

Raising the Bar with Bundles

Treating patients with an all-or-nothing standard



The term *bundle* is growing in popularity throughout the health care quality improvement world. A *bundle* is a collection of processes needed to effectively and safely care for patients undergoing particular treatments with inherent risks. It is a grouping of several scientifically grounded elements essential to improving clinical outcomes.¹ Several interventions are bundled together and, when combined, significantly improve patient care outcomes.

According to the Institute for Healthcare Improvement (IHI), the creator of the bundle, a bundle should be small and straightforward. A set of three to five evidence-based practices or precautionary steps is ideal.¹ Individual elements of the bundle must each be proven to be necessary for the best care, but only together do they cause significant improvement. The result is improved patient care. “IHI believes that all of the things in the bundle are absolutely necessary for providing the best care. All components must be done for success, not just some of the components. It’s all or nothing,” says Carol Haraden, Ph.D., vice president at IHI.

Haraden says that two things are essential to forming a bundle. “First, it has to be irrefutable science,” she says. In other words, the practices or components that make up the bundle have to be grounded by excellent research. “Second, all elements of the bundle have to be executed in the same space and time to ensure that clinical improvement occurs,” continues Haraden.

Background

The concept of *care bundles* was created during the VHA-sponsored Idealized Design at Intensive Care Unit (IDICU) innovation project. Any ideal ICU would need to consider improvement in the care for ventilated patients as a priority. “We knew this was a big issue because of the cost to the organization, cost to the patients, and risk of ventilator-associated pneumonia (VAP),” states Haraden. The committee asked the question, “What do we know about ventilator patient care that has been shown to be effective in randomized control trials?”

The four clinical components are as follows:

1. Elevation of the head to 30–45 degrees
2. Daily sedation vacation and daily assessment of readiness to extubate
3. Peptic ulcer disease (PUD) prophylaxis

4. Deep vein thrombosis (DVT) prophylaxis (unless contraindicated)

“These four practices ended up composing the bundle. All four components are absolutely necessary for providing the best care for ventilated patients. All components must be done for success, not just some of the components,” continues Haraden.

IHI challenged IDICU prototype sites to measure individually how they were doing with each ventilator bundle component. Next, IHI challenged them to test how many patients received all four components combined. They found that the organization with the highest percentage measured only 17% completion. This then was the problem, and IHI’s bundle was the solution. Organizations were doing some of the steps, but not all of them all of the time.

By studying the teams that were successful with both bundle adherence and VAP incidence reduction, IHI found several important factors that were also critical to the reduction of VAP, including the following:

- Using multidisciplinary rounds
- Developing daily tracking tools that were both easy to use and incorporated into standardized documentation
- Reviewing the tracking tool during rounds with a commitment to recovery when components had been omitted

Some organizations also changed the standard of care to one in which the bundle was automatically ordered when any patient was placed on a ventilator. More bundles followed, and today many organizations are finding success using the bundle approach.

Types of Bundles

Several different types of bundles have been created, including the ventilator care bundle, the central line bundle, and the sepsis bundles.

Ventilator Care Bundle

One intervention in IHI’s 100,000 Lives Campaign is to prevent VAP through use of a bundle. The first two components are directed at preventing VAP and the latter two components at preventing other complications associated with mechanical ventilation. IHI has noted an average 45% decrease in VAP in a recent ICU collaborative improvement project. In fact, teams that

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consistently accomplish every bundle element on every patient every time have gone months without a single case of VAP.² A useful way to track compliance is to use IHI's Ventilator Care Bundle Checklist to track compliance with this bundle (see <http://www.ihl.org/IHI/Topics/CriticalCare/IntensiveCare/Tools/VentilatorBundleChecklist.htm>).

Central Line Bundle

The central line bundle is also central to IHI's 100,000 Lives Campaign. Performing all the steps in the central line bundle helps prevent catheter-related bloodstream infections. The central line bundle has five components:

1. Hand hygiene
2. Maximal barrier precautions
3. Chlorhexidine skin antisepsis
4. Optimal catheter site selection, with the subclavian vein as the preferred site for nontunneled catheters
5. Daily review of line necessity, with prompt removal of unnecessary lines

Using IHI's central line insertion checklist at the time of each line placement helps ensure that all components of the central line bundle are met each and every time. This checklist is available at <http://www.ihl.org/IHI/Topics/CriticalCare/IntensiveCare/Tools/CentralLineInsertionChecklist.htm>.

Sepsis Bundles

There are two separate severe sepsis bundles: the sepsis resuscitation bundle and the sepsis management bundle. The following are the components of the sepsis resuscitation bundle (tasks should begin immediately but must be done within six hours for patients with severe sepsis or septic shock):

1. Serum lactate measured
2. Blood cultures obtained prior to antibiotic administration
3. From the time of presentation, broad-spectrum antibiotics administered within three hours for emergency department (ED) admissions and one hour for non-ED ICU admissions
4. In the event of hypotension and/or lactate > 4 mMol/L (36 mg/dl):
 - a. Deliver an initial minimum of 20 ml/kg of crystalloid (or colloid equivalent)*
 - b. Apply vasopressors for hypotension not responding to initial fluid resuscitation to maintain mean arterial pressure (MAP) of 65 mm Hg

* See the individual chart measurement tool for an equivalency chart. This can be found on IHI's Web site, at <http://www.ihl.org/IHI/Topics/CriticalCare/Sepsis/Tools/SepsisDatabaseIndividualChartMeasurementTool.htm>.

† Achieving a mixed venous oxygen saturation (SvO₂) of 65% is an acceptable alternative.

5. In the event of persistent hypotension despite fluid resuscitation (septic shock) and/or lactate > 4 mMol/L (36 mg/dl):
 - a. Achieve central venous pressure (CVP) of 8 mm Hg
 - b. Achieve central venous oxygen saturation (ScvO₂) of > 70%†

The following are the components of the sepsis management bundle (tasks should begin immediately but must be done within 24 hours for patients with severe sepsis or septic shock):

1. Low-dose steroids administered for septic shock in accordance with a standardized ICU policy
2. Drotrecogin alfa (activated) administered in accordance with a standardized ICU policy
3. Glucose control maintained > lower limit of normal but <150 mg/dl (8.3 mMol/L)
4. Inspiratory plateau pressures maintained < 30 cm H₂O for mechanically ventilated patients

The severe sepsis bundles are a byproduct of the practice guidelines published by the Surviving Sepsis Campaign in 2004. This campaign was launched by the European Society of Intensive Care Medicine and the Society of Critical Care Medicine in collaboration with IHI. For more information, visit <http://www.survivingsepsis.org>.

Bundles in Your Organization

Bundles are relatively simple and inexpensive to implement and are easily audited,³ but as with any other change, the implementation of bundles needs to be carefully introduced to staff. Effective communication is essential. Thoroughly explaining the change, the new process, and the benefits of the new process will help quell the fear of change in staff members.

Most importantly, bundles should be considered a good starting point for improving care. Answering "yes" or "no" to each of the steps in a bundle serves as a simple estimate of the reliability of care for patients. Organizations can score themselves on a pass-fail basis by giving themselves a pass (or completed) when they do all the bundle components for a particular patient. If, however, even one of the components is not completed, a fail (or not completed) should be scored for that particular patient.

To help organizations get started with bundles, IHI offers many useful tools on its Web site, at <http://www.ihl.org>. **PS**

References

1. Institute for Healthcare Improvement: *Bundle Up for Safety*. <http://www.ihl.org/IHI/Topics/CriticalCare/IntensiveCare/ImprovementStories/BundleUpforSafety.htm> (accessed Jan. 18, 2006).
2. Institute for Healthcare Improvement: Getting started kit: prevent ventilator-associated pneumonia. <http://www.ihl.org/IHI/Programs/Campaign/Campaign.htm> (accessed Jan. 18, 2006).
3. Fulbrook P, Mooney S.: Care bundles in critical care; a practical approach to evidence-based practice. *Intensive Crit Care Nurs* 8:249-255, Nov.-Dec. 2003.