Artificial intelligence: 
The future of the healthcare supply chain

In these modern times, the once unheard of scientific advances shown in classic science fiction films have become an accepted part of our daily reality. We now enjoy common technologies that allow us to locate nearby restaurants, broadcast our whereabouts through social media and map our destination through GPS — all with our smart phones.

Technological advances continue to make our lives easier, and artificial intelligence (AI) has become commonplace. In use in other industries, AI technology is now being applied in the healthcare supply chain.

This paper will present the next evolution of the healthcare supply chain solution that combines AI and a virtual item master to provide a level of detail and comparison almost impossible to achieve with current systems and information. We'll examine “smart attributes” and product ontologies (product/attribute mappings) that can systematically align products so that they can be effectively mined. Through increased standardization and better control of high-cost physician preference items, effective mining can drive cost savings. Users benefit from a more complete understanding of a product’s total value, including clinical and profit impact, not just the cost paid.

The search for accurate data
Certainly the healthcare supply chain has evolved in new and advantageous ways — analytics, automated ordering, optical character recognition and more. But one area that hasn’t changed much is the hospital item master. Initially constructed to support product replenishment, the item master lacks valid, normalized data. The success of value analysis and standardization efforts are severely limited by the item master’s lack of accurate data and the technical limitations of legacy materials management information systems (MMIS) and enterprise resource planning (ERP) systems.

An additional stumbling block is comprehensive access to data. Data is difficult to obtain and consolidate because it comes from multiple internal and external sources, including hospitals, manufacturers, distributors and GPOs. This multiplicity makes activities such as bidding, cross-product comparison and value analysis both tedious and time consuming. As a result, you might have to turn to your manufacturers and GPOs for needed information you can’t access.

For example, to conduct a value analysis study on thoracic drainage catheters for your hospital, where do you start? Typically, you would look first to your item master, only to find that the items needed are not in the file. Next, you would turn to the purchase order history. But now you hit another roadblock upon discovering that these items happen to be purchased as invoice-only. At this point, your only option is to turn to your vendor representative for the needed item information, such as what was purchased (line item detail) and how much was paid. You might even want to know who else supplies the items and whether any of these items are under contract.

Given this obvious conflict of interest, it’s not surprising that vendors may be reluctant to give you the information you requested. After adding in the time-consuming process of obtaining all the relevant, applicable contracts, the net result is likely to be weeks of delay before you can even begin the analysis.

What are smart attributes?
The answer lies in smart attributes. Let’s begin by defining an attribute. An attribute is simply a component part of a product, such as the catalog number, description, UOM, UNSPSC, etc. Because the global governing data standards (GS1/GDSN) rely on product descriptions, it is necessary to further attribute the description, which
A “smart attribute” uses what it “learns” on one product and transfers that knowledge when it recognizes the same descriptive synonyms used for a different product.

**Artificial Intelligence — Creating a new level of product understanding**

The application of AI technologies has created the ability to understand, store and use product information in an entirely new way. AI technologies allow you to understand the underlying grammatical structure – the product DNA – used to build each product, together with all natural variations that potentially exist. AI gives you the ability to maintain these structures/ontologies dynamically, continually learning and updating as new data passes through the system. Now you have a “smart attribute,” because it uses what it “learns” on one product and transfers that knowledge when it recognizes the same descriptive synonyms used for a different product.

**How smart attributes drive value**

Once all the data is at hand, the next task in advanced product sourcing is to sort through and align all equivalent products. The result would typically be two groupings:

- Functionally similar — a grouping of products that could potentially be used for a similar purpose
- Functionally equivalent — a grouping of products that could be used for the same procedure with no adverse effect on clinical outcome

From a purchasing perspective, it is important to know the range of pricing typically associated with functionally similar products, since pricing information is vital to the negotiation process. However, the actual purchase will be made based on a compound evaluation of clinical efficacy, price and occasionally revenue implications. In other words, purchases will be made based on overall value. To perform this comparison, you must first perform this analysis on the entire product group.

**How smart attributes support all descriptive variations**

Using AI-driven product ontologies and smart attributes, data can be structured to support the needs of legacy applications as well as strategic sourcing and value analysis activities, all from one data set. The data from this global virtual item master takes another step in its evolutionary journey and is refined using an online, cloud-based platform with user tools that automatically present the normalized data obtained from all sources, both internal and external, in natural English (non-abbreviated and complete). These descriptions include multiple alternative names typically associated with any given product. Because of the normalization process, advanced product sourcing also has the ability to automatically identify all associated products that would be used for any given procedure or purpose.
Now imagine that your entire supply data, including contracted items, was normalized and housed in a virtual item master. Imagine further that this virtual item master was linked to a matrix containing manufacturer catalog items that were also normalized. Suppose that all these items had smart attributes that automatically lined up products based on how your organization defined functionally similar or functionally equivalent items (see figure 1). What would this mean to you both in terms of cost and time savings?

Finally, imagine that you are part of a large hospital network with disparate MMIS/ERP systems and multiple item/contract masters. As these multiple MMIS solutions work within a single framework, all have been normalized and the descriptions fully attributed, allowing products to be described in common English and viewed in one place. Healthcare systems can roll up information into a central virtual item master, yet each facility retains its own naming conventions.

This future is already possible

Next-generation strategic supply sourcing supports all of these functions today. It helps you to reduce costs by supporting the success of value analysis and standardization initiatives, especially through better management of high-cost physician preference items.

Where does artificial intelligence go from here?

We now have the capability to create intelligent data, and the technology is evolving daily. Additional improvements in integration between AI technology and intelligent data, like smart attributes, will offer organizations new ways to manage purchases as they happen, enabling quick value judgments on which savings opportunities offer the greatest potential. Future technological advances could include:

- **Automatic identification of savings opportunities**: automatic detection and ranking of potential savings opportunities based on the specific goals of the organization
- **Automatic bid preparation and integrated work flow**: automatic collection of all relevant products required in the bid creation process with online vendor access for bid response
- **Automatic value analysis creation**: automatic identification of product groupings that have the potential to provide the maximum cost savings
- **Spend leakage protection**: automatic real-time identification of similar or equivalent products being purchased outside of the organization’s approved product formulary
- **Inventory threat detection**: automatic identification of products being purchased when a similar or equivalent item is in inventory
- **Reporting based on significance and relevance**: presentation of cost savings opportunities that are both relevant and actionable, based on the criteria established by the user or organization

Conclusion

These are exciting times for supply chain management, times of real and revolutionary change. Gone are the days when it took dozens of people, reams of paper and hours of manual calculation and interpretation to get the answer. AI and other technologies now do the work for us.

Today’s advanced product sourcing has already helped elevate the importance of the supply chain in driving the overall financial health of provider organizations. The supply chain is now being recognized as an area of significant savings opportunity and a source of the accurate, comprehensive data needed in today’s performance-driven environment. Through the support of value analysis and standardization initiatives, strategic sourcing adds dollars to the bottom line.

Technology will continue to advance and refine, taking cues from consumer sites, like Amazon, to improve ease of use, accessibility and predictability. Technology has already become more predictive, looking inward to automatically find and access data, presenting suggestions and anticipating your needs before you’ve even asked the question. By incorporating these new technologies, next-generation healthcare strategic sourcing will add even more value, helping to make jobs easier and organizations more profitable.

Any descriptions of future functionality reflect current product direction, are for informational purposes only and do not constitute a commitment to provide specific functionality. Timing and availability remain at McKesson’s discretion and are subject to change and applicable regulatory approvals.
