodless medicine can be implemented by using a team approach. A physician champion with a clear business plan that addresses all issues and challenges is critical for successful implementation. As blood and blood product costs rise and supply decreases, alternatives such as cell saving techniques and the use of pharmacologic interventions can have a significant impact on net hospital expenditures.