

An HSRC-ASU White Paper

HEALTH SECTOR SUPPLY CHAIN RESEARCH CONSORTIUM



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Supply Chain and Revenue Cycle Integration: Asset Management in U.S. Hospital Systems

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About HSRC-ASU

The Health Sector Supply Chain Research Consortium (HSRC-ASU) is a research group within the Department of Supply Chain Management at the W. P. Carey School of Business at Arizona State University. The Consortium was founded in 2004 to bring together health sector organizations and academic researchers to conduct research on topics related to the strategic management of the health care supply chain. HSRC-ASU embodies:

- **Research** – We engage in cutting-edge research on the health care supply chain.
- **Thought Leadership** – We function as a boiler room for new ideas to drive excellence and innovation in the health care supply chain.
- **Collaboration** – Our research is developed through collaboration with member organizations representing multiple stakeholders across the health care supply chain.
- **Industry Guidance** – HSRC-ASU research is responsive to industry needs and provides guidance and opportunity to raise the standard of management and policy practice surrounding the health care supply chain.

About Craneware

Craneware is a member organization of HSRC-ASU. This research study was sponsored by Craneware.

Craneware is the leader in automated revenue integrity solutions that improve financial performance for healthcare organizations. Craneware's market-driven, SaaS solutions help hospitals and other healthcare providers more effectively price, charge, code and retain earned revenue for patient care services and supplies. This optimizes reimbursement, increases operational efficiency and minimizes compliance risk. By partnering with Craneware, clients achieve the visibility required to identify, address and prevent revenue leakage. To learn more, visit craneware.com and stoptheleakage.com.

We would like to acknowledge the research participants for their contribution to the study.

- Catholic Healthcare West
- John C Lincoln Health Network
- Abrazo Healthcare

If you have comments on this paper or would like to learn more about HSRC-ASU please contact us at contactsrc@asu.edu. Our website is wpcarey.asu.edu/hsrc-asu

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Executive Summary

As healthcare reform continues to place an emphasis on margin management¹ within provider organizations, creating synergy between the supply chain and revenue cycle² has increased in importance. In most provider organizations supply chain management (SCM) and revenue cycle operations function in silos, occasionally responding to anecdotal evidence to make improvements in the processes linking the two areas. Hospitals and health care systems that become proficient in managing the revenue environment achieve strategic advantage by reaching their financial goals and assuring a stream of revenues to support their clinical efforts. Inventory constitutes an important asset for American hospitals. As clinical inventory is utilized for patient care, much of it has the potential to be transformed into revenue through direct billing to third party payors and patients themselves. While the supply chain function has not traditionally been perceived as extending to revenue capture, it is increasingly clear that a linkage between supply chain and those aspects of the hospital that recover money for products used is indispensable for accurate, efficient and consistent cost recovery .

Supplies represent about 15% of a median hospital operating budget, this expense being only second to labor.³ With imminent decrease in reimbursement and increases in supply costs, the need to ensure synergy between supply chain and revenue cycle operations is a significant focus for hospitals. However, most are unsure where to start.

This paper and supplemental tools were developed through literature reviews of research pertaining to revenue management, and interviews conducted with three health care systems that vary in size, mission, technology implementation, and efforts to achieve integration of supply chain and revenue cycle operations. While it is clear that technology applications are indispensable to successfully manage “supplies as assets” from point of order to recovery of funds, it is increasingly clear that an organization’s comprehensive intent to strategically manage its supply chain, as a flow of materials, information and funds, is indispensable to success. One critical factor in achieving this success is the presence of supply chain leadership at the executive level to provide necessary vision to execute and implement processes that lead to optimized revenue recovery via integration of supply chain and revenue cycle. A recent HSRC-ASU study found that leaders in organizations that positioned supply chain at the senior management level associated supply chain involvement with overall organizational success as well as with buffering the organization from financial risks⁴. The dynamic interface, or what we describe as “synchronicity” between supply chain and revenue cycle management is yet another tactical opportunity to optimize reimbursement and to mitigate compliance risk. The aim of our work is (1) to formulate an understanding of the current issues facing healthcare providers in supply chain and revenue cycle operations, (2) to create a progressive practice picture for supply chain and revenue cycle synchronicity that helps to optimize reimbursement and mitigate compliance risk, and (3) ultimately, to provide a self assessment tool for health care systems to assess their practices in supply chain and revenue cycle management (RCM).

¹ Margin Management looks at the cost of providing care and the practices and processes used in billing for its provision. Within margin management, expense and revenue activities share information freely and collaborate closely to improve the bottom-line through integration and collaboration between supply chain and revenue cycle processes. It focuses primarily on the middle segment of the revenue cycle to ensure full charge capture, consistent exchange of information between Item Description Master (IDM) and Charge Description Master (CDM) files, and accurate billing.

² Revenue cycle operates in three segments: a front end that determines eligibility and coverage rules, a middle segment where providers capture charges and code for payment, and a back-end that is devoted to sending patients and third-party payers bills for payment

³ HFMA, 2008 Supply Chain Survey

⁴ Repositioning Supply Chain in Health Care Systems, A White Paper, HSRC-ASU, 2010. Available at <http://wpcarey.asu.edu/hsrc-asu/completed-projects.cfm>

Benefits of Linking Supply Chain and Revenue Cycle Information:

- Additional revenue flowing into the hospital based on more legitimate reimbursements for supplies used in patient care
- Better strategic decision making just by knowing the financial impact associated with high cost physician preference items
- A framework is established for defensible pricing in an era with increased supply scrutiny around hospital charging and markup enforcement practices

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Background

In the current environment of health care reform in which hospital operating margins are being tightly squeezed, paying more attention to margin management is imperative. A margin management approach takes into consideration more than just the market prices the hospital system receives for its commodity purchases; instead, it requires them to assess their whole operation's cost of delivering care, broken down to a per unit basis. The successful implementation of margin management calls for accurate charge capture, inclusive billing, and uniform exchange of information with the Item Description Master (IDM) and the Charge Description Master (CDM). This valuable financial information can then be used to help make management decisions, assist in identification and mitigation of the system's risks and to take advantage of the opportunities associated with changes in reimbursement modalities anticipated due to health care reform.

Due to anticipated decreases in reimbursement levels, increases in supply costs, and need to precisely determine the cost of patient care in value based purchasing schemes, hospitals will need to create synergistic interactions between supply chain and revenue cycle processes. The dynamic interface or what we describe as "synchronicity" between supply chain and RCM will be realized as an opportunity to optimize reimbursement and to mitigate compliance risk. Compliance risk in this situation could be the current and prospective risk to revenue and profit by not fulfilling contract obligations to receive the lowest possible prices; compliance risk related to coding and usage/billing of devices etc.

A recent paper by Moody's, scrutinizing cost management under health care reform, indicates that:

"Achieving quality and cost goals in a transparent manner is particularly challenging, especially in an environment of declining reimbursement, non-standardized measurements, growing competition, and increasing demand for services. This will require more sophisticated IT tools to determine and monitor costs as well as credible data evidencing the link between quality and cost."⁶

While none of the revenue management efforts reviewed below are uniquely focused on management in an environment of bundled care, there is no doubt that what is presented in this paper are the efforts that must be precursors to understanding cost in a "value for money" environment, making the case for excellence in both care and financial performance management. Failure to mitigate these compliance risks leads to the lost ability to track cost, to monitor utilization, and to produce accurate and informative reimbursement metrics. This can in turn lead to lost revenue, increased supply costs which reduces operating margins and, perhaps of greatest importance, failure to secure contracts and to remain competitive in the marketplace. Thus the anticipated result of establishing the link between the supply chain and revenue cycle is additional revenue, reduced supply costs, and organizational sustainability in a competitive environment.

Hospitals, under conventional and emergent reimbursement schemes should look for the "intersections" of the supply chain and revenue cycle for opportunities to improve the bottom-line. It is necessary for information to flow seamlessly and accurately across the various business and clinical functions so that everyone has access to complete information. Technological interfaces, such as linked IDM and CDM, can help facilitate this process. Carter and his colleagues argue that "enhanced coordination and communication between revenue cycle and supply chain professionals can unlock value. In addition, improved data integrity leads to better sourcing and pricing decisions."⁷

⁵ Lee Brooks. "Perfect Storm, perfect opportunity to link the supply chain and revenue cycle." *Healthcare Purchasing News*. July 2009, 33, 6, Pg. 68

⁶ Moody's Special Comment. *Achieving Greater Cost and Quality Accountability Will Be Credit Positive for Not-for-Profit Hospitals in Era of Reform*, May 10, 2011.

⁷ Jason Carter, Lee Kuhn, and Barton Richards. "Impacting your hospital's bottom line: Through improved integration of the revenue cycle and supply chain." *Healthcare Purchasing News*. Sep 2010; 34; 9; Pg. 60

Some risks associated with non-integration of supply chain and revenue cycle include:

- Decreased and inaccurate reimbursements
- Hindered contract negotiations and decreased contract compliance
- Decreased transparency
- Difficulties in monitoring supply revenue and usage, and inability to cross-check utilization of supplies
- Inability to properly audit and adjust systems to capture cost-to-charge data visibility
- Inaccurate billing
- Excessive use of labor

Integration of supply chain management and revenue cycle management ranked third in a survey by HFMA as the next most likely area for improvement with 50% of respondents indicating it was a high or tremendous opportunity. According to the survey, the most effective strategy to integrate the supply chain and revenue cycle is through “developing shared goals and accountability to foster collaboration...the best performing hospitals are those that involve the senior financial executive in effectively leveraging physician preference strategies (especially around high cost physician preference items such as orthopedic implants), decision-support technologies, contract negotiations, and optimized supply chain roles as a way to generate greater efficiencies and cost controls in these critical areas.”⁸

Supply Chain Management/ Revenue Cycle Management (SCM/RCM) integration is a linked collaboration between the two functions so actual costs are utilized in market pricing decisions and strategic managed care contracting is coordinated with supply chain managers. The integration links supply chain with the billing functions of a hospital and results in all chargeable supplies being accurately represented in the CDM. When integrated, supply chain managers and revenue cycle managers are able to share information freely and decisions can be made collaboratively.

The successful integration of the two functions also requires appropriately and accurately connecting key people and processes. In doing so, hospital systems should see the benefit of integration by improvements in operating margin. Supply chain and revenue cycle functions to consider include:

- Supply Chain Functions: contracting, strategic sourcing, procurement, and inventory management.
- Revenue Cycle Functions: patient record access, charge master accuracy, coding, charge capture, and patient accounting.

If hospitals synchronize supply chain and revenue cycle processes, they can optimize reimbursement and mitigate compliance risk by creating greater transparency and increased flow of information. In doing so, hospitals can create competitive advantages and improve operating margins and be successful in fact-based negotiations with both suppliers and payors. Now more than ever, hospitals need to ensure this synergy between the supply chain and revenue cycle processes.

⁸ HFMA Educational Reports. Opportunities for Supply Chain Improvement: Highlights and Expert Insights Regarding HFMA's 2008 Supply Chain Survey. 2008.

“Experience shows the annual value of adopting a margin management approach could help providers to reduce supply costs up to 10 percent, enhance net revenues by 2 percent, and generate an equivalent of a 1 percent to 5 percent improvement in their operating margins.”

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Methodology

HSRC-ASU carried out a case based study in which three diverse health care systems were interviewed using a pre-set questionnaire to better understand their level of SCM/RCM integration. The information collected in this report reflects the responses of senior executives responsible for supply chain and revenue management. The respondent organizations were identified with the goal of ensuring diversity of type and size of health care system, level of integration, and ownership status. The interview questionnaire was developed collaboratively by HSRC-ASU and a team of experts in revenue management from Craneware. Onsite visits were conducted at the facilities to gain a broad understanding of processes in place followed by structured interviews in one-hour conference calls where a senior researcher and at least one other member of the research team were present. Interview responses were then analyzed for emergent themes associated with SCM/RCM integration to maximize revenue capture.

Key points to be identified during the study included progressive practices in supply chain and revenue cycle integration, challenges faced by systems in implementation of practices and the risks associated with the absence of aforementioned integration.

Demographics

Catholic Healthcare West (CHW), founded in 1986, is a non-profit health care system that employs more than 60,000 caregivers and staff and operates more than forty hospitals and care centers making it the eighth largest health care system in the nation and the largest system in California. It operates both urban and rural centers in California, Arizona, and Nevada with 8800 acute care beds and 1000 skilled nursing beds.

John C. Lincoln Health Network (JCL), established in 1927, is a non-profit health network that employs more than 4,600 caregivers and staff that operate two hospitals and sixteen physician practices in Arizona with a total of 266 beds

Abrazo Health Care, purchase by Vanguard Health Systems in 2003, is an investor-owned health care system and is the second largest healthcare delivery system in Arizona. It is comprised of 1043 licensed beds across six acute care hospitals, two health plans, and Abrazo Medical Group with 77 employed physicians in 18 locations.

The Study

Catholic Healthcare West (CHW)

Study Findings

Integration The Vice President (VP) of Supply chain at CHW reports to the Chief Financial Officer (CFO) and Executive VP of CHW. CHW has implemented a number of process changes in an attempt to integrate SCM and RCM. Beginning in 2003, all 41 CHW facilities started using Lawson as its Enterprise Resource Planning (ERP) and Material Management Information System (MMIS) systems. The major challenges faced during the Lawson implementation were the different item masters and accounting systems at the facilities, which needed to be standardized and entered into the system.

⁹ John Napiewocki and Anne Uruburu. “Margin for Improvement.” Healthcare Financial Management. Feb 2005, 59, 2. Pg 64

“It requires about \$33 in new revenue to produce just one dollar in new profits for your hospital. However, it only takes one dollar in supply chain savings to have the same bottom line effect.”

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Standardization The SCM and RCM standardization process took four years, but currently there is one standard integrated IDM that contains over 174,000 items for all 41 facilities and a link to the corporate level Charge Description Master (CDM). The IDM is reviewed daily to ensure that new chargeable items are added to the corporate standard CDM and linked in Lawson.

Information Technology (IT) Solutions CHW uses a number of other IT solutions to manage its operations including McKesson Horizon Performance Manager as a decision support system and Par Excellence or Omnicell in some hospitals for inventory management. CHW also uses a number of tools through its Group Purchasing Organization (GPO), Premier, including Supply Chain Advisor and MySpend. A variety of patient accounting systems (HIS), which house the charge master are also in place across the enterprise including McKesson, Siemen, Meditech products amongst others. CHW is also working on a number of initiatives to improve its inventory management. CHW uses Value Analysis Teams (VATs) to help standardize its Physician Preference Items (PPIs) and lower inventory costs, but inventory management decisions are made at a facility level.

John C. Lincoln (JCL) Health Systems

Study Findings

Integration At JCL, supply chain leadership does not exist at the corporate suite (C-suite) level. The Director of Network Supply Chain reports to the Senior VP and CFO. The Director also works closely with the VP of Revenue Cycle Operations to ensure accurate charging through its IDM, which is standardized throughout the network and contains over 15,400 active items. JCL has a written strategic plan for supply chain management. The main objective of the plan is to “increase employee and physician awareness and accountability for optimal management of supply costs.”

Standardization Current plans include “optimiz(ing) the buying power of the Network through the creation of a structure that supports efforts focused on better product utilization, standardization, and the management of new products and technology.” Also “decreas(ing) product expenditures by selection of the most effective and economical quality product based on trial and evaluation methods.”

Information Technology (IT) Solutions JCL uses a number of IT solutions to manage its operations, including PeopleSoft for MMIS and ERP systems and GPO provided analytical tools though Premier including MySpend, which offers benchmarking data, and Clinical Advisor.

JCL is currently working on an initiative to transition from its current HIS system to Epic. Management at JCL believes that this change will bridge current gaps in performance.

JCL uses PeopleSoft and AtPar for inventory system management, a perpetual inventory model that is broken down by each business unit. JCL undergoes a physical count and adjusts its inventory levels annually. JCL uses VATs in an attempt to support standardization for its supplies. Additionally, a number of physician champions have been recruited to help with clinical resource utilization for selected Diagnosis Related Groups (DRG). There are no physician incentives or formalized gain-sharing approaches to support standardization at this time.

¹⁰ Robert T.Yokl President and CEO, Chief Value Analysis in Healthcare.

Abrazo Health Care

Study Findings

Integration The Vice President of Supply Chain at Abrazo Health is responsible for six hospitals and twenty physician clinics in Arizona. He reports to the CFO at Abrazo Health. Recently, the VP of Supply Chain has created a strategic plan for supply chain that aligns corporate (Vanguard Health Systems) and regional strategies to services lines.

Abrazo is in an early stage of integration of its supply chain with RCM. The system is currently working on a total of 41 initiatives to integrate the Supply Chain Management and Revenue Cycle Management, of which 38 are scheduled to be implemented during 2012. Many of these initiatives focus on commodity management, physician preference item (PPI) standardization and purchased services and re-processing efforts. The integration process is being led by the VP of Supply Chain in collaboration with the head of finance.

Standardization Vanguard Health Systems has a common IDM shared across all five regions consisting of over 6,000 supply items. A number of Information Technology (IT) systems are used for management of IDM, including McKesson Pathways Material Management (PMM) for its Enterprise Resource Program (ERP) and MMIS, ECRI for contract utilization management, Hyperion for decision support and financial performance analytics. Abrazo also uses a number of available website tools from its GPO (HealthTrust Purchasing Group.)

Inventory management within Abrazo is fragmented. Rather than a regional warehouse, each hospital has its own central storeroom that is managed with min/max reorder points and department level storerooms that are parred three times per week. Abrazo has successfully transitioned to a strategic focus utilizing value analysis teams (VATs), as well as scrutinizing DRG and profitability data to standardize its PPIs and lower inventory costs. Also being evaluated is the feasibility of moving to a central distribution center for the entire region with Abrazo running operations themselves or through an outsourced model.

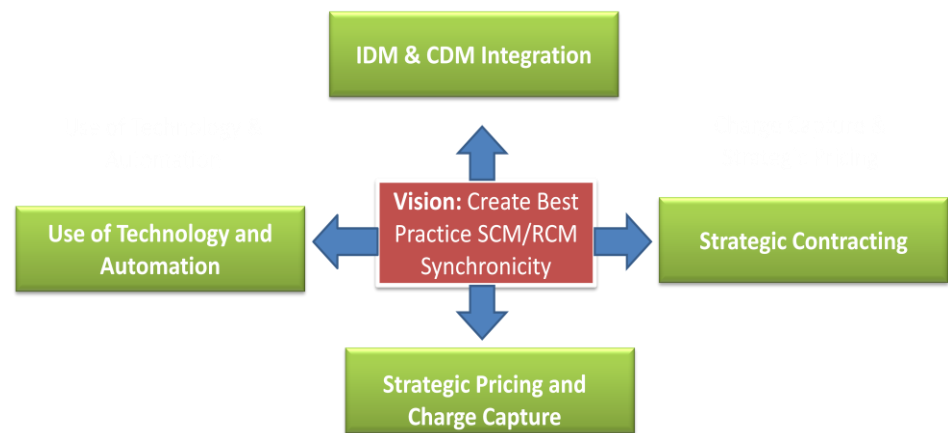
Information technology (IT) Solutions Abrazo views its patient accounting and charging system, Siemens MS4, and its billing system, Xactimed, as tools for integration of SCM and RCM to maximize revenue recovery. Abrazo outsources to Avega Health Systems for benchmarking data at both the physician and DRG level. This information is procured through co-management agreements and savings are shared between physicians.

Abrazo continues with its integration work, with both progress and challenges. According to the VP Supply Chain, "The system has not yet matured to a regional mindset. We are slowly transitioning contracting and decision-making from an individual facility level to a regional level."

Discussion

Successful management of supply chain and revenue cycle requires appropriately and accurately connecting key people and processes. Crucial to this management is a clean IDM. To optimize reimbursements and revenue, reimbursable supplies of the IDM must be linked to procedures in the CDM. By establishing links between supplies and procedures, the process of tracking supplies, as important assets, is facilitated from acquisition to reimbursement. Thus, supply chain information technologies and decision support systems can be leveraged to help hospitals establish and ensure the linkage of the supply chain and revenue cycle.

Margins can be improved via SCM/RCM integration with a concentration on four important categories: (i) IDM/CDM Integration (ii) Strategic Contracting (iii) Strategic Pricing and Charge Capture, and (iv) Use of Technology and Automation. The optimization of operating margins calls for consideration of the cost of patient care and practices and processes utilized to bill for that care. Successful implementation requires accurate charge capture, inclusive billing, and uniform exchange of information with the IDM and the CDM.¹¹



IDM & CDM Integration

Integration of IDM and CDM requires several essential components and strategic selection of key supplies and procedures in the linkage process:

- Clean data files with current data and consistent item names and codes are necessary. Chargeable supplies that are not listed in the IDM should be identified and efforts should be taken to ensure supplies used in procedures are represented in CDM.
- The use of an updated, clean IDM can be helpful in updating and maintaining a current CDM.
- Ensuring accurate pricing reflective of costs
- Ensure charge codes for chargeable supplies are consistent with IDM coding.
- A template listing all supplies used in each targeted procedure is a helpful tool in the integration process.
- During the IDM/CDM integration process, it is also beneficial for hospitals to define appropriate new parameters for profit and loss reporting.

¹¹ John Napiewocki and Anne Uruburu. "Margin for Improvement." *Healthcare Financial Management*. Feb 2005, 59, 2. Pg. 46

Challenges faced when integrating supply chain with revenue cycle:

- Maintaining clean, updated, and integrated IDM/CDM
- Updating pricing in various systems
- Utilizing contracts to fullest potential
- Maintaining connectivity between functions
- Overcoming organizational complacency to produce change

Through integration of the IDM and CDM, hospitals can better account for chargeable supplies, which will increase supply accountability, reimbursement and decrease revenue leakage.

The IDM and CDM are reviewed on a daily basis at CHW to ensure that chargeable items are added to the corporate standard CDM and linked in Lawson. Additionally, CHW has incorporated its CDM with the item add process so that any time there is a new product introduced, adding it into the CDM is a mandatory step. The item is then coded as either chargeable or non-chargeable so that they can be easily identified.

Reflecting the importance of managing the revenue cycle, there is also one corporate FTE, within the corporate CDM team, at CHW that is dedicated to the review and maintenance of the standard supply CDM. This FTE also does spot audits of facility charging practices.

At this time, JCL feels that they have a minimal level of SCM/RCM integration. JCL has a number of initiatives aimed towards improving the SCM/RCM integration as they estimate it costs \$53 to re-work a claim, with some claims not even worth that amount.

Abrazo has linked its patient accounting and billing systems to facilitate direct communication. Abrazo does this to leverage their IT systems to better capture otherwise potentially lost revenue.

All three systems acknowledge the need for a clean, standardized, and linked IDM/CDM, but it is a significant challenge to accomplish. Decision-making at the hospital level rather than the system level perpetuates the problem of integrating the factors associated with margin management.

Strategic Contracting

The accountability of supplies also leads to improved strategic managed care contracting. More informed contract negotiations occurs as a result of better supervision of supply costs and receivables. Better contract terms can be negotiated through managed care contracts to ensure the cost of expensive supplies is fully covered by payors. Hospitals gain increased visibility from a better understanding of charge capture and an improved understanding of the relationship between supply cost and payment data.

To ensure optimal contracting, hospitals should form multi-functional teams with a high-level of coordination and collaboration. The close collaboration amongst the teams can lead to optimal contract negotiations and sourcing strategies. Claims data should be analyzed to determine if expected charges are actually being charged, which may involve looking for utilization of the proper HCPCS and revenue code for payment. If hospitals pay more attention and make a detailed examination of payor contract language, utilization of the appropriate coding can be increased which can increase payment for certain procedures.

Strategic advantage can be gained with the increased insight that occurs as SCM/RCM becomes more closely integrated. This can lead to advantageous payor contract negotiations that are based on actual costs and additional reimbursement. By accessing benchmarking information for regularly contracted pricing from peer hospital systems, systems can negotiate lower prices with vendors to offset costs associated with negative-margin procedures and gain market competitiveness. The siloed activity of SCM and RCM hinders the important interactions necessary for purchase price negotiations with vendors and insight into the supply costs in various patient procedures for managed care negotiations.

Through strategic contracting and supplier base reduction CHW has made tremendous strides towards standardizing its IDM and CDM. One of the biggest challenges CHW faced during the Lawson implementation in 2003 was that each hospital had its own IDM, CDM, and accounting systems. Within four years of the Lawson implementation there was a standardized IDM, CDM, and accounting system across all 41 facilities containing more than 174,000 items.

Like CHW, both JCL and Abrazo have a common IDM with more than 15,400 and 6,000 items, respectively. Abrazo shares its IDM with its corporate organization, Vanguard. However, Abrazo is currently evaluating movement from the hospital level to a regional level for contracting in an effort to improve standardization of supplies.

The systems recognize the importance of standardization, but again struggle with implementation. In both geographically decentralized as well as centralized systems, supplier base reduction remains a challenge. This means that changes in pricing across equivalent items is an ongoing process and accurately assessing opportunities for negotiating pricing with both suppliers and payors is jeopardized when information is not accurate. This leads to the risk of purchasing and turning over assets at higher prices.

Contract utilization at JCL is monitored manually through its GPO IT systems; however, they feel that the switch from Meditech to Epic will provide cleaner information that will be easier to track in the future.

Abrazo has the capability to monitor contract utilization through McKesson Pathways Material Management, but the module hasn't been loaded into its system so it is currently done manually or by outsourcing through ECRI Institute. Reports are requested quarterly.

High cost clinical items, for which allowable reimbursement is not achieved, represent an immediate opportunity for revenue management efforts. The three systems analyzed in this study have different levels of strategic commitment to engaging clinicians and successfully working to manage these items as important assets.

Strategic Pricing and Charge Capture

Margin management decreases the probability of lost charges. Once the link has been established between the IDM/CDM, it is imperative to install a process to maintain the precision of the linkage with accurate cost data. Supplies that are utilized in targeted procedures should be tracked from acquisition through patient billing. Prices should be strategically set to optimize maximum allowable reimbursement. Charge capture processes should be incorporated in pricing strategies in each of the targeted areas.

An automated and integrated audit process should be combined with charge capture, reconciliation, and payment policies and procedures. Appropriate, accurate, consistent billing policies, in addition to claims reviews, will help reduce claims denials. The assignment of charge capture teams or a team of experienced auditors can help in the process to discover and to remedy missing charges. Another integral component is understanding the impact of net revenues when considering payment methodologies, contract negotiations, and costing intelligence. Through increased charge capture and strategic pricing hospitals can ensure reimbursement claims are paid appropriately when supplies are used in patient procedures. This will lead to increased revenue recovery.

Use of Information Technology and Automation

Technology can be an important instrument in establishing SCM/RCM integration. In the integration process, it is very important to ensure that supply chain data files and ERP systems are properly connected with the financial and patient accounting systems. “Ultimately, any supply or service entered into the IDM and chargeable to a payor should have an automatic link to the chargemaster.”¹²

The use of chargemaster review software, claims and coding scrubbers, contract management systems, and reimbursement calculators can help hospitals to identify potential lost revenue. Content cleansing and enrichment help to provide quality information that hospitals can use to conduct accurate price analysis or to create an electronic item catalog. Software can also be instrumental in the automation of catalog and price synchronization.

Health care systems can also make effective use of an electronic data exchange to increase connectivity with suppliers. Automated requisitioning can help ensure electronic requisitions are contract-compliant and contain correct item attributes. There are a number of software applications available to help hospitals collect patient charge data and automate replenishment and charging systems. Lastly, hospitals can effectively implement software which can identify the absence of coded supplies and identify the absence of chargeable supply items on patient bills.

CHW has also made effective strides towards automating its processes by creating its own custom built Web-Tool template in Lawson. The Web-Tool allows communication with the user community and enhances system tracking. Once an order is placed and delivered through Web-Tool, it is scanned into the system using hand held technology at the loading docks. The hand held system immediately identifies the department to which the item needs to be delivered, updates the inventory system, and can also identify an “urgent” item that needs extra attention such as specific storage requirements, etc.

There are areas at CHW which lack automated processes to measure discrepancies. For instance, the revenue cycle team calculates missed revenue in terms of items that are priced below fee schedule and/or items that have a cost greater than the reimbursement rate. It is ad hoc and normally incident driven.

Additionally, there is a manual paper-based system for replenishing code cards at CHW that has to be verified twice, by the checker and then again by the pharmacy. The same process is used for thousands of physician preference cards.

Some automation initiatives can be effortlessly mapped to certain metric improvements, such as e-procurement and electronic order exchange. When multiple process efficiencies are combined, more time can be dedicated towards focusing on critical contract negotiation and enforcement which tends to generate the most significant results.

CHW uses automated supply cabinets from Omnicell, but only in a few of its hospitals as the decision to purchase Omnicell cabinets is made at the individual hospital level. The rest of the facilities use supply carts and nurse station baskets for its inventory replenishment system.

¹² John Napiewocki and Anne Uruburu. “Margin for Improvement.” *Healthcare Financial Management*. Feb 2005, 59, 2. Pg. 46

As suggested above, electronic exchange of information and transactions with suppliers is critical. An automation technology such as Omnicell also has important IT capabilities. But it is the vision to bring together such potential that remains a challenge for health care systems.

In 1999 Ernst & Young estimated that the potential savings for hospitals through e-commerce in supply chain could range between 13 and 27 percent. Over a decade later there are no firm estimates as to how much e-commerce has actually contributed but there is a continued belief that the potential is enormous. Process changes, such as automating catalog and price synchronization and sending and receiving order acknowledgements with automated catalog price updating electronically, can decrease the amount of time spent processing transactions and updating catalogs. It also facilitates increased time devoted to strategic initiatives.

Equally important are electronic advanced shipping notices and invoices, which can increase efficiency for receiving staff and decrease manual, back-order management processes. By combining automated catalog updating, advanced shipping notices, and electronic invoices, time spent resolving account payable discrepancies can be significantly reduced. In turn, buyers will have more time to concentrate on contract negotiation and oversight.

Strategic application of an automated supply chain management information system and process change that is more focused on conscious utilization and management of supplies can improve organizational effectiveness including improvements in cost and revenue profile, efficiencies in clinical work flow, and supply chain effectiveness. Health care systems can improve the ability to document supply use, gain more control of supplies and fulfillment processes, and have improved charged capture, accountability, and transparency. Such information can also be used to gain favorable pricing from suppliers by providing with insight into utilization and thus supporting supplier upstream planning. Searching for themes pertaining to automation, across only three systems, is obviously difficult. It is clear, however, that there is not, within or across systems, consensus as to (1) what kinds of automation are best employed, (2) the return on Investment (ROI) associated with investments in automation, nor (3) the ability of automation to interact across supply chain strategies. The ability to utilize cabinetry and robotics, for example, provides benefits associated with error reduction and inventory management as well as linkages between utilization and cost management. Yet the applications are highly inconsistent with the focus for such technology frequently being on inventory management rather than on the total management of supplies as a hospital's critical asset.

Conclusion

This study has proposed that supplies, especially those for which revenue can be recovered, constitute an important part of an organization's assets. Linking the traditional aspects of supply chain management (e.g., strategic sourcing, logistics, and inventory management) to margin management decreases the probability of lost charges occurring.

Detailed in this paper are the challenges associated with the interface between supply and total economic environment of the modern hospital. Once the link has been established between the IDM/CDM, it is imperative to install a process to maintain the precision of the linkage with accurate cost data. Keeping in mind the supplies that are utilized in targeted procedures, these supply items should be tracked from acquisition through patient billing. Prices should be strategically set to optimize maximum allowable reimbursement. Charge capture processes should be incorporated in pricing strategies in each of the targeted areas.

Strategic advantage can be gained as the increased insight that occurs as the SCM/RCM become more closely integrated can lead to enhanced payor contract negotiations that are based on actual costs and additional reimbursement. By accessing benchmarking information for regularly contracted pricing from peer health care systems, hospitals can generate the evidence to negotiate lower prices with vendors to offset costs associated with negative-margin procedures and gain market competitiveness. Siloed activity of the SCM and RCM functions hinders the important interactions necessary for purchase price negotiations with vendors and clouds insight into the supply costs in various patient procedures for managed care negotiations.

This paper exposes the challenges and benefits of a hospital managing its supply chain with a view of “supplies as assets.” There is obviously a very important clinical value for supplies. If appropriate supplies are not present, the hospital cannot carry out its work. However the value of such assets must be transformed into dollars to assure the sustainability of the hospital itself. Critical to achieving value across stakeholders is, as we have described, a “synchronicity” between supply chain and revenue cycle management.

Finally, we believe it is important for organizations to assess their investments and efforts in this area and to bridge the barriers to achieving synchronicity between supply chain and revenue cycle management. To achieve this, a Self Assessment Tool to evaluate SCM/RCM practices has been developed and will be further refined as we learn more about this area. We urge readers to utilize this tool and provide input to us. Please send your inquiries and comments to: contacthsrc@asu.edu

Limitations of the Study

This paper represents a set of exploratory efforts to understand how three very different hospital systems employ information technology and automation in their attempts to integrate supply chain and revenue cycle management. Limitations included difficulty in securing participation of health systems over a short time period, and failure to obtain detailed information on the three product categories (Hip implants, IV Catheters, cardiac Stents). Given the impact of cost and cost recovery for implants (hip, IV catheters and cardiac stents), we had hoped to track the accounting for these products from the point of purchase through reimbursement. Due to differences in tracking and access to data (which is in some instances confidential) and the variable management of purchase orders and inventory for expensive implants from supplier to hospital, this was not covered in the first phase of the study. While we hope to capture such information in a larger survey, this is an area where systems should look to employ advanced technology to assure that they are accruing the full benefits.

Recommendation

The “Self Assessment Tool to evaluate SCM/RCM Practices” (Appendix B) was developed as a result of this study. HSRC-ASU recommends the use of the tool for health care systems to evaluate their current efforts in SCM/RCM integration. Although, there are several strategic processes within a hospital’s supply chain, the integration of the supply chain and revenue cycle is one strategy that is becoming increasingly important in optimizing operating margins through reduced supply chain costs and increased revenue recovery practices. The goal of this assessment tool is to assist hospitals in understanding the progress made towards maximizing revenue recovery by ensuring linkage between supply chain and revenue cycle. For more information/questions on the tool please email contactsrc@asu.edu.

Appendix

- A. Questionnaire used for the study
- B. Self assessment tool to evaluate SCM/RCM practices
- C. Literature review

Appendix A. Questionnaire Used for the Study

Name:

Organization:

SCM/RCM Background

1. How is Supply Chain positioned in your organization?
2. Does supply chain leadership exist at the C-suite level? Yes/ No
What is the title of the organization's supply chain leader?
To whom does this person report?
3. Does your facility have a written strategic plan for supply chain? Yes/No
If "Yes," would you mind sharing with us?
To what extent is the strategic plan related to the mission, values, and corporate strategy of your organization?
4. How do you calculate lost revenue? Is there a process in place to measure it?

SCM /RCM Integration: RCM is defined as "All administrative and clinical functions that contribute to the capture, management and collection of patient service revenue (HFMA)".

5. How is your executive leadership engaged in this integration process?
6. How employees are held accountable for their participation in the integration efforts? How are they recognized for their work?
7. What process changes were implemented to ensure an established link between SCM and RCM?
8. What challenges were faced during the process?
9. What are some of the current SCM/RCM initiatives in your organization??
10. Number of FTEs /committee hours involved in revenue recovery?

Supply Chain Information Technology (SCIT)

11. Does each facility have a common item master? If yes, how many active products in it currently?
12. What SCIT systems are in use for?
 - a. MMIS/ERP
 - b. Decision Support
 - c. Cost accounting systems
 - d. Financial Performance Analytics
 - e. GPO provided analytical tools
 - f. Inventory management
13. How have you leveraged automation and IT to support linkage between SCM and RCM? Specifically identify any business tools that you use to maximize revenue recovery?
 - a. If so, what information/reports are obtained that you were unable to acquire earlier? Please give some examples?
 - b. To what extent are these systems still deficient?
14. What challenges were encountered while linking the supply chain (or ERP) data files with financial/patient accounting systems?

Metric and Historical Trend

1. To what extent has your engagement in revenue recovery influenced your financial performance?

2. Please indicate:

<u>Metric</u>	<u>Current Performance</u>	<u>Prior Year Performance</u>	<u>Year IT Implemented</u>	<u>Most Useful IT Tool</u>
Total Patient Revenue (\$)				
Total Operating Revenue (\$)				
Total Operating Expenses (\$)				
Total Adjusted Operating Expense (\$)				
Total Supply Expense (\$) - Excluding Pharmacy				
Average Inventory (\$)				
Average Inventory Turns				
% of Inventory Adjustments				
Total Manual Purchase Orders				
Total Electronic Purchase Orders				
% Supplies Through Primary Distributor on Contract				
% of Denied Claims				
% of Erroneous Invoices (Any error that leads to reworking an invoice thereby adding additional expense or reuse of resources)				

Inventory Management

3. What is the process for inventory management?
4. How often do you do a physical count of the inventory?
5. How often do you have to adjust inventory?

Product Standardization Questions

6. Do you have Value Analysis Teams (VAT) in place? In which areas do you have value analysis teams?
7. How have purchasing decisions transitioned into strategic activities in commodity and PPI areas?
8. What sorts of physician incentives are used in standardization of PPIs? Do you have any formalized gain-sharing approaches?
9. How do you track the products costs throughout product life cycle (acquisition to reimbursement)? What specific initiatives have been implemented to integrate supply chain and revenue cycle information?
10. Please provide the following metrics for fiscal year 2010:

Metrics	Hip Implants	Eluting Stents	IV Catheters
Cost per procedure			
Procedures per month			
Estimated Lost Revenue			
Reimbursement (%)			
Fee-for-service			
Self-pay			
Capitation			
Note: Hip Implants = DRG # 461, 462, 469, 470			
Eluting Stents = DRG # 246, 247			

Contract Negotiation

11. What processes are in place to monitor contract utilization for Hip Implants, IV Catheters, Drug Eluting Stents?
 - a. Percent of spend on contract
 - b. Percent of spend off contract
 - c. Process/tool to monitor contract price changes
 - d. Process/tool to monitor reimbursement changes
 - e. Process to monitor systems and reconcile charges
12. What benchmarks are used to measure supply expense against industry standards?

Balanced Scorecard (BSC)

13. How have you used balance scorecards to assist in the integration of SCM/RCM? What areas of performance have you measured? What metrics have you included, how were they established/monitored, and how do they relate to success/failure?
14. Has the BSC been linked to the organizations strategy, mission, and values?

Best practices in SCM and RCM Integration

15. List three best practices currently used in your organization that has led to synchronization between supplies and revenue optimization.

Appendix B.

Self Assessment Tool to Evaluate SCM/RCM Practices

The following tool has been developed by the Health Sector Supply Chain Research Consortium (HSRC-ASU) at Arizona State University based on its research in the area of supply chain and revenue cycle integration (SCM/RCM). There are several strategic processes within a hospital's supply chain. The integration of the supply chain and revenue cycle is one strategy that is becoming increasingly important in optimizing operating margins through reduced supply chain costs and increased revenue recovery practices. The goal of this assessment tool is to assist hospitals in understanding the progress made towards the integration of the supply chain and revenue cycle.

An in-depth case study of three hospital systems with varying practices in SCM/RCM was conducted. Onsite interviews were combined with existing literature to identify "leading practices" in SCM/RCM. Representatives from these systems (both supply chain leaders and financial leaders) were asked survey questions to share SCM/RCM strategies, to discuss leading practices and key learning points for SCM/RCM, to discuss organizational competencies and capabilities enabling SCM/RCM, and to discuss the role of technology in the integration process. This informational guide and self-assessment tool is based on the proceedings from this study.

Four main categories necessary for successful integration are presented here with a list of assessment questions and performance metrics for each category. Combined, these assessment questions and performance metrics can help develop a "best practice scenario" for SCM/RCM integration. Included below are the questions and metrics for your consideration and self-assessment.

Section 1

Name of Person Completing Assessment:

Organization:

Section 2

Is there a Supply Chain executive in the C-suite? Yes/No

Is there a written strategic plan for supply chain? Yes/No

Total number of beds in your hospital:

Total number of beds in your system:

Total supply spend (\$):

Supply cost per adjusted admission (\$):

ASSESSMENT OF SUPPLYCHAIN AND REVENUE CYCLE MANAGEMENT

Dimension 1: Strategic Contracting

Please indicate your participation in each of the following strategic contracting activities by circling Yes/No.

1. Do you review contracts to ensure accurate payments? Yes/No
2. Is reimbursement data used in managed care contract negotiations? Yes/No
3. Do you review managed care contracts to assess potential for additional payment? Yes/No
4. Do you review vendor contracts to assess opportunities for additional savings? Yes/No
5. Is there coordination and collaboration between contracting representatives and supply chain representatives? Yes/No
6. Are revenue recovery opportunities identified based on payer mix and analysis of reimbursement data? Yes/No

Metrics and parameters: Assess effective usage of strategic contracting

Please answer the following questions (wherever applicable) as **“How many times a month do the following activities take place in your organization”**.

1. Contracting representatives and supply chain representatives coordinate and collaborate to ensure they are aligned .____times monthly
2. How many claims are denied monthly because of inaccurate **Healthcare Common Procedure Coding System (HCPCS)** in supplies? ____
3. Is benchmark information used to verify “market” contract pricing (pricing similar to that for peer hospitals.)Yes/No
 - a. If yes, how many times a month is benchmark information used to verify “market” contract pricing? ____times monthly.
 - b. What is the source of benchmark information? Check all that apply.
 - i. Within Same Network
 - ii. Peer Hospitals Outside of Network
 - iii. GPO
 - iv. Third-Party Contracting
 - v. If “Other” please describe
4. What is the estimated percent of “off-contract spend” for items that are available “on contract”? ____%
5. What is the percent of medical surgical spend as a percent of total supply spend? ____%
6. For items where reimbursement data is available, how many times a month is the data utilized in contract negotiations with vendors? ____times monthly.
7. What savings (\$\$) do you attribute to the use of strategic contracting activities? \$_____
8. Please indicate your responses on a scale of 1-5 (where 1=significantly buffers us from risk, 2= buffers us from risk, 3=neither buffers us not exposes us to risk,4= insufficiently buffers us from risk, 5=does not buffer us from risk)

- a. Our current Strategic Contracting efforts buffer us from risk associated with:

RISK	SCORE
Inaccurate billing	
Hindered contract negotiations	
Inefficient use of labor	
Excessive and unnecessary supply spend	
Lost reimbursement revenue	

Dimension 2: Use of Supply Chain Information Technology in SCM/RCM integration

Please indicate your participation in each of the following activities by circling Yes/No.

1. Do you have connectivity with your suppliers through an electronic data exchange? Yes/No
2. Do you measure contract compliance? Yes/No
3. Do you “clean” data files through the use of software/technology to provide quality information for price analysis? Yes/No
4. Do you have software that identifies the absence of coded supplies? Yes/No
5. Do you have a process to identify missing supply items on patient bills? Yes/No
6. Are there instances you have to revert to a manual process due to breaches in the interoperability between existing systems? Yes/No

Metrics and parameters: Assess effective usage of supply chain IT

Please answer the following questions (wherever applicable) as **“How many times a month do the following activities take place in your organization”**.

1. Data discrepancies in ERP inventory and billing systems are recorded. ____ times monthly
2. Systems automatically update catalog and price information. ____ times monthly /annually.
3. The link between patient data with replenishment and charging systems is reviewed. ____ times monthly
4. With how many suppliers do you have direct connectivity (not through GHX or another exchange) through the use of an electronic data exchange? __Suppliers with direct connectivity.
5. What is your current level of contract compliance? ____%
6. What percent of contract compliance do you attribute to automatic requisitioning? ____%
7. What is your estimated dollar revenue recovery attributed to the use of IT solutions? \$ ____
8. Please indicate your responses on a scale of 1-5 (where 1=significantly buffers us from risk ,2= buffers us from risk, 3=neither buffers us not exposes us to risk, 4=insufficiently buffers us from risk, 5=does not buffer us from risk)
 - a. Use of Information technology solutions buffers us from:

RISK	SCORE
Decreased transparency	
Making less informed decisions	
Experiencing difficulty in streamlining processes with improved supply chain coding	
Decreased contract compliance	
Inaccurate catalog and price information	

An inventory checklist of the presence/use and implementation level of IT Solutions to integrate supplies and revenue .Please circle all application/s present for each solution, specify other applications if any used and indicate level of implementation/integration by CIRCLING Yes OR No against each question

IT SOLUTION	VENDOR/APPLICATIONS (examples)	INDICATE OTHER APPLICATIONS USED , IF ANY	EFFECTIVE IMPLEMENTATION LEVEL(YES/NO)	INDICATE ANNUAL SAVINGS (\$) ATTRIBUTED DUE TO EACH SOLUTION
MMIS	Lawson, Oracle/Peoplesoft Enterprise Stock, CPSI Materials Mgt,Healthland MMS, HMS Materials, McKesson Pathways/Paragon		Categorized by UNSPSC/cleansed? Yes/No	
OR Scheduling/Management	Cerner Surginet, Horizon Surgical Manager, Meditech, Epic Optime, HMS Surgery Mgt		Charges automatically generated? Yes/No Linked to MMIS? Yes/No	
Controlled Cabinets/ADC	Pyxis, Omnicell, McKesson, Amerisource Bergen		Are charges automatically generated? Yes/No	
Purchase EDI	GHX, Cardinal, McKesson		Percentage of spend on EDI ___%	
Purchase Contract Management Software	Group Purchasing Org service, Datapros , Lawson		Percentage contracts loaded ___%	
Billing System	Healthquest (McKesson), Medseries (Siemens), ProFit (Cerner), Epic Financials, CPSI, Meditech, Healthland, Siemens		The supply table is linked? Yes/No	
Claim Scrubber	SSI , 3M, Passport Nebo		Installed? Yes/No	
Claim Analysis/Charge capture	Revrunner (MedAssets), Craneware Bill Analyzer		Claims reviewed pre-bill Yes/No Claims reviewed post-bill Yes/No	
Denials Management	WebMD, Medassets, Craneware, HMS Online Denial Mgt, Relay ePremis		Installed? Yes/No	
Payer Contract Management	IMACS(Medassets),Concuity, McKesson pathways		Installed? Yes/No Contractual write offs uploaded to PAS? Yes/No	
Supplies/Revenue Link/Analysis	Crosswalk (Medassets), Supplies ChargeLink (Craneware), OR Supplies KPIs(Deloitte)		Performing Volume Reconciliation? Yes/No Pricing Review? Yes/No	

Dimension 3: Item Description Master (IDM) & Charge Description Master (CDM) Integration

Please indicate your participation by circling Yes/No for each of the following questions.

1. Do you use standardized supply item information in you IDM? Yes/No
2. Do you use strict naming conventions and coding numbers in your IDM? Yes/No
3. Are the charge codes for chargeable supplies consistent with IDM coding? Yes/No
4. Do changes in IDM automatically trigger adjustment of CDM? Yes/No
5. Is there a process to factor supply costs into procedure charges when not billed separately? Yes/No
6. Do you review supply items for accurate charge codes? Yes/No

Metrics and parameters: Assess level of IDM and CDM Integration

1. What is the total number of items in your IDM?
2. What is the total number of items in your CDM?
3. How many times a month do you “clean” your IDM data files and delete uncommonly used supply items? ___times monthly
4. How many times a month do you review the CDM to ensure that supplies used in selected procedures are represented and coded correctly? ___times monthly
5. What percent of supplies acquired monthly were not attributed to a purchase order in the last year?
6. What percent of monthly POs were not linked to the IDM? ___%
7. What percent of supply items have a link to a CDM charge code? ___%
8. What percent of supply items in the IDM are chargeable?
9. What percent of supply items are not represented with charge codes in the CDM? ___%
10. How many chargeable supply items are not listed in your IDM? ___ITEMS
11. What is your estimated annual revenue (\$) attributed to enhanced integration of IDM/CDM? \$_____
12. Please indicate your responses on a scale of 1-5 where (where 1=significantly buffers us from risk, 2= buffers us from risk, 3=neither buffers us not exposes us to risk, 4=insufficiently buffers us from risk, 5=does not buffer us from risk)

a. OUR CURRENT LEVEL OF IDM/CDM integration buffers us from

RISK	SCORE
Inability to properly audit and adjust systems to capture cost-to-charge data visibility	
Failure to consolidate reporting and varying charge processes across facilities	
Difficulties in monitoring supply revenue and usage, and inability to cross-check utilization of supplies	
Decreased coding consistency and inaccurate prices charged	

Dimension 4: Charge Capture & Strategic Pricing

Please indicate your responses by circling Yes/No for each of the following questions.

1. Do you track strategic supply items (items that are reimbursable) throughout the lifecycle i.e. acquisition to billing? Yes/No
2. Do you have lists of supplies utilized in patient procedures? Yes/No
3. Do you conduct root cause analysis on claims denials? Yes/No
4. Are auditing tools used to identify lost charges, under-charging, or overcharging? Yes/No
5. Are you capturing/updating price changes in the appropriate IT systems? Yes/No

Metrics and Parameters: Assess effective charge capture

Please answer the following questions (wherever applicable) as “How many times a month the following activities take place in your organization”.

1. Claims examined for missing charges ____times per month
2. Missing charges are identified ____times per month
3. Systems are updated for price changes. ____times per month
4. How many “miscellaneous” charge codes are in the CDM? ____charge codes
5. What is your estimate of percent of total claims filed that are missing charges? ____%
6. How many claims are denied in a month? ____times per month
7. Do you track savings due to effective charge capture? Yes/No
 - a. If yes, what is the estimated savings (\$) due to effective charge capture practices during the last year? \$____Saving
8. Please indicate your responses on a scale of (1-5) (where 1=significantly buffers us from risk, 2= buffers us from risk, 3=neither buffers us not exposes us to risk, 4=insufficiently buffers us from risk, 5=does not buffer us from risk)
 - a. Our current efforts in charge capture management buffer us from the:
 - i. Decreased charging/reimbursement
 - ii. Inaccurate charging/reimbursement

Summary: Overall Estimated Risk of Poor SCM/RCM Performance

How would you rate your overall risk level due to current SCM/RCM integration practices in your organization, given your overall current efforts in supply chain and revenue management?

Our efforts in supply chain and revenue management:

- i. Significantly buffers us from risk
- ii. Buffers us from risk
- iii. Neither buffers us not exposes us to risk
- iv. Insufficiently buffers us from risk
- v. Does not buffer us from risk

Appendix C. Literature Review

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