WHITE PAPER

DATA IS KING: HOW ANALYTICS BRING INTELLIGENCE TO HOSPITALS

ABSTRACT

Over the past few years, we have witnessed a shift in the healthcare supply chain industry regarding the importance placed on data – not only for cutting costs and boosting revenue, but also for increasing efficiency and clinician satisfaction, and improving patient care and safety. It is widely known that data is essential for effectively managing clinical inventories and ensuring that the supply chain works properly, but it has traditionally either been unavailable, unreliable or inaccurate – particularly within the procedural environments at hospitals (Perioperative/OR, Cath/EP, Interventional Radiology, Endoscopy/GI).

Accurate, accessible and dependable data is needed for both day-to-day inventory operations (e.g., reordering, product availability, expiration tracking, recall management) and more strategic decision-making (e.g., forecasting supply needs, standardizing product usage based on best outcomes and value, optimizing supplier-partner relationships with consolidation and consignment programs).

This White Paper offers practical and proven methods for capturing, analyzing and utilizing this data in order to gain control of and optimize clinical inventories at hospitals. With these methods, users have critical operational data at their fingertips, such as how many days of on-hand inventory they have, what their burn rate is, and how much safety stock is needed, as well as which specific supplies they need to reorder, etc. Users also gain access to data critical for longer-term planning and risk mitigation, which enables them to see what they can cut from purchasing if they need to redirect dollars elsewhere, and to forecast resource needs based on anticipated procedure volumes. This data also enables them to track recalled products to patients instantly, ensure the availability of desired products, and prevent expired products from being placed in patients.

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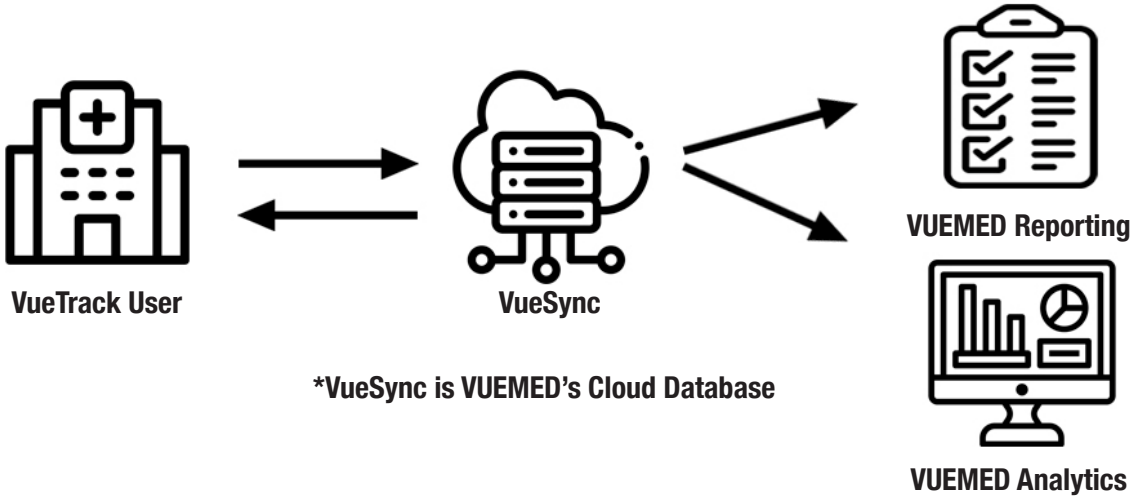
VUEMED

VUEMED's Data Generating Ecosystem in a Nutshell

Our ecosystem of solutions, built upon our foundational technology platform VueTrack™, tracks products from their point of delivery at the facility to the point of care, using RAIN RFID (GS1 UHF Gen2) and barcode scanning technology. The complete lifecycle of each SKU is documented and reported in real time, and a perpetual inventory status is maintained for each item tracked, down to its lot/serial number and expiration date. Our solutions capture swiftly and accurately all Unique Device Identification (UDI) and other relevant data, and transmit key information to the appropriate hospital systems. All inventory transactions captured by our solutions are recorded and analyzed securely and in real time in the VUEMED Cloud, where information is reported in aggregate by SKU and by location (at the IDN or hospital level, and location within the hospital, such as department, floor or room).

This data can easily be shared between hospital departments, among hospital personnel (clinicians, materials management, supply chain, risk management, etc.), between the hospital and its IDN, and between hospitals and suppliers. Hospital and department-specific data for each SKU, such as price, par levels, consignment status, item number and billing code, are maintained and accessible in the Cloud.

VUEMED's real-time, web-based reports give users immediate access to important data, such as stagnating items, par level adjustment recommendations, expiration tracking, recalled items, items in need of reordering, and physician utilization, to name just a few.



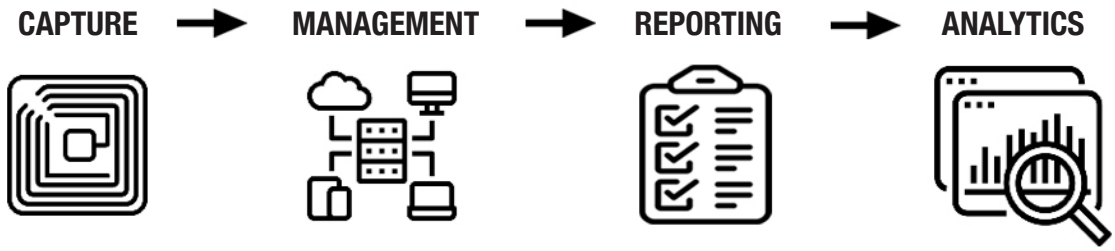
***VueSync is VUEMED's Cloud Database**

Data Flow Process

- ✓ Products are documented through one of VUEMED's data capture applications and synced to VUEMED's Cloud server.
- ✓ The data is housed in an Azure SQL database which contains tables and views that can be accessed by various data analytics and reporting services.
- ✓ Queries are made against the database using data analytics tools such as Tableau.
- ✓ The data stays up-to-date, allowing users to come back to analytics reports quarterly, monthly, or even daily to see how trends progress over time.

VUEMED has the advantage of a closed data generating and sharing system, which captures the data, manages it, reports on it, and analyzes it.

Data Intelligence Generation



Data Capture

Products are documented through one of VUEMED's data capture applications, either using a manufacturer barcode (VueTrack) or an RFID tag (VueTrack-RF™), for any desired inventory transactions, including at the point of care. These transactions are then synced to VUEMED's Azure SQL Cloud server. Products can then be added or subtracted from the inventory in the Cloud, and inventory and case information is housed in the Cloud, available for reports to guide actions, such as reordering.

RAIN RFID technology (VueTrack-RF) is particularly effective at capturing UDI data because it completely automates the tracking of medical devices and supplies from the point of entry all the way to the point of care. RAIN RFID uses Ultra High Frequency (UHF) passive Gen 2 RFID tags and readers that are compliant with global standards (GS1 EPC) and the FDA's UDI regulation. It continuously and automatically tracks the movement and location of supplies in real time and with 99.5% accuracy – without the need for human intervention. Data capture is hands-free and cabinet-free. With the use of strategically placed zonal and steerable antennas in the ceiling, RAIN RFID turns any space – whether a supply room, procedure room or warehouse – into a fully controlled inventory space using existing shelving and storage systems. For hospitals that are not yet ready to implement a RAIN RFID solution, barcode scanning solutions are an excellent alternative.

Data Management

Once the data is captured using barcode scanning or RFID, it is matched against our proprietary universal item master catalog in the Cloud (VueSync™), which powers all of our data capture applications. This database contains all of the hospital-specific item attributes (e.g., item number, price, consignment) and serves as the main source of product identity with both DI and PI data incorporated. Device identifier (DI) is a mandatory, fixed portion of a UDI that identifies the labeler and the specific version or model of a device. Production identifier (PI) is a conditional, variable portion of a UDI that identifies such information as lot or batch number, serial number and expiration date.

VueSync is synced to a user's computer, the data captured by each computer is synced to VUEMED's Cloud server, and inventory and case information is housed in the Cloud, available for reports. The Cloud reporting application enables admin users to manage item attributes (such as consigned, critical, etc.), edit inventory transactions data, and control multiple data capture requirements (such as specifying whether a RFID tag is required). Through the interfaces with the ERP system, the Cloud reporting application maintains relevant item master updates, and supports automated requisitions and replenishment processes. The Cloud application also supports any relevant interfaces with clinical documentation and billing systems to enable accurate patient records and full charge capture.

Data Reporting

The intrinsic advantage of the Cloud lies in its ability to store, compute, analyze and report tremendous amounts of data with easy user access, and to help turn data into actionable information. A variety of thematic reports with real-time data are instantly available through the Cloud, which empower users by giving them full visibility of their inventory.

Here are some examples of the types of reports that users can run:

- Inventory Review: On-hand inventory, consumed inventory
- SKU Status: Under par, expiring, unused, new items
- Clinical Usage Analysis: Case summary & details, physician comparisons
- Orders: Creating and managing requisitions & receipts
- Transactions: Add, remove, transfer, consume
- Item Data Management: Par levels, pricing, consignment, critical item designation
- Cross department and cross facility comparisons
- Advanced reports, such as trend forecasting, are available through Tableau

Data Analytics

The analytics step is where the power and capability of the data are on full display, and where the real change happens. Smart Key Performance Indicators (KPIs) – such as those tracking expiring or expired inventory, stagnating or unused items, and consumed vs. purchased inventory – provide hospitals with the data visibility needed to guide and achieve inventory optimization as well as alignment with clinical needs, while also preventing waste and unnecessary spending.

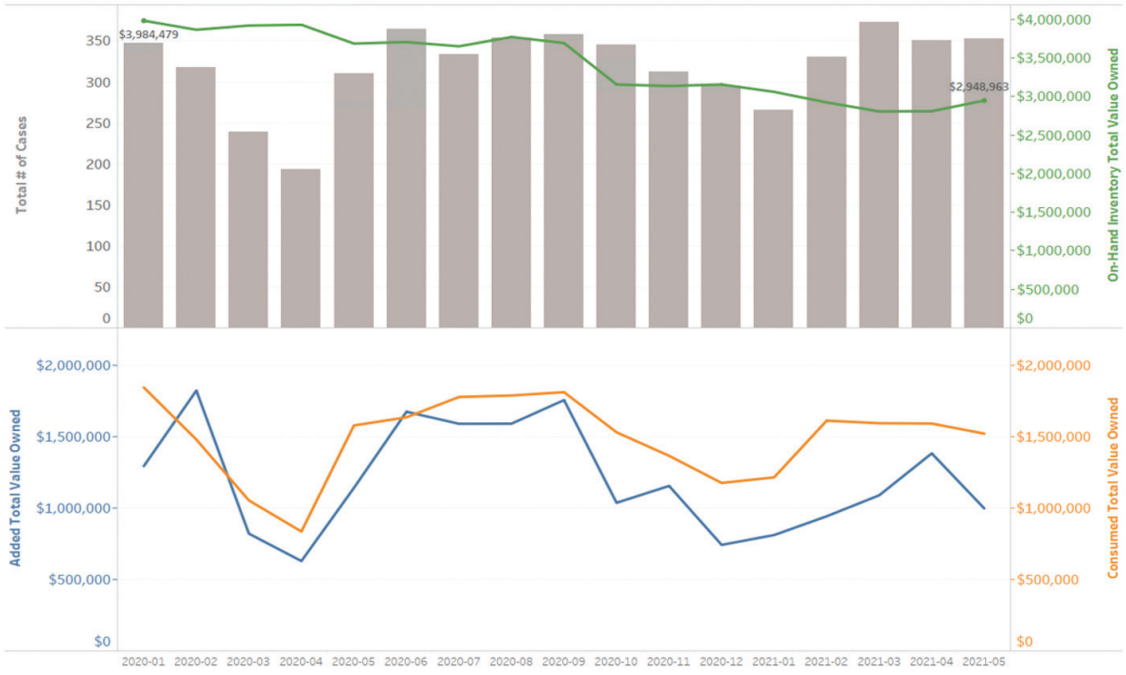
Below are suggested KPIs for monitoring cost management and inventory performance: These metrics are especially effective when viewed for each clinical department, in the context of each department's clinical, operational and budgetary needs and objectives.

KPI	Description	Purpose	Frequency
Added vs consumed inventory	Value of inventory purchased compared to value of inventory consumed for patient cases: • Case volume trends • On-hand inventory value trends	• To examine how well the inventory being purchased is aligned with clinical consumption needs • Close alignment in purchased vs consumed values leads to leaner inventory and reduced waste	Monthly
Cost per SKU and per unit trends	Changes in cost per SKU and cost per unit for: • On-hand inventory • Purchased inventory • Consumed inventory	• To help assess the drivers of the cost – the degree to which any changes are driven by the unit price vs. volume/purchasing/usage behaviors	Quarterly

KPI	Description	Purpose	Frequency
Inventory excess – unused items	Items in inventory not used for patient care for at least 12 months	• To examine if such items are still needed and, if so, consider designating as critical. • If not needed (substituted, no longer preferred, etc.), work with vendors to return, replace, etc.	Quarterly
Inventory excess – items above par	Items above recommended min/ max par levels based on at least 6 months of consumption history, lead times, etc.	• To optimize the types and amounts of on-hand items required to support clinical needs	Quarterly
Waste due to expirations	Removed items due to expiration and on-hand items expiring within 30, 60 and 90 days	• To ensure items can be used or returned prior to expiration • To prevent expired items from being used in patients • Lagging indicator of how well purchases are meeting clinical needs	Monthly
Consumed wasted	Items opened but not used during patient procedures (including opened in error, dropped on the floor)	• To examine clinical practices that lead to unnecessary waste (i.e., opening items before confirming need) • To assess any waste trends related to specific item, type of procedure, or clinician	Monthly

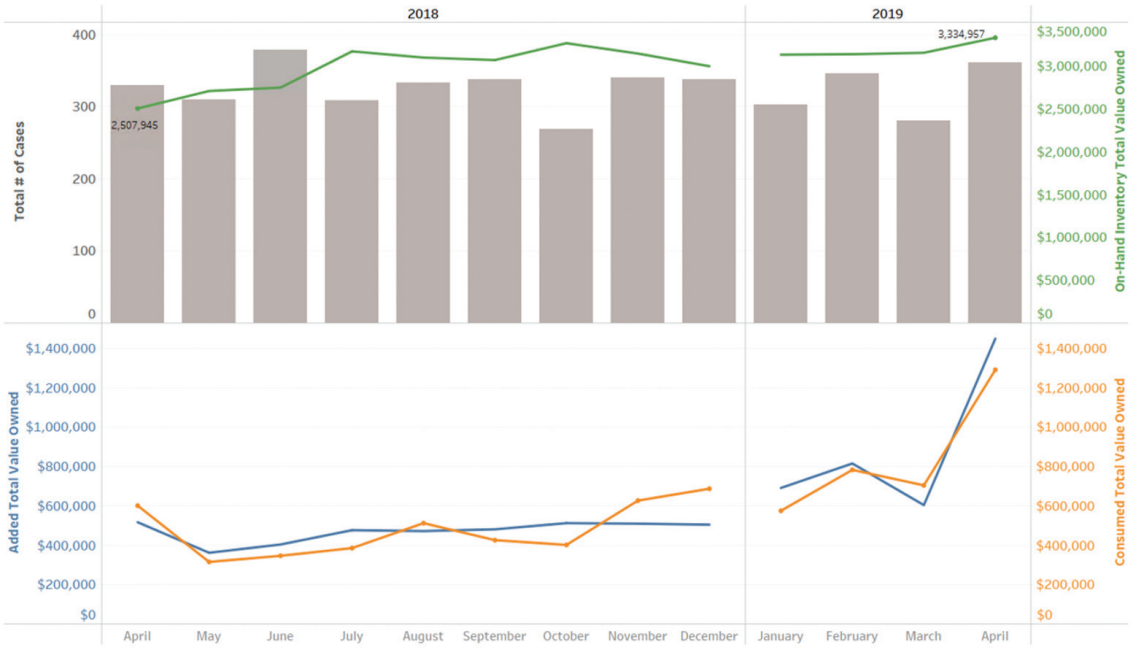
The graph below shows how a department implemented the metric of total on-hand inventory vs. added and consumed values in order to reduce its supply spend by working through existing available inventory to support its clinical needs:

Owned Total On-Hand vs. Added and Consumed Values (Jan 20 - May 21)



Using the same metric, the graph below illustrates how a department demonstrated clear alignment of purchases with consumption, while investing in building an additional clinical service line:

Owned Total On-Hand vs. Added and Consumed Values (Apr 18 - Apr 19)



The following graph shows the metric of total value expiring within 90 days vs. total value of items expired and removed. This KPI illustrates how the management of items at risk of expiration, as well as a review of those that have expired each month, are expressed by their total value in dollars and are key to alerting users about what is at stake in order to prevent unnecessary waste:

Owned Expiring 90 Days Total Value vs. Removed Expired Total Value Last 17 Months

And other metrics show the importance of reporting and reviewing items opened and wasted during clinical procedures:

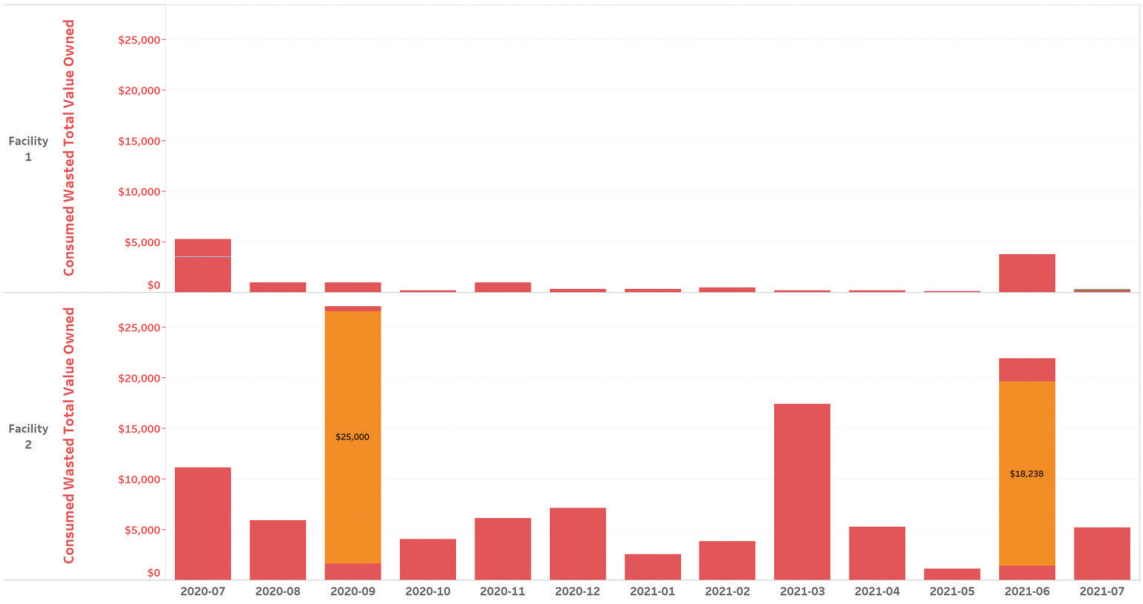
Owned Consumed Wasted SKUs, Units, and Values Past 14 Months

These types of waste amount to significant dollars on any given month, and are sometimes driven by just a few items. Often, they are preventable by just making small changes in clinical workflows and protocols.

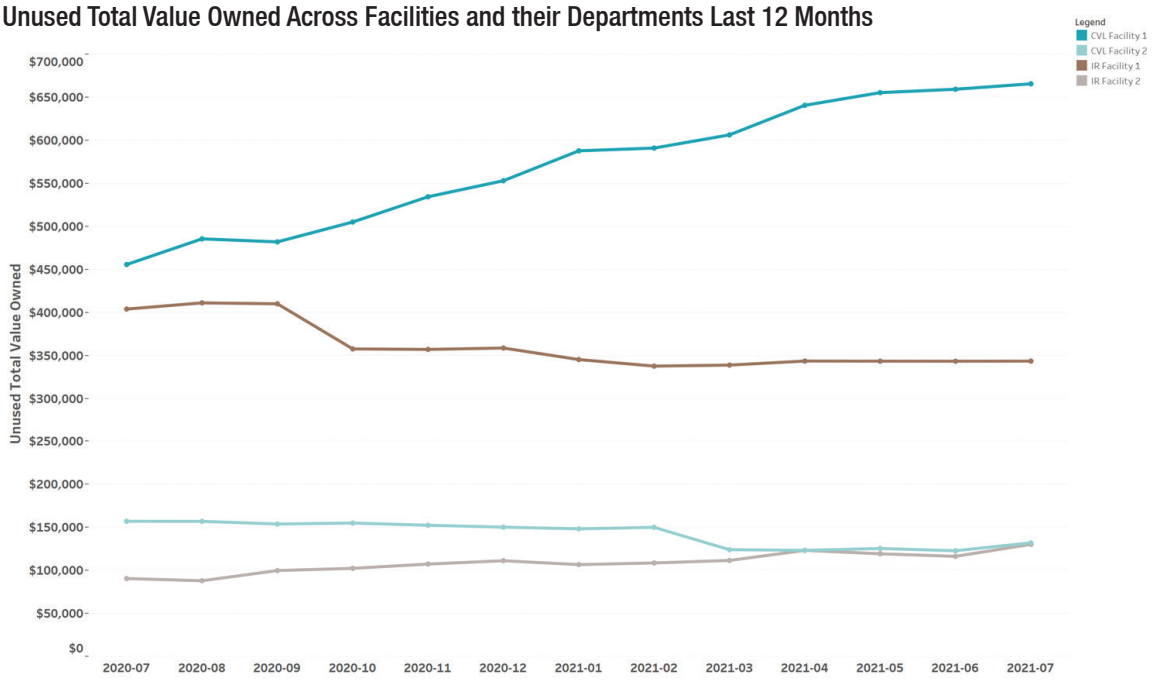
It can also be informative to examine trends in similar departments across several facilities – to understand the outliers and find opportunities for standardization of items or processes.

Here is a graph examining the consumed wasted metric for a couple of departments on different campuses which perform the same types of procedures:

Consumed Wasted Total Values Owned Across Facilities for a Department Last 12 Months



And here is a review of unused inventory trends across multiple facilities and similar departments:



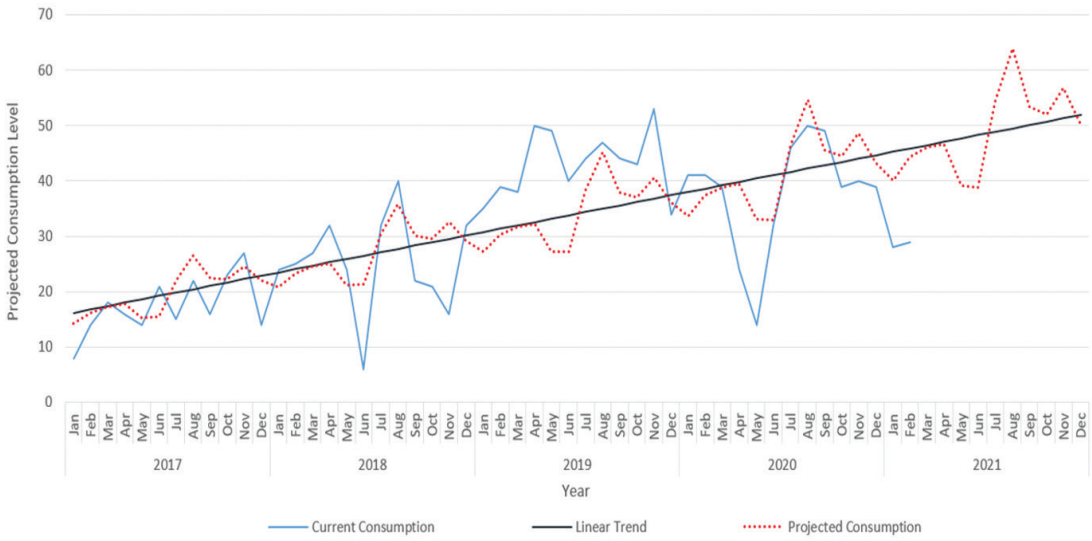
Using Data Analytics to Achieve Supply Forecasting

The availability of accurate consumption and inventory data gives users the ability to be more proactive about anticipating and managing their supply resources. There are two ways that VUEMED approaches forecasting:

1) Consumption and Minimum Par Level Forecasting Model: Uses past consumption history to forecast minimum par level requirements going forward, while taking into account each item's usage history, order lead times, and EOQ (ordering costs and inventory holding costs) when available.

2) Procedure-Based Demand Planning Model: uses scheduled or anticipated types of cases and the associated supplies and implants that would be required for each type of case, based on prior consumption history.

Consumption Forecasting (Mar 21 - Dec 21)



Below is an example of a specific case: Ablation-RFA and the anticipated % likelihood that each of the below items will be needed, based on the previous two years of usage history of supplies usage for this type of procedure.

VUEMED ID	Manufacturer Product Name	Catalog Number	Year 1 Usage	Year 2 Usage	Year 3 % Likelihood Will Be Needed
417671	Intraoperative Probe Cover	PC1308	25	2	80%
417773	Banded Bag	60050S	20	2	73%
423006	CVL Cath Lab Pack	LLCA38A	22	2	73%
10892	AVANTI+	504-607X	15	2	67%
10896	AVANTI+	504-608X	19	2	67%
22002	Percutaneous Entry Thinwall Needle	G00166	22	1	67%
61557	Carto 3 External Reference Patch	CREFP6	17	1	67%
410599	PRO-PADZ	8900-4006	17	2	67%
10888	AVANTI+	504-606X	21	1	60%
417777	Video Camera Drape	9900	17	1	60%
10882	AVANTI+	504-605X	10	0	53%
34919	Dynamic XT	BAR201101	13	0	53%
416674	Drape Dome	03-KP18	8	2	53%
417896	Supreme	DAI401860	9	0	47%
34896	Adult Non-REM PolyHesive	E7506	7	1	40%
397461	PentaRay Nav ECO	D128208	7	1	40%
50471	BRK XS	G407209	4	1	33%
397550	Swartz	407453	4	1	33%
409942	SoundStar	R10438577	5	1	33%
417295	Thermocool SmartTouch	D134702	4	1	33%
417894	Supreme	DAI401891	6	0	33%
423134	Webster	BIOD6-DR-252	10	0	33%
50568	Adult REM PolyHesive II	E7507	7	1	27%
422939	Inquiry	IRV81104	5	0	27%
10877	AVANTI+	504-604X	2	1	20%
411355	Dynamic XT	M0042011010	5	1	20%
418202	EnSite Precision Surface Electrode Kit	EN0020-P	2	1	20%
47294	Agilis NxT	408310	2	0	13%
68081	Livewire	401914	2	0	13%
416678	Tegaderm IV Advanced Securement Dressing	1688	1	1	13%
8661	Perclose ProGlide	12673	1	0	7%
127568	Thermocool SmartTouch	D133602	1	0	7%
127898	Attain Command Sure Valve	6250V-MP	1	0	7%
155083	GlideSheath Slender	80-1060	1	0	7%
407818	Supreme	401979	1	0	7%
410358	TYRX Asorbable Antibacterial Envelope	CMRM6133	1	0	7%
424580	Tegaderm CHG Chlorhexidine Gluconate IV Securement Dressing	1657	0	1	7%

Conclusion

Accurate, reliable and automated data capture – from point of entry in the facility to point of care in a patient procedure – is, without a doubt, the most essential piece of the healthcare supply chain data puzzle. Such data not only enables hospitals to control and optimize their clinical inventory, but also feeds KPI programs that monitor performance, measure savings, and guide improvement opportunities.

Information truly IS power – the power to analyze and decide, the power to make changes and adapt, the power to succeed and excel.

About VUEMED

VUEMED is a SaaS and Cloud-based healthcare IT company that solves acute inventory management, supply chain and product utilization documentation problems in hospitals with its suite of advanced UDI-compliant RAIN RFID, mobile and barcode scanning solutions. VUEMED's vision is to transform the healthcare supply chain into a value chain, with tools that promote greater transparency and provide more comprehensive and accurate data to improve efficiency, savings and revenue capture, enhance patient safety and care quality, and guide better decision-making.