The IoT Streamlines Healthcare Supply Chains
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Introduction
Technology is advancing rapidly. Things we dreamt of only a few years ago are now a reality. Think of the potential of connecting any physical object, animate or inanimate, to the Internet. The Internet of Things (IoT) realizes precisely this idea. In a medical facility, the data collected from connected-objects can be used to save lives. In this article, however, we shall present how this data can also be used to streamline some aspects of a medical facility’ supply chain. The benefits directly accrue to the bottom line, and most importantly, result in an enhanced quality of care.

Behind the Scenes of Material Management
Let us consider for a moment an operation room (OR) in a medical facility. In the course of one day, the medical practitioners (doctors, nurses) use hundreds of different items - medical supplies, devices and equipment. Materials personnel are the ones who ensure all required items are continuously available, at the time and in the quantity they are needed. Theirs is the task of replenishing what was consumed, performing long-term stock planning, and attending to ongoing ‘out-of-stock’ calls.

High-value medical devices (e.g. a pacemaker) can be very expensive. A single item may cost several thousand dollars. The material managers need to ensure there are enough of these on stock to guarantee the OR is operating efficiently. They also need to prevent the loss or misplacement of items as well as the accidental use of expired items. In addition, hospitals are increasingly shifting traditional purchase orders to a consignment model. As a result of this trend, it is not uncommon to see sales-reps of medical device manufactures in the vicinity of the OR - they are there to encourage the use of their product, and to ensure it is in stock.

IoT Brings the Supply Chain to “Life”
Let us take a high-value medical device, and examine how the IoT can bring to life the entire supply chain that is concerned with such an item.
Due to their value, expensive medical devices are stored in secure cabinets in the OR, or nearby. These items are managed (counting/checking for dates/stored) manually and the result is that a nurse must spend significant amounts of time managing inventory. This may lead to inventory shrinkage, inventory overstocks and waste in the form of expired items. In an OR, a missing inventory item may lead to procedure delay or even a death of a patient. Maintaining high levels of inventories is the typical “insurance policy,” albeit an expensive one. Finally, consignment purchases turn the vendor into a more intimate supply-chain partner - the vendor needs to be continuously informed on the levels of inventory for re-stocking and for billing purposes.

Let us connect the medical device to the Internet. This can easily be done with RFID technology, for example. In this case, “connecting” means that the object is tagged and can transmit in real-time its own unique ID, along with information on what is actually occurring with it. For example: "I am a stent with ID<112233> and I am being stocked in Cabinet<223> in OR<008> of Hospital<XYZ Medical center>." This transmission is sent to a centralized data warehouse. Moreover, we are able to implement Item Level Traceability. In other words, automatically record everything that goes in or out of any cabinet, in any OR, in any medical center, with three levels of traceability: 1) which item was taken, 2) which item was taken and by whom, 3) which item was taken, by whom, and for which procedure.

Now comes the fun part. What brings the supply chain to life is a cloud server platform that facilitates a connection between hospitals, vendors and logistics organizations. Each one of these stakeholders is granted access to a complete portrayal of the supply chain. Access is secure, granted only to authorize parties, each with only the data they need. And this view is kept up-to-date, in real-time. Today, hospitals guesstimate stock levels, what was used since the last order was supplied, and what is being used at the moment. The Materials Manager and the vendors are constantly trying to assess the inventory situation and to ensure the medical teams have everything they need. The logistics companies are simply in the middle, moving the goods around as efficiently as they can – while receiving urgent calls to supply devices for procedures. With the supply chain coming to “life” (so to speak), each one of these stakeholders is continuously informed and can take efficient action to ensure the flow of goods is optimal. This is what the IoT can do for a supply chain.

The Benefits of a “Live” Supply Chain
With traditional resource allocation methods (such as the “PAR methodology”), resources where allocated in accordance to an average consumption, eye balling methods, or simply by over-stocking. The introduction of an IoT approach results in a system where allocation is significantly more accurate; it is done according to actual needs. It balances cost management with an emphasis on doing things right (utilization) by doing the right things (allocation).
Let's head back to the OR, and join a procedure in progress. The doctor asks for a device (remember when they say to the room “scalpel!”, and then a scalpel magically appears in their hand?). The nurse goes to a “SmartCabinet” and takes what she needs. We already know the device is not expired. The cost of the device is associated with the procedure, and if needed, added to the patient’s bill. If the device is returned unused, that also is recorded. The SmartCabinet ensures everything the OR requires is stocked and in the proper quantity (without expired items). The Material Manager is also able to use a special feature of the system to ensure optimal inventory levels for special procedures. The system is alerted when a specific procedure is scheduled for the OR, checks the current levels of all the items required for said procedure and issues re-stocking or purchase orders for any item that is found lacking. No more running around for surgical thread while the patient is open on the operating table!
In healthcare facilities, the cost of medical supplies, devices and equipment is second only to that of labor. In fact, such costs can rise to as much as 40% of a hospital’s budget. By implementing a reliable materials replenishment system, it has been demonstrated that a one-time reduction of over 30% in inventory and cost savings of nearly 20 hours per week in labor can easily be attained. Simply put, the materials personnel only arrives to re-stock when items are needed, and they have exactly what is needed in their cart. Additionally, the return of the investment can be realized in as little as 18 months.

Summary

In the healthcare industry, significant cost-benefits can be realized across the supply chain by connecting all parties to one platform and all of the data – Hospital, Vendor, Logistics. Access is granted securely according permissions that are enforced by a central cloud-based server. The hospital, the vendors and the logistics companies are all connected, and each party obtains all the information they require about the flow of goods in the chain.

Medical facilities strive to attain a high quality of care in a cost-effective way. This is a standard principal goal and benchmark. Advanced materials management can contribute to this goal by minimizing the medical practitioner’ responsibility in the supply chain, freeing them to spend more time with their patients- not counting or looking for supplies.