Effective Demand Forecasting In the Health Care Supply Chain

The road to automated replenishment is not an easy one. However, through the integration of intelligence, technology, and expertise, effective demand forecasting in the health care supply chain is attainable.

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Envision a scenario in which pressing the Enter key on a hospital computer sets into motion a series of coordinated processes that reaches across the entire health care supply chain – from the manufacturing plant, through transportation and distribution networks, to the patient's bedside.

Through a careful integration of the hospital system's diverse data, including information captured from clinical, financial, and operational sources, the simple act of scheduling a routine medical procedure would activate an automated system that:

- Chooses products for the patient standardized to the (IC-9) procedure codes;
- Assesses the need for backup contingency supplies and product options based on physician product preference and historical data;
- Picks the supplies appropriate for that individual case, and groups those supplies with all other supplies needed for prep, recovery, and follow-up;
- Verifies the latest contract price and ensures synchronized pricing accuracy among all supply chain stakeholders;
- Determines whether there is a need to replenish supplies either at on-site stock locations or in the off-site warehouses of a distribution partner;
- Aggregates the product replenishment requirements and automatically places an order; and
- Communicates usage data to the manufacturer and other stakeholders for predicting future demand.

What Else?

These processes may well be the vision of the future for the health care supply chain – a world in which medical and surgical supply purchases are uncompromisingly driven by the demands of caregivers and their patients, but which also embraces the most innovative and effective concepts of demand forecasting, inventory postponement, and automated replenishment keeping supply chain costs under control. It is a world where technology erases the lines of distinction between direct purchases and distribution, sending an aggregated purchase order that automatically selects the most cost-effective product combination and routing through the supply chain, and then segregates and delivers the order to the appropriate recipients.

It is a world where supply chain performance is measured end to end, analyzing down to the SKU/location level, dramatically reducing the need for on-hand inventory for scheduled medical procedures; and where health care information not normally associated with the supply chain, such as aggregate patient data, medical research, demographics, and the hospital's own strategic objectives, is integrated to extend demand predictability into the future.

This Future Is Within Reach

Today, there are three factors that make this vision of the future attainable: the abundance of untapped information already available in the hospital setting; a methodology of demand forecasting developed in other industries, but which can be adapted to health care; and the recent growth and maturation of some information technologies that enable an unprecedented level of integration of data from diverse sources.

Integration of clinical data into the supply chain equation will revolutionize the management process, enabling us to transform the existing yet often segregated mix of information into actionable intelligence for health care decision makers. Unique

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and customized application of some proven principles of supply chain management from the retail industry, and some recent technological advances, will gain health care supply chain efficiencies that we have been anticipating for years. These efficiencies, in turn, will open the door to numerous corollary benefits such as improved patient safety, more favorable clinical outcomes, revenue enhancement, and an even more healthful work environment for clinicians.

Health Care Is Not Retail

This is not the first time the health care industry has considered applying retail demand forecasting strategies. These concepts are well-proven, and have been around since the late 1970s, when health care executives first used them in efforts to standardize, manage, and package product in patient-ready (consumer) configurations. In health care, those efforts met with some success.

Where else but in a hospital can a manager walk in and look at a schedule that tells the number of customers and the potential product demand with relative accuracy for that very day?

Proponents found they could work well to support limited procedures and volume, but often failed to cover contingencies clinicians frequently encounter at the pre-op, procedural, and recovery phases.

Having incorporated these lessons into the lore of supply chain management, we contend that our industry is now ready to develop its own set of principles that draws upon the concepts of retail demand forecasting models, but which fully accounts for the unique nature of health care – in which a failure to meet the demands of consumers (patients and clinicians) can have dire consequences.

Advances in technology, historical trending, surgical scheduling, and clinical information systems have given us the ability to manage usage more effectively. The integration of supply chain management systems with point-of-use data entry, and improvements in inventory management (such as the emerging RFID technology), are enabling us to clear the way for the final and most important step in the integration of health system data – linking the clinical pathways charted in advanced patient data to the supply chain decision-making process.

Projecting Demand Accurately Is the Key

In the retail industry, one of the most common challenges facing executives is a lack of reliable information for predicting what customers will buy. Retail stores stock their shelves based on a combination of intuition, experience, and market research that is often highly speculative. It is a risky proposition, especially for the buyer responsible for filling warehouses that serve thousands of retail outlets. The proliferation of clearance sales at the end of each buying season attests to the odds for failure.

Yet, even with its inherent uncertainty, the retail industry has developed a methodology of predicting demand that, to date, has worked better than in other industries. Companies like Wal-Mart, Office Depot, Costco, and Dell have been able to forecast with enough reliability to be able to significantly reduce losses resulting from unsold or discounted inventory.

Health care executives are different – but not just because their decisions have considerably more impact on the lives and well-being of the people they serve.

Although hospital administrators often feel a lack of predictability, their potential for success in determining what they will need to stock their supply shelves may be substantially greater than in almost any other industry – at least for certain subgroups of their total annual purchases. Where else but in a hospital can a manager walk in and look at a schedule that tells the number of customers and the potential product demand with relative accuracy for that very day?

To date, efforts to automate the health care industry have been admirable. Most hospitals now have automated systems in place to track diagnoses, medical events, patient satisfaction, purchasing, accounts payable, reimbursements, surgical team preferences, dispensing of pharmaceuticals, and more. Unlike the retail environment, however, the principal challenge in hospital systems is not a lack of reliable information to support decision making, but rather the lack of visibility and integration of data that is already there – data that is routinely gathered but stored in diverse information systems that rarely communicate with each other in meaningful ways.

With so many data sources, and so many advances in technology and analytical capabilities, there could be boundless possibilities for a health care institution capable of organizing

and using its information to gain business and clinical advantages. Ultimately, the goal should be to create a health care supply chain that is capable of keeping the clinicians supplied, and at the same time, limiting on-hand inventory to what is necessary to address contingencies.

On the Road to Automated Replenishment

Hospitals are across the board in their level of sophistication in supply chain management, ranging from facilities' systems that still track physician preferences on index cards, to systems that are managing the supply chain with advanced methodologies such as activity-based costing, Internet-based analysis of purchasing and utilization, and outsourcing the management of supply acquisition in high-dollar clinical units.

Yet, further advances for even the most sophisticated institutions depend not only on the application of new technological tools and importation of proven methodologies from other industries, but also on the continued refinement of their existing technologies that have shown their worth. We envision four key mileposts on the road to the goal of automated replenishment:

- Expansion of intelligence gathering and analytical tools to encompass not only the entire health care supply chain, but also to integrate clinical information;
- Development of health care-specific demand forecasting methodologies;
- Application of these new management methods to create a clinically driven demand chain supported by low on-hand inventory and automated replenishment; and
- The application of this expanded supply chain intelligence for quality improvement and reimbursement optimization with the health system.

Expanding Proven Value

Experience has shown already that integrating and analyzing the data within a single management system, such as hospital purchasing, can reap substantial benefits. Internet-based mining of routine purchasing data, when properly analyzed, can produce information that forms the basis for combining purchase orders, standardizing products, reducing inventory, and improving contract compliance – all proven strategies for reducing costs. Not only that, analysis of supply chain activities has enabled the creation of models that more appropriately determine actual supply costs. Integrating supply chain information with a hospital's clinical, financial, and human resources information systems offers an opportunity to analyze relationships between supply utilization and other important measures like labor costs, reimbursement levels, and patient outcomes. Such analysis enables health care systems to identify the cost of care at the episode level, detecting variations from the norm by clinician and procedure. Potential benefits are immediate, including a reduction in the need for clinical employees to track and manage inventory, and capturing supply consumption as a part of clinical documentation.

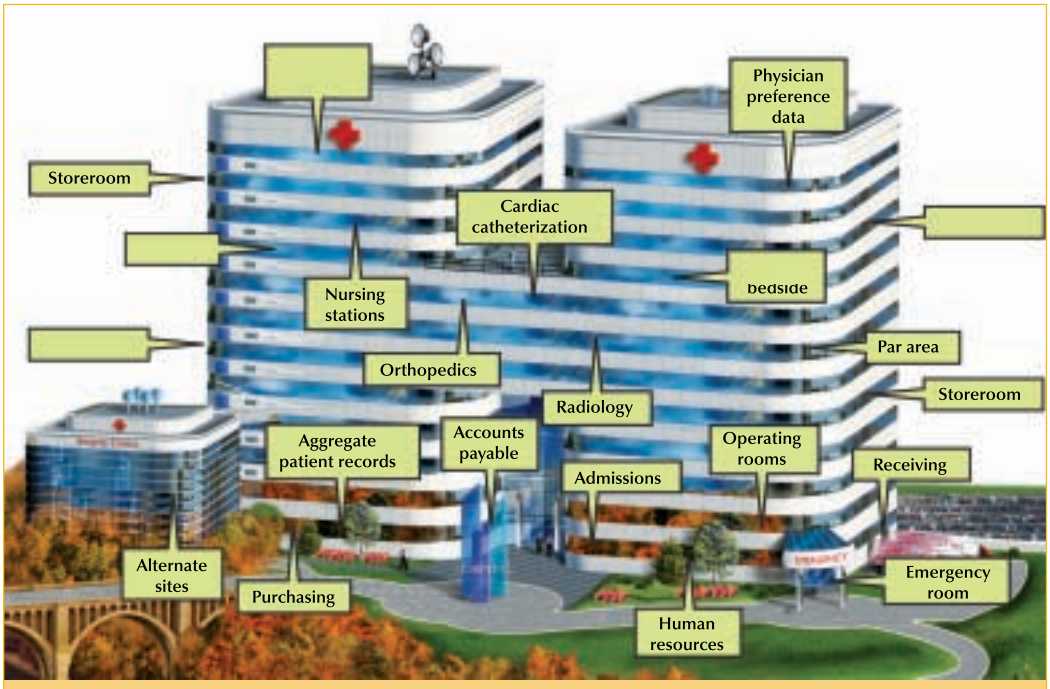

Figure 1 Potential Sources of Information to Support Effective Demand Forecasting in a Health Care System

Forecasting Demand

By integrating clinical information systems, the health care system can link utilization to outcomes and provide more accurate clinical documentation, which immediately offers the potential to improve charge capture and reduce reimbursement denials. The hospital executive, or the hospital's supply chain partner, has reliable information to create a realistic bill of materials for procedures from the preparation phase through recovery and follow-up.

In specific locations, such as the surgical suite, SKU- and location-specific forecasting technology can be used to synchronize surgeon preference information, and predict demand based on the hospital's scheduling, patient demographics, and even seasonal demands – with the consequent benefits of reduced inventory levels in the OR, lower costs for case preparation, and improved fill rates and service levels. In many cases, hospitals are likely to experience increases in clinical satisfaction, productivity, and patient safety as well.

Because the risks associated with health care are unlike those of any other industry, the quality of demand forecasting must be impeccable. The process must:

- Project demand by location and SKU and address long-term and short-term needs;
- Support the hospital's budgeting and planning process to account for introduction and expansion of medical/surgical programs; and
- Address the importance of the critical lead times that are inherent and essential in the health care environment.

Automated Replenishment

In effect, this approach would convert the conventional medical/surgical supply chain into a "demand chain," in which information from many sources actually drives the product flow. Originating at the patient's bedside, the information flows through the demand chain back to the production plant, where reliable demand forecasts enable manufacturers to make intelligent production decisions. The distributor uses the same information to reduce overstocks and product shortages, and both the manufacturer and the distributor feed supply chain intelligence back to the hospital in the form of an efficient product flow.

When the abundance of information in a health care system is properly analyzed and applied to a well-tested demand response model, the risks associated with automation can be reduced to an acceptable level in an environment that must allow for emergencies, and cannot compromise patient safety. In this environment, automated replenishment must also be impeccable – ensuring appropriate, accurate, and on-time ordering tied directly to clinical demand, and incorporating processes to:

- Track and report exceptions;
- Determine procedure-specific lead times for re-orders; and
- Be self-correcting.

Improving Quality and Enhancing Revenue

Effective demand chain management produces tangible changes in the traditional supply chain – most notably the cost savings from inventory reduction and postponement, but there are many additional benefits from this approach of gathering information from diverse sources within the health care system. The heightened visibility of the demand chain enables hospitals to identify opportunities for improving patient outcomes. It also allows better case documentation to support revenue enhancement.

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The Demand Chain Continuum

Despite many advances in supply chain management, too much of the medical and surgical inventory in health care consists of slow-moving SKUs with a high risk of obsolescence, expiration, damage, or recall. With adequate safeguards for protecting patient identity, pressing the Enter key to schedule a particular medical procedure can generate specific lists of medical/surgical supplies necessary for every stage of a procedure – taking into account preferences of the clinician; patient attributes such as age, weight, sex, medical conditions, and allergies; and predictable external factors that influence the utilization of supplies.

Together, a fine-tuned forecasting system and automated replenishment process can prepare the hospital for every scheduled procedure, reduce the costs for such procedures through standardization, and help ensure favorable outcomes. These systems also can help project the likelihood of unscheduled cases and unexpected acuity issues, and determine the necessary product mix for backup and support. ■