Health System Supply Chain

INSIGHTS 2016

Results of the Third Health System Consolidated Service Center Practitioners' Survey

'Diving deeper into the model and the metrics'

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Industry Context

This Report was produced as the introduction and the context for the most recent Consolidated Service Center Survey of 2014. That was not very long ago, yet it seems like a very long time ago. Much has happened in the industry, yet much has remained the same. And that applies to the management of supply chain in healthcare providers and suppliers, alike.

What has remained the same, and what is 'new'?

While the factor found in the responses to the 2012 and 2014 Surveys is the same, what has continued to grow and intensify, is the degree to which Supply Chain and senior executives, recognize that a leading means/strategy to offset reductions in reimbursement brought about by healthcare insurance reform (the Affordable Care Act - ACA), along with continuously rising expenses, is Supply Chain Management. That recognition continues to provide Supply Chain executives with great opportunities, as well as increased expectations of senior executives and users/care givers, for continuously improved performance. That means significant annual expense reduction (of double-digit percentage, or double-digit dollars of expense/spending), quality of services and support for patient care. Further, dramatically shortened timeframes for the improved performance to be achieved continues and increases the stress level for the Supply Chain executives.

As is was reported in 2012 and 2014, one of the primary drivers of the increase in the pace of evolution of provider supply chain models, is the discovery (via research of several organizations, including the Healthcare Financial Management Association [HFMA]) validation and acceptance that, when measured using an '*activity based cost*', or a '*cost accounting*' method, the *total annual supply chain expense* in a hospital – therefore, for an IDN, has reached ***50%*** of total annual provider operating expenses! While this was viewed skeptically by supply chain veterans and senior executives alike, for the first few years after the unveiling of this factoid (circa, 2009), more providers have actually measured it for themselves. They have validated the original research findings.

For the remaining skeptics in 2016, this revelation and its acceptability requires a change in perspective, definition of and approach to managing *supply chain expenses*. The total hospital operating expense pie had historically been split between *labor*, at about 70% of the total, and *other* expenses, at about 30% of the total. When considered functionally and not according to allocations to cost centers, expenses associated with all people (nurses, clerks, dieticians, engineers, administrative assistants, pharmacists, purchasing staff, etc.) that spend any amount (26 minutes or 8+ hours, etc.) of their daily working time doing supply chain related tasks (counting stock on shelves, completing requisitions, 'looking' for needed items, negotiating contracts, meeting with sales reps, driving to the hardware store for parts, etc.) are added to the total spending on consumable products of all kinds (drugs, food, maintenance, medical, devices, etc.), plus non-professional (legal, department management outsourcing, auditors and consultants, etc.) services, that total is about 50% of total annual expenses for a hospital. So, the new, 50% (supply chain) total is comprised of *a portion* of the 70% for labor in the historical expense pie, plus the remaining expenses associated with procurement of products and services.

That has provided the motivation and fueled the momentum to pursue many different supply chain models, especially those formerly considered too risky and/ or likely to go the way of the dinosaur. Creativity and an increase in risk taking are more acceptable in today's era of payment reduction/reform.

Remaining basically the same is the *physical* supply chain model used by most healthcare providers, which happened to evolve in an environment which included: cost and volume based reimbursement, fragmented management responsibility and looser accountability, preference for decentralized supply chain activity, a lack of formal and multi-industry supply chain knowledge and expertise, and application of those principles, and a virtual dearth of a strategic and data driven supply chain plan.

Struggling with this fragmented or decentralized structure, health systems frequently looked to third parties in the supply chain to provide the strategies, rationalization and consolidation opportunities; new models and other innovations (such as in information technology). In the US in particular, GPO's stepped in to consolidate sourcing and contracting, while distributors of all types (medical-surgical, pharmaceutical, lab, food, office supplies, etc.) provided a certain level of logistics aggregation for consumable products.

Despite movement toward consolidation, most health systems are still managing multiple supply channels into their hospitals and other care delivery venues. This is magnified for IDNs with dozens of provider sites in their networks. At best, consumable supply and purchased service spending (purchases) through their GPO contracts represents only about 60-65 percent of providers' total annual spending on products and purchased services. The share represented by purchases from medical - surgical distributors is far less; somewhere between 10 and 25 percent.

This means that health systems still have to contract for the balance (sometimes majority) of spend not covered by the portfolio of GPO contracts and obtain the majority of their supply volume and/or value, either directly from the manufacturers and/or through a number of specialty distributors. The point of aggregation of this physical supply chain model is the hospital receiving dock or site of care delivery.

During the 10-15 years running up to passage of the ACA, certain provider supply chain executives realized that this is not the optimum model, and in the last few years, many more have joined that school of thought. Rather, the historical model generally results in too much fragmentation, lack of visibility of product and movement, higher overall unit prices and total supply chain expense.

As of 2016, there are over 50 known CSCs, with a dozen or more currently known to be evaluating, planning or developing a CSC. This is an increase of over 25% since 2014 and over 47% since 2012. In Canada, the increase in growth is lower as a portion of the total (from 20 to 23 between 2014 and 2016), but that is because, as mandated by the Ministers of Finance in all of the Provinces in the 1990s, the Shared Service Organization (SSO) model, as it is called in Canada, was born. Many SSOs were initiated soon after the mandate. The combined record of growth, performance and sustainability reported in each of the Surveys, hardly seems like a model that is a fad or 'flash-in-the-pan', as some still consider it.

So, what is a Consolidated Service Center (CSC) model? This model allows multi-site provider organizations to leverage their volume and scale, and enhance the productive use of all assets. In its 'purest form', it can be

defined as one by which a health system consolidates sourcing, contracting and procurement, and facilitates direct trading relationships with product manufacturers, that historically relied on distributors/wholesalers to market and distribute their products.

CSCs generally (but not always) have a single (for most, but some IDNs that have provider sites that are widely dispersed geographically, might have a more/several) of dedicated facility, in which (all, or at least many more than in the historical model) consumable supplies used by the IDN (and a growing number of implantable devices) from all supplier sources, are received and maintained, for a defined period of time. At pre-determined and some random times, products are sent to all provider points of use, eliminating the need for a General Storeroom at each hospital or other facility, via a consistent, efficient and integrated transportation network and infrastructure.

The products sent at scheduled delivery times are merged with (the exception) items that are received randomly at the consolidated facility, but not for storage at that location. This allows the benefits from aggregation, and cross utilization of space and the transportation infrastructure to be experienced. This also reduces total operating expenses for all care locations within the IDN; the more items sent with each delivery (the 'fuller' the truck going to those locations anyway), the lower the cost of delivery for each item. This approach is similar to the more advanced supply chain management practices already adopted by the Retail, Technology and Automotive industries, with great success. It is also referred to as a 'hub and spoke' concept.

Some of these consolidated supply chain operations and facilities serve as the foundation for other consolidated services that can take advantage of the benefits of space, management, transportation infrastructure and resources, with minimal additional marginal costs. The other services includes a few or many of the following: mail, printing, laundry/linen processing and/or distribution, record storage, pharmacy unit dose packaging and compounding, case cart filling, centralized sterile reprocessing of surgical instruments and custom pack assembly. Each additional service may even generate its own return on investment and contribute to the overall model's ROI, by sharing overhead and infrastructure.

Reported reasons for adopting this advanced supply model generally fall into three categories – total supply expense reduction, quality / service level enhancement, and management control. That has been consistent for all three Surveys.

Total supply system costs are reduced by optimizing the entire "enterprise" supply chain for the complete catalog of *consumables* (tens of thousands of products and devices vs 1000-2000managed by the "official supply chain team" in the hospital/site General Storeroom, in the historic model), as well as all types of provider locations (hospitals, clinics, long-term care sites, ambulatory surgery facilities, etc.). Further, it provides the physical visibility of what products are being ordered directly by the sites, which facilitates includes standardizing and enhancing a health system's supply chain *processes*, from the point of origin (manufacturer), all the way to the points of use, not just the receiving dock at each destination facility. Service levels are reportedly improved relative to conventional supply chain models through focus, repetition, standardization and even some level of information technology tools.

Suppliers/Manufacturers are responding to this provider supply chain model evolution, and are recognizing the benefits of a channel that requires delivery (for those that ship directly to customer, and do not use a distributor) of their products to the customer's single location receiving point, rather than to 5, 10, or many more sites. This reduces their cost of sales and distribution. It also allows manufacturers to invest capital in product development and/or marketing, rather than distribution resources and/or the likes of a new warehouse management system. The achieved savings are usually shared between these suppliers and their customers – the CSC.

Distributors are also re-thinking and developing their revised role in the supply chain. In some cases, they will provide a CSC with a defined segment of the products that the CSC decides it does not want to handle; lab items or drugs might be one of those categories. In other approaches, the distributor provides outsource management of the CSC, acting like a Third Party Logistics (3PL) company. In that case, the CSC is able to obtain expertise, capital, and other resources it might not be able to obtain cost effectively. More creative models are continuously being developed.

The benefits of providers consolidating, standardizing, and aggregating the entire supply chain: order management, product distribution and ancillary services that do not "touch the patient", from point of origin, to the point of use, by applying lean engineering to achieve optimization, are significant. Yet, they don't reach true optimal levels until the associated purchase contracts are amended to reflect the spectrum of costs that are removed. In some applications of the CSC model, GPOs are used for selected item contracting. This is similar to distributors handling a segment of products that the CSC does not want to handle. Frequently, the GPOs handle commodity products for which their national volume aggregation results in lowest prices available. Note that too many of these exceptions and carve-outs may reach a point at which total savings are reduced.

IDN's are discovering the value of "self-contracting" and how contract prices and terms can be enhanced as a result of aggregation, standardization and "guaranteed commitment and compliance". Survey responses indicate that commitment and compliance is a challenge for the CSC/IDN, but much less of a challenge than it is for a national GPO contract. Self-contracting is strategically interdependent with self-distributing. The ability to offer market share growth or stability, plus the more optimized distribution model, can be very valuable to manufacturers/suppliers. The benefits achieved are shared with the CSCs.

The growth of CSCs is accelerating. The model is evolving, too. A single IDN might now co-develop a CSC with other IDN's. The role of the GPO in these models is also evolving. There are potential roles for other 3rd parties (warehouse operations, transportation services, etc.) that can support the model for the IDN(s), and bring expertise and/or resources not readily available to the IDN. These can also reduce capital outlays required by the IDN. There has been a continuing evolution in the information technology tools available that enhance the visibility of the total supply chain's performance and costs, further helping the CSC model to achieve and maintain success.

Prior to the completion of the inaugural 2012 Survey of SSOs and CSCs, by the same authors, and this 2016 edition of the Survey, the industry lacked an objective and unbiased "data-based picture" of this evolution (revolution?). The findings of this Survey can help educate and potentially guide supply chain leaders, in all

sectors of the healthcare industry, through the evaluation of the potential fit (strategic, cultural, financial, geographic, etc.) and feasibility of the model. The 2016 Survey validated many of the findings of the 2012 work, while adding both depth and dimension to the data and other findings.

Goals & Objectives of the Survey

Supply chain is a core discipline within Health systems. It has the ability to marshal resources efficiently, to support clinical care processes and provide insights into the management of cost, quality and outcomes.

As with supply chains in other industries, there is no one right or wrong answer, no magic model that is better than all others but there is always room for improvement. Part of the journey to improvement is using data to inform our progress when measured against ourselves and also against our peers.

This is the third in a series of Health Systems insights that is focused on the use of Consolidated Service Centers ('CSC') in Healthcare. Our objective is not to promote one supply chain model over another but to use practitioner-sourced data to increase the understanding of how the CSC model is being used in Health Systems.

Our first survey (2012) questioned the return from the implementation of consolidated service center models. It concluded that systems experienced significant cost benefits (on average 8.9% on materials spend) but they had done so with a variety of operating models.

In the 2014 Survey, we dug deeper into the key value drivers within the consolidated or shared services supply chain. It concluded a mix of value from both procurement and logistics activities complementing each other within the supply chain. It also provided insights into the commercial contract savings that systems were able to unlock within the model.

With the CSC model now reaching maturity for a number of health systems, our focus with the current survey is on the ecosystem that exists post implementation. We take a look at the sustaining roles of partners, the procurement and distribution strategies by product categories and the metrics that are in place to drive sustaining value to the Health systems.

We will provide some commentary as a potential interpretation of the data from the survey but we also provide access to the survey data itself and encourage others to use it to inform their own understanding of the model.

We sincerely thank those that have given their time to support this survey and we remain available to answer their questions on where they stand within the results presented.

About our Sponsor

We are delighted to have TECSYS on board as a sponsor for the 2016 research. They are an important supplier to health systems and they understand the benefits of increasing the body of knowledge and research on innovative supply strategies in Healthcare.

TECSYS provides transformative supply chain solutions that equip customers to succeed in a rapidly-changing, omni-channel world. TECSYS solutions are built on a true enterprise supply chain platform, and include warehouse management, distribution and transportation management, as well as complete financial management and analytics.

TECSYS is the market leader in supply chain solutions for health systems and hospitals. Over 600 mid-size and Fortune 1000 customers trust their supply chains to TECSYS in the healthcare, service parts, third-party logistics, and general wholesale high-volume distribution industries.

TECSYS' shares are listed on the Toronto Stock Exchange under the ticker symbol TCS.

A Note about the Terminology

Throughout the document we make reference to both Supply Chain Shared Service Organizations and Consolidated Service Centers. Other terms that exist within the industry include Integrated Service Centers and Distributed Integrated Service Centers and Health System Self Distribution models.

A Shared Services Organization (SSO) or Consolidated Service Center (CSC) is an enterprise developed to provide consolidated and centralized supply chain and other support services to hospitals and healthcare providers, in a defined geographic area and distance from the 'center'.

In Canada, SSO is the preferred name. In the US, it is CSC. In addition, in the US, a Service Center Model is known by a number of names used in the healthcare industry such as: Integrated Service Center, Regional Service Center, Distribution Operations Center, etc.

The service center's "customers" usually are healthcare provider organizations with a common corporate ownership (such as an IDN), or unaffiliated providers in a geographic market that collaborate under various forms of legal and governance structures.

While each of these terms are different, they all fall within the spectrum of a specific form of health system supply chain transformation.

The individual activities of forming a shared services organization or consolidating the materials flow through a consolidated service center do not in themselves drive the full value of the transformation but they can be important enablers of a larger change that includes product standardization, clinical engagement, the development of treatment formularies, improved contracting, streamlined logistics and information flows.

Survey Methodology

About 60 health systems in the U.S. that have some derivation of the model were identified and were personally invited to participate in the survey.

The survey was issued as an online survey which included 29 multi-part questions for each participating health system. The surveys were completed between April and June 2016.

The survey requested financial information, procurement and distribution model profiles, insights into the role of distributors, GPOs and direct supplier relationships, metrics data and qualitative inputs.

22 Health systems (36%) submitted responses to the survey with 14 systems (23%) completing every question in the survey.

Information was provided on the basis that the individual health systems contributing would not be identified from the research.

Respondent Profile Summary

The following table provides an overview of key profile attributes of the responding systems with a mean or average, the minimum value of an attribute as well as the maximum value seen in the responses. This represents the aggregate values for the customers of responding IDN's operating CSC.

Measure	Range of Respondents	Mean Response
# Acute Hospitals	2 - 168	24
Ambulatory Centers	0-116	18
Doctor Clinics	0-300	118
System Revenues	$.69Bn - $39.7Bn	$7Bn
Supply Spend	$197M - $6.6Bn	$1.2Bn

Summary of Observations

In this report we peel back the onion from being just a CSC enabled supply chain, to look at the variations that exist in procurement and logistics strategies and across the responding CSCs and different product groups. We also look beyond the implementation phase of the CSC to understand the metrics that are being used to measure and track improvement within the IDN's supply chains, and the gaps in and challenges associate with accumulating these metrics.

The traditional CSC model appears to be at its most 'pure' in Medical and Surgical Devices and Medical Consumable supplies. Pharma and Drugs remain heavily weighted towards the traditional GPO and wholesaler model.

GPOs and Distributor relationships evolve rather than disappear with the introduction of the CSC model. GPOs continue to provide extended contracting for commodity products, allowing CSC procurement teams, to focus on higher value- add categories and providing them with benchmark costs, tools and processes to facilitate additional pricing improvements.

Distributors continue to support a breadth of lower value commodity items, streamlining the order to cash process and reducing the number of orders and invoices to be processed. They also provide coverage to remote facilities and they play an important role in contingency planning.

Health systems would benefit from a common set of operational metrics and sharing of some benchmark data. Baseline performance, savings and cost to serve metrics do exist but there is a lack of consistency in what is measured and how it is calculated.

Data compliance, access to reliable information and disparate IT systems are the greatest challenges to the use of and management by metrics; exacerbated by a lack of industry standards and benchmarks.

Standardization and increased visibility and control over inventory are considered to be the largest value drivers for the CSC model but many see the platform that the CSC provides for further initiatives and its impact on clinical relationships, as an added benefit in the longer term.

The move towards a CSC is a process that has facilitated discovery of many additional value-add functions for health systems. The initial implementation should not be underestimated Communication with executive, supply chain and clinical staff should emphasize the level of transformation being undertaken. It is a complex change management initiative, but all those who have provided input indicated that they would do so again.

Summary of Key Learnings

We have added to the list of key learnings that we initiated in 2012 and now carry forward to the 2016 report.

1. Unexpected savings achieved with physician preference items ('PPI').
2. Logistics and contracting savings feed into each other in this supply chain model
3. *There is no single supply chain model for all systems but there are guidelines on the key value drivers in the model*.
4. Overall cost of the service is reduced and the CSC model can provide a platform for future health system service improvements and cost benefits.
5. Health system executive commitment is essential.
6. This is a significant change for all stakeholders in the health system. Planning and communication are critical for success.
7. Include clinician customers from the beginning.
8. Invest in the right supply chain information technologies – they self-fund.
9. Clean data, clean it some more and keep it clean.
10. Plan to upskill the internal supply chain talent through training and the addition of experience supply chain resources.
11. *Have more experienced leadership in place from day one to lead a complex CSC operation.*
12. *Invest in the appropriate industrial engineering and lean six sigma resources to ensure a sustainable process and product movement.*
13. *Standardization should be an early part of the process and will help the later implementation.* If operating a collaborative model, consider getting it right internally first and then set criteria for who joins.
14. Don't under-estimate and under-invest in change management.
15. Develop a long term space plan and revisit it annually to adjust for any unforeseen changes.
16. Set a baseline for current costs to measure the benefits of the model changes.
17. Track qualitative benefits.
18. CSC's and in-hospital storerooms are not the same.
19. 100 % of respondents would do it again.
20. The journey does not stop with the implementation of the CSC model. It provides a platform for future supply chain improvements.
21. *Metrics provide key guidelines for decisions to sustain the improvements post implementation. Adopt industry standards and benchmark where possible.*

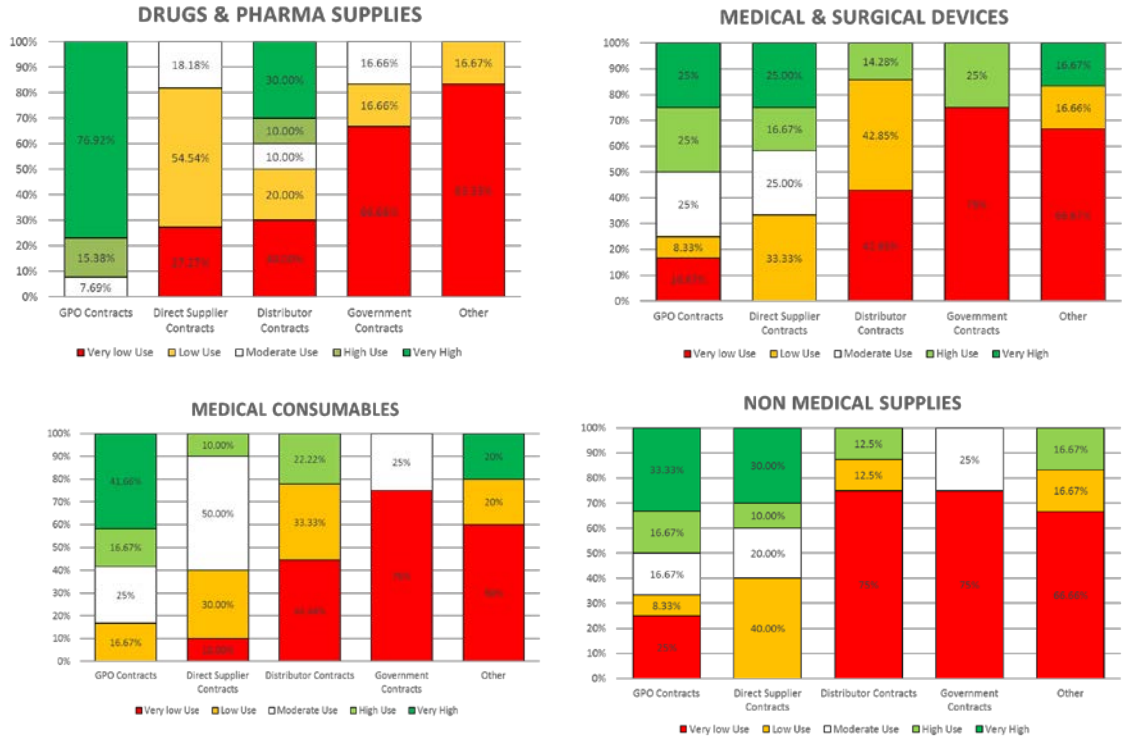
Procurement Model Observations

The notion of a 'one size fits all' CSC model is quickly dispelled when looking at the variations that exist in both the procurement and distribution models.

Participants were asked to estimate the amount of spend in each product category that is sourced from GPOs, Direct supplier contracts, Distributor contracts, Government contracts and other sources.

- 75% - 100% of spend - very high use
- 50% - 75% of spend - high use
- 25% - 50% of spend - moderate use
- 10% - 25% of spend low use
- < 10% of spend - very low use

The charts below show the % respondents with each concentration of spend.



This shows a diversity in contract sources by product category. Even with a CSC in place drugs and pharma spend remains concentrated with GPO contracts. GPO contracts are utilized across each of the product categories.

Distributor contracts are also highly utilized in the drugs and pharma category and exist to a lesser extent in the other product categories.

We explore further the residual relationship with GPOs and Distributors through some qualitative comments later in the report.

Medical and Surgical Devices, Medical consumable supplies, and non-medical supplies show a higher concentration of direct supplier contracts – which we would traditionally expect in conjunction with the CSC model.

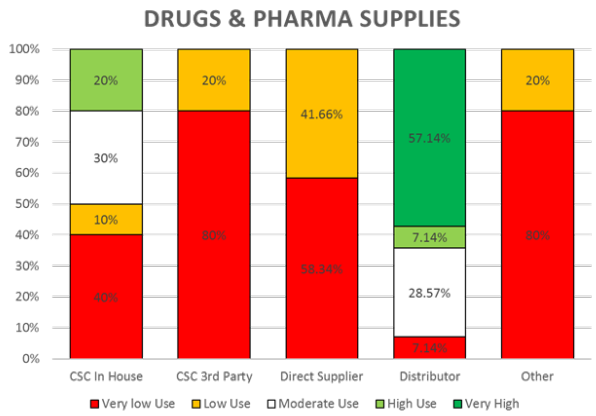
Distribution Model Observations

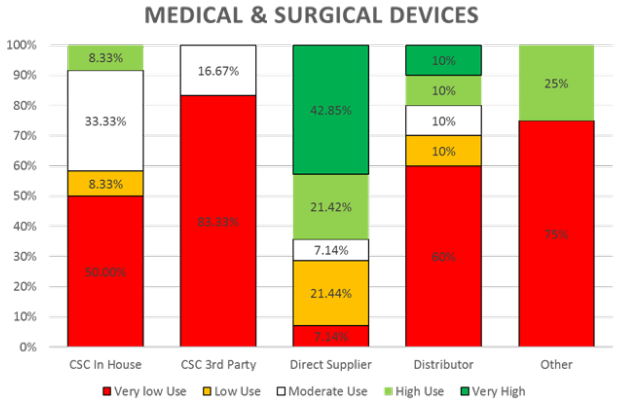
We sought similar profile information in relation to the distribution model for the same product categories. Participants were asked to estimate the amount of spend in each product category that flows through CSC with self-management CSC run by a third party, Direct supplier deliveries, Distributors and other sources.

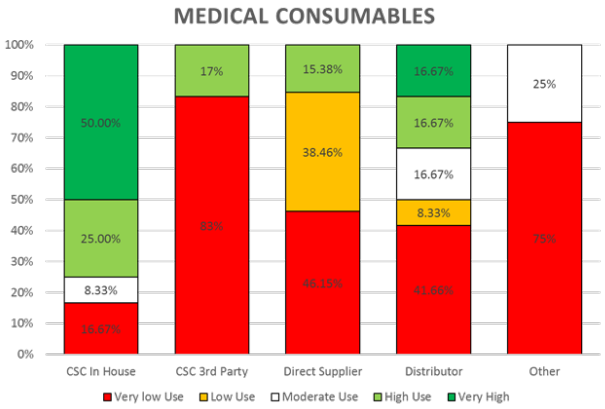
- 75% - 100% of spend - very high use
- 50% - 75% of spend - high use
- 25% - 50% of spend - moderate use
- 10% - 25% of spend low use
- < 10% of spend - very low use

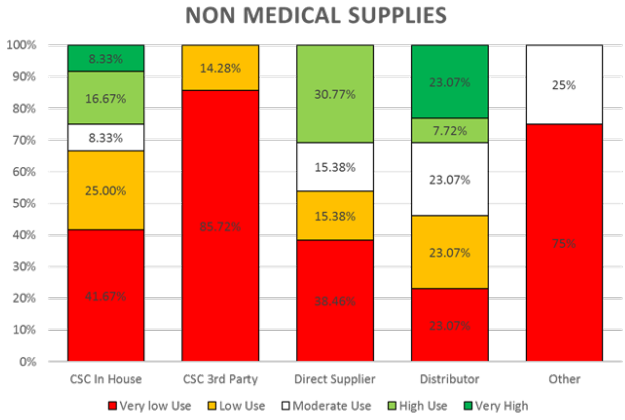
The charts below show the % respondents with concentration of spend with each source. This is reflective of the traditional CSC rollout with the highest concentration being in the area of medical consumable supplies. The predominant model is also an in house managed CSC, despite the fact that a number of 3rd party CSC models are beginning to emerge.

Drugs and Pharma remain dominated by wholesale distribution, although some more mature CSCs include this within their scope.









What the procurement and the physical distribution profiles both illustrate is health systems running a CSC model do so across a spectrum of products and are working with a different combination of partners.

We asked participants to provide some narrative on the sustaining role of partners within their supply chain model. This provides some qualitative inputs to support the quantitative questions.

Role of GPO

We have already seen that the GPO remains a critical partner – in particular for Drugs and Pharma supplies. The comments about the role of the GPO includes some common themes:

- Extension of our procurement / supply chain team – integrated approach to deliver value.
- Provides a benchmark on commodity items and enables our procurement team to focus on higher value items or to use the benchmark as a base to be improved upon.
- They bring pricing, operational, clinical and analytical tools to identify cost saving and efficiency opportunities. Some GPOs are seen as providing cost management solutions rather than just commodity pricing.

One of the key themes is a sense of the GPO being used to provide additional coverage and bandwidth to execute a strategy that is being managed by the procurement team within the IDN.

Role of Distributors

In a similar fashion Distributors appear to be used in a thoughtful and targeted fashion under the CSC model. The most common themes from the survey include the following.

- Commodity and lower end products – reduce PO and invoice volume to streamline order to cash process.
- Provides next day pharmaceutical products to acute care and retail pharmacies.
- Maintain a percentage of spend with distributors as a backup to the CSC model and to support geographically isolated facilities.
- The distributor allows us to focus on the high dollar procedural supply chain while they handle the small dollar/high volume commodity chain.

Contingency backup

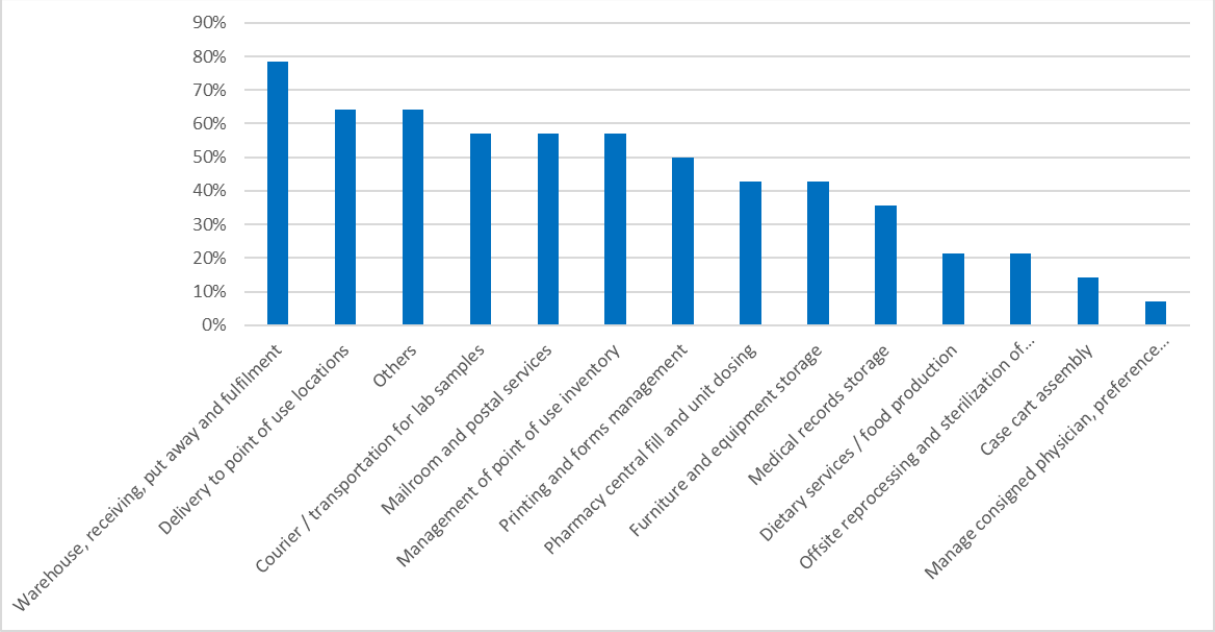
Maintaining the distributor relationship is seen as critical for many as part of their contingency plans which appeared to some variations on five key strategies:

- Back-up service from primary distributor and secondary distributor with Low Unit of Measure capability.
- Back up stock at each CSC site
- Agreements with key suppliers to maintain product flow.
- Support from other CSCs as backup DCs.
- Maintenance of 'warm' sites to relocate procurement and administrative resources if needed.

CSC Services Scope

As noted in the 2012 and 2014 research, the scope of CSC model has expanded beyond the traditional warehousing/distributing, to point of use. The capability is expanded over time to deliver additional value in mail room, lab, pharmacy, central sterile and other functions as listed below.

% of respondents that fulfil each function within the CSC



Other functions that were listed included IT and Biomed services, Mail Order Pharmacy, OR Module with consignment, bed repair and administrative functions.

The list of functions and progression beyond the initial model is consistent with that shown in prior years' research.

CSC's were reported as typically located within 1 (60% respondents) hour travel time to acute facilities with 70% indicating a max travel time to acute facilities of 3 hours or less.

90% of respondents managed transportation from the CSC with a combination of their own fleet and couriers. The remaining 10% used a dedicated 3rd party fleet for their transportation needs.

Managing Supply Chain Performance

One of the key themes of this year's survey was to understand the supply chain performance measures in place for IDNs and the CSCs. Most of the research published to date provided measures of performance improvements (metrics) from a baseline but little has been published around comparative benchmarks between CSCs. With increasing numbers of CSC models, and many becoming more mature, benchmarking supply chain performance has the potential to identify potential areas of supply chain performance improvement.

Before we can benchmark however we need to understand what data is currently available and being tracked by IDNs with a CSC.

We took a sample of supply chain metrics commonly used in other industries and asked participants to indicate whether these were in place at their IDN today. It is appropriate to remind readers at this stage that the following are based on self-reported values of the metrics, and we have not undertaken any audit or validation of participant responses.

Key Supply Chain Metrics	% In Place
%product availability at the point of use	64%
%fill rate to customer locations	93%
Perfect Order Index	43%
% or orders delivered on time to customer request date	57%
% orders delivered on time to commit date	57%
Manage by exception to back-ordered parts	43%
None in place	14%

There appears to be primarily a service level and fill rate focus, with lower levels of attention to performance relative to customer expectations and process consistency, that would be required in the Perfect Order Index.

Supply Chain Responsiveness and Cycle Time	% In Place
Total order cycle time	79%
Warehouse order cycle time	79%
Receiving time - Dock to stock	43%
Purchasing / approval cycle time	64%
Supplier order cycle time	64%

Overall cycle time metrics are generally in place, but may miss out on managing the components that make up that cycle time.

Overall Supply Chain Cost	% In Place
Total cost to serve	50%
Supply chain cost as % product cost	57%
Supply chain cost per procedure	71%
Procurement savings delivered	79%
Supply expense per adjusted patient day	93%
Supply expense per adjusted discharge	79%
Supply expense as a % of total operating expense	93%

Cost metrics – supply expense as a % of total operating expense and supply expense per adjusted patient day provide overall target measures, whereas supply chain cost per procedure should provide a more robust measure that includes cost to serve.

Warehouse/Operations	% In Place
# order lines picked per FTE / Hour	93%
# orders picked per FTE / Hour	71%
Inventory count accuracy by location	71%
Inventory turns - owned inventory	93%
Inventory turns - consigned inventory	36%
% slow moving inventory (>365 days on hand or similar metric)	79%
Value of obsolete / expired inventory as % of total value distributed	79%
Supply chain operating expense per order line shipped	50%

Not surprising given the CSC focus, that there is a higher level of functional metrics in place for the warehouse and procurement functions.

Purchasing	% In Place
% of spend under contract	79%
% of invoices not requiring manual intervention	79%
% of supplier orders received on time	57%
Number of products (SKUs) managed per purchasing FTE	43%
% Purchasing savings delivered / total spend	71%
% purchase orders managed by EDI / Web	100%
Average number of order lines per purchase order	93%

Point of Use	% In Place
Number of inventory turns at the point of use	79%
% product expiration	57%
% product shrinkage	50%
None in place	29%

The metrics in place reflect the service focus of IDN supply chains and functional metrics in both procurement and warehouse operations.

While these may be limited compared to those published by APICS (http://www.apics.org) or WERC (http://www.werc.org/) the ability to benchmark even a limited set of metrics between peers would represent a major step forward for health system supply chains.

Asked if they would see benefit in being able to benchmark these metrics against peer organizations the participants gave a resounding:

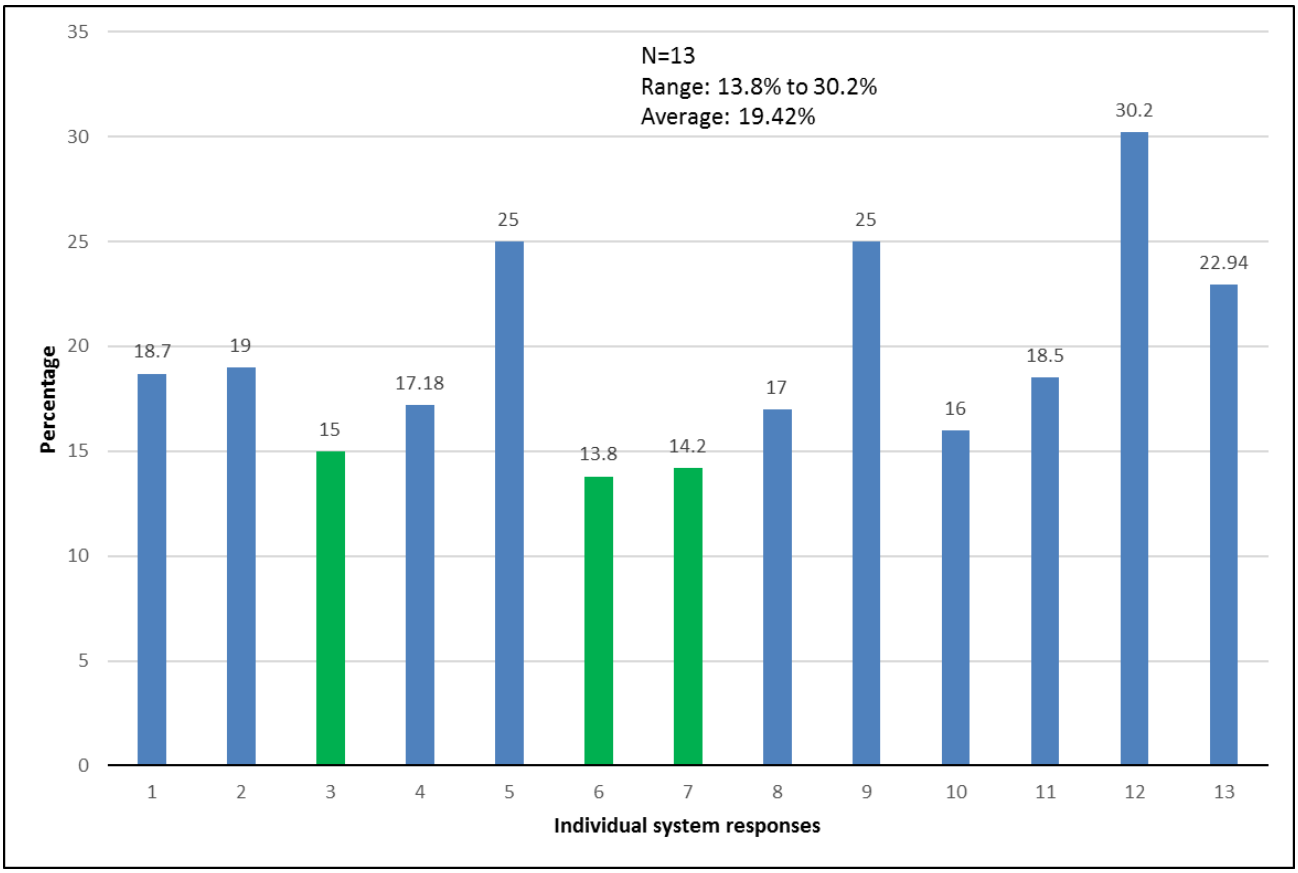
100% - Yes.

This is something that the authors and sponsor of the survey will consider as a follow up to this report.

Selected Key Metrics

Not knowing the level of metrics that would be available, we challenged our participants to share a small number of key measures from their health systems.

Supply spend reported as a % of total operating costs



Although the number of respondents is limited, the opportunity to benchmark key metrics throughout the supply chain has the potential to assist in identifying and driving further supply chain improvements.

A pre-requisite for this however would be a common set of metric's definitions and inputs to ensure that we are comparing like with like, and some level of validation to remove 'noise' from inaccurate reporting into the data set.

In the following metrics we have highlighted the overall range, the average result and also highlighted the average of the top 3 performers.

	Range	Average	Top 3
% Fill rate - on time and in full (order)	92% - 100%	97.7%	95%
Inventory Turns for owned inventory	10.8 - 122	16.85*	15
Total order cycle time	12hrs – 7.2 days	63.36 hours	NA
% Spend under contract	83% - 96%	85.3%	84%
% Purchasing savings delivered / total spend	2% - 10%	2.5%	4%

* Excluding outlier of 122 turns

With a higher volume of participants and a broader range of metrics it would be possible to develop a profile of highly effective healthcare supply chains. The limitations of the current data set are outlined across the following metrics:

Number of products supported	Range	Average
Drugs / Pharmaceutical Supplies	597 – 19,500	7,364
Medical and Surgical Devices	900 – 65,000	17,271
Medical Consumables	1,000 – 13,009	7,762
Non Medical Supplies (excl dietary)	100 – 4,000	2,564

SKU consolidation is a generally accepted as a key driver of savings within the supply chain. Of the top 3 performers (based solely on supply spend as a % of total operating costs) one is at the lower end of the range of skus supported, one is at the higher end and the third is in the middle. There are clearly other factors at play and insufficient data points to drive operating conclusions.

Another observation in relation to the top 3 performers (again based on the single metric as above) is that one of the three is only at the evaluation stage for a CSC. In theory at least they would not have reflected the benefits of the CSC model but we can observe from their data that they have already perform well when it comes to SKU consolidation.

Participants were asked whether IDNs could drive the same benefits without the benefit of implementing a CSC. Only 33% responded that they believed this was possible but, this singular response may provide a hint that some of the benefits at least are possible.

Looking outside the Healthcare industry, much work has been done by WERC, APICS and others on metrics and benchmarks. Rather than reinventing a healthcare specific set of metrics, it may be worth adopting and adapting current best practice and creating supply chain benchmarks that extend beyond healthcare.

Gartner has also published a supply chain maturity model which may be useful for future consideration which is referred to as their "Demand Driven Value Network ".

The five maturity levels within this framework are:

Level 1 - React (business unit focused, often misaligned or siloed objectives)

Level 2 - Anticipate (some supply chain functional performance improvements over Level 1);

Level 3 - Integrate (integrated, cross functional supply chain decision-making);

Level 4 - Collaborate (profitable demand-driven fulfillment through internal and some external collaboration); and

Level 5 - Orchestrate (profitable shared value creation through innovation across internal/external networks).

While Gartner will recognize that few companies ever reach level 5 in this framework, it appears that many of our health systems are operating in the range of Level 1 to level 3.

Most Critical Metrics

We asked participants to identify the 3 most critical supply chain metrics in their view. Although this was an open ended question there was significant consistency in the responses provided.

In order of response frequency these fell into the following themes:

Cost to serve metric: Supply chain cost…	As a % of net patient revenue As a % of operating expenses Per adjusted admission Per adjusted discharge Per procedure / case
Cost savings metric:	Cost savings delivered Value delivered
Service level metric:	% fill rate %product availability to the point of use
Others:	Order cycle time Supply chain ROI % Spend under contract Customer satisfaction Supplier and SKU rationalization GL Balancing

Establishing consistency and some common definitions around these metrics would be beneficial for the industry.

Metrics challenges

We provided participants with a list of key challenges to rank in order of most to least challenging. The consolidated ranking from all participants is below in order of most to least challenging:

Most Challenging  Least Challenging	Challenges with data capture compliance within the IDN
	Access to reliable information
	Multiple information systems that are not connected or integrated
	Lack of common definitions / practices
	Lack of external benchmarks (other reported metrics from Health systems for comparison)
	Availability of bandwidth and talent
	Lack of IT capabilities
	Lack of executive attention and support

The top 3 challenges relate to information systems' environment and our ability to make data capture a seamless part of the day-to- day profile. The IT landscape at many IDNs is typically one of many disparate systems that have limited connectivity or ability to build a picture of the end- to- end supply chain.

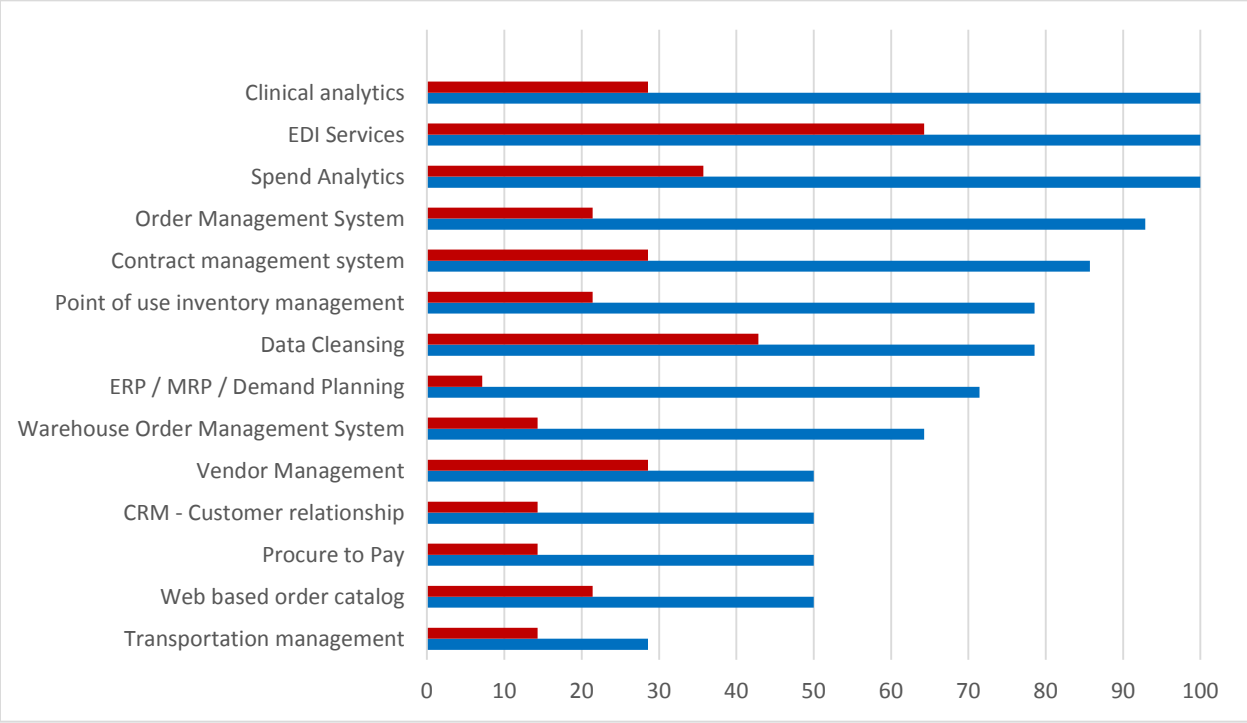
We outline some of this from an IT systems profile captured later in the report which shows a high % availability of key systems but few examples of enterprise systems that provide true supply chain visibility.

The lack of common definition and practices and the lack of external benchmarks are an industry problem but one which could be resolved by a group of interested systems, willing to collaborate in this regard.

The authors of this report would be willing to help facilitate some of this discussion if parties show sufficient interest.

IT Systems

Percentage of respondents with systems in place



Information Technology enablement is a critical part of the value within all IDNs. In this context it was interesting to see the execution systems complemented by a high level of access to analytics, data cleansing and spend management systems.

Key technologies in place by category included:

Clinical Analytics	EPIC, SAP / Business Objects, Crimson, Advisory board, IBM, In house
EDI Services	GHX, Cloverleaf, MCMS, Internal, Data Trans
Spend analytics	Vizient, ECRI, Novation, Crimson, Meditech / HBI
Order Management	Lawson, Coupa, SAP, Infor, AtPar, Meditech
Contract Management	Ecton, HEMM, Fortis, Contract Guardian, Bravo.
Point of use inventory	Tecsys, Pyxis, Par Excellence, Q Sight, Optiflex, Omnicell, Cardinal
Data cleansing	Vizient, SAP, Primrose, Nuvia, In house
ERP / MRP / Demand planning	Tecsys, SAP, Infor / Lawson, MCMS, PeopleSoft
Warehouse order	Tecsys, Meditech, Infor

management system	
Vendor management	PRX, HEMM, Symplx, Rep Trax
CRM	Salesforce, Microsoft, In house
Procure to pay	Coupa, Infor, Concur, SAP, MCMS, In house
Web based order catalog	Infor, Sciquest, Storefront (Punchout), SAP, Coupa
Transportation management	TecSys, Telogis

Key Value Drivers in CSC Model

With access to a unique group of practitioners that have implemented CSC models for their IDNs, we took the opportunity to get them to rank what they perceive as the greatest value drivers within the CSC model.

In the 2014 survey research, we observed the combination of logistics and procurement savings that fed into each other and provided some insights into the range of procurement savings that could be achieved under category headings.

In this case we asked them to rank in order of value sixteen potential drivers with the following consolidated ranking coming from the group:

Most Value  Least Value	Standardization of products in use across the health system
	Improved visibility of IDN inventories through consolidated service center systems and processes
	Reduction in total inventory required to support the IDN
	More delivery options in negotiating terms with suppliers
	Handling efficiencies at point of use through the reduction of the number of deliveries
	Ability to take advantage of bulk or forward buying offers from key suppliers
	Logistics efficiencies by consolidating deliveries inbound into hospitals
	Ability to add or move additional functional areas to CSC
	Pick and pack efficiencies through improved warehouse processes, automaton and measurements
	Release of valuable real estate in acute and other facilities that was previously used to store supply inventory
	Increased supply chain awareness and profile within the health system
	Consolidation of supplier deliveries inbound into the CSC
	Increased ability to go to market with committed spend on key products
	Forced move towards a standard order catalog
	Consolidation of supplier invoices and simplification of administration

This gives some valuable insights from those that have been through the process into the key areas of focus when considering or planning a CSC implementation.

Some of the key unexpected benefits realized through the implementation included:

- Increased control over inventories and service levels
- Freeing up of more valuable real estate space in acute facilities
- Platform to add additional services and drive further cost and service initiatives
- Improved relationship with clinical staff – some direct quotes below.

"The CSC has given us flexibility and control over clinical products such as custom procedure trays, drapes and gowns, suture and endo, and cardiology products. By giving the clinicians input into the product selection combined with a high degree of service the clinicians have an increased confidence in Supply Chain. The added services we've been able to provide within the CSC has allowed us more opportunities to partner with clinicians and physicians to address their needs and bring value to the organization."

"Clinicians are receiving better service (e.g. fill rate, order accuracy, on time)"

"We now have data (supply cost per case and outcomes) that is presented to physicians to help them make better decisions."

A look back to the implementation phase

Our surveys in 2012 and 2014 were very focused on the implementation of the CSC model, the building of a business case, the management of key stakeholders and learnings from the process.

The objective of this survey was to build on rather than to repeat the previous work and as such the three reports can be read together as an extended set of insights in addition to being standalone reports.

In the current survey we did take the opportunity to ask participants to look back at their implementation experience to provide some additional insights into the implementation phase.

Key Barriers / Challenges in the Process

Key barriers in making decision to pursue CSC	**Key barriers during the implementation phase.**	**Key barriers post implementation.**
Competition for capital	Hiring the necessary management talent to run CSC	Continuous improvement – sustaining the gains.
Must have a clearly defined ROI and business plan.	Standardization process needs diverse inputs.	Expanding the scope
Being too ambitious with financial benefits: - Under investment in technology - Underestimating the talent requirements.	Changes in relationships: - GPOs - Distributors - Supplier negotiations	Facilities planning – size to accommodate additional functions and system growth.
Organization buy in and understanding of the complexity involved.	Systems capability – filling gaps and selecting future systems.	Sustaining metrics to keep the management focus.
Change management - Executive team - Staff - Clinical resources	Change management - Bringing staff and clinical resources on the journey.	Building on the vision.

The table above illustrates how the challenges shift over the project timeline. What is clear from the challenges mentioned is that this is a transformation process that requires detailed planning before the start, project management through the execution and a transition to maintain the momentum once the initial implementation is complete.

It requires executive involvement and supply chain leadership to bring the executive, supply chain and clinical leadership on the journey. The availability of reference case studies can help explain the vision but as we have seen from this and other reports the size and scope of the solution will most likely vary from system to system.

The issue of staff retention through this process was one that we addressed specifically within the survey. Some direct quotes on how this was managed below:

- *"Communicating this transition and being transparent with our goals and objectives helped a great deal with our retention of current staff. Communicating early and often along with building a talent ladder for our team within the CSC continues keep our team engaged."*

- *"Internal hiring fairs that offered current staff either lateral or promotional opportunities at the new DC…Nearly 50% of positions filled were with internal staff."*

- *"During the transition our Supply Chain Directors were offered retention bonuses. We also invested in talent by hiring the best and brightest and by developing training programs to assist our leaders in transitioning their skills from transaction focused to more of a supply cost analytics focus."*

Recommendations to those Considering CSC

To conclude the survey we invited participants to contribute some advice for those considering implementing a CSC and to disclose what they would do differently if considering again.

The positive starting point for this was that when asked if looking back they would proceed with a CSC if they had to make the decision again we once again had:

100% Yes

What would you do differently?

- Understand all of the why's - Standardize better
- Have more experienced leadership in place from day one to lead a complex CSC operation.
- Invest in the appropriate industrial engineering and lean six sigma resources to ensure a sustainable process and product movement.
- Develop a long term space plan and revisit it annually to adjust for any unforeseen changes.
    - Build a larger CSC operation. We have added on to the existing CSC twice to enable other support functions to be consolidated and moved off-site.
    - ROI should include other capabilities and be approved as part of the initial plan.
    - More bays, air conditioning.
- Purchase rather than lease building – provides more flexibility.
- Probably not have as aggressive a schedule.
    - Start the hiring process much earlier. Develop training materials sooner. Have a larger support staff.

Final recommendations:

- Consolidation of shared services will be a necessary cost savings and efficiency gain in the current environment; reductions in reimbursement, with more to come
- CSC's need to serve as the universal shared service center for all things supply chain and key support functions that support multiple healthcare providers.

- Make sure you really understand the ROI...and your resource needs.
    - Don't do it because everyone else is or based only on a consultant's recommendation.
    - Stick to core competencies...bigger not always better.
    - Understand your organization; is this model a good 'fit'?
- Plan the work and work the plan.
    - Have clear goals and develop a concise plan to meet those goals.
    - Implementing business, space, and resource plans to align with the organizations long term strategy is essential.
- Determine your model and desired end state first.
    - Do you want to be like a "distributor" (everything for everyone)?
    - Do you want to centrally manage high volume items?
    - Do you want Point of Use visibility / management or dock-to-dock, only?
    - Do you want to demand forecast and plan?
    - Foremost, have your house in order BEFORE embarking on a CSC.
- Executive Leadership support.
    - Without it, it is an uphill battle. Implementing a CSC is difficult and is not something everyone wants to do.
    - You need leadership to help knock down barriers, continue to send the message that this is "their project" and to support you when things don't go well.
    - You also need their support in approving capital for the project and the operating costs of hiring people (leads, project managers, IT, etc.) to support the project.
- Keep it simple.

Conclusions:

Healthcare supply chains exist in an environment where lives are literally at stake. We could be forgiven for thinking that this is a reason why our healthcare supply chains should be different, why we can justify excessive inventories and reduce the pressure to drive efficiency gains. We must allow ourselves to fall back on that excuse. We have historically underinvested in systems and process but compensated with excess inventory and resources or outsourced our service problems to supply chain partners such as GPOs and distributors.

The insights that we have been able to glean from practitioners who operate IDN supply chains in innovative ways – such as CSCs, highlight the many similarities between healthcare and other industry supply chains.

The move towards a CSC model for them has been as much about regaining visibility and control over their supply chains as it has been about cost efficiencies. The same needs exist to drive performance and this can only be done through investment in people, systems and processes.

We have reaffirmed that there is no one supply chain model that is the best fit for all IDNs, including a CSC. What is required though is a series of metrics and benchmarks that can facilitate more informed decisions as IDNs make their own decisions and enable their own supply chain journey.

The development of standards and uniform performance metrics by which we can develop universal benchmarks within the industry, can only help improve industry-wide performance and decision making. Healthcare can borrow from work already done in other industries to develop or adopt these standards and metrics, and whether a system operates a CSC, works with distributors, GPOs or other partners, there should be a common language to allow comparison and learning from each other.

This research should be read in conjunction with the 2012 and 2014 reports to build a broader understanding of the CSC supply chain model, it's business case, considerations for implementation and sustaining the model with improvements into the future.

The highest levels of supply chain performance relative to patient care support, service and cost efficiency are no longer an option.

Future Research and Insights

As the Integrated Delivery Networks/systems' CSC and SSO models gain maturity, we expect that the information needs of the practitioners to support their decisions and improvements will also change.

The above report outlines the challenges that exist within the industry to establish relevant metrics and to progress the maturity of Healthcare supply chains. Although this report focused on IDNs that run CSC models, these questions are relevant to the industry as a whole.

Health care providers (IDNs and individual hospitals) need to be able to understand their operational performance using metrics and benchmarks that are comparable to each other and across industries. We would be delighted to assist the development of this understanding by working collaboratively with health systems, suppliers and industry organizations.

We know that there are similar supply chain initiatives in other geographies and that many systems have international facilities and capabilities. We plan for more international participation in future studies.

We see this effort as one that is owned and driven by the practitioners that feed these surveys and we invite you all to contact the authors of this report to help shape the future research into healthcare providers across the spectrum of care venues supply chain transformations.

Thank you again for your contribution and participation.

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