



## Order to cash

# Using GS1 standards to improve EDI accuracy and achieve the perfect order

In 2011, Becton, Dickinson and Company (BD), Mercy Health (Mercy) and its supply chain company, Resource Optimization & Innovation (ROi), launched a collaborative initiative to fully automate their order-to-cash process to achieve the “perfect order,” implementing GS1 standards from manufacturing site to patient bedside. This end-to-end integration of global data standards—in supply chain and clinical processes—by a healthcare manufacturer and provider is a first-time accomplishment in the U.S. healthcare industry. Moving forward, the trading partners have continued to perfect and extend their perfect-order success, resulting in highly accurate and efficient processes with a continual focus on improving patient care. This review will provide an update on how the two organisations implemented EDI to achieve supply chain efficiencies and how their use of GS1 standards continues to evolve.



*By Dennis Black and Matthew Mentel*

## Adopting a phased approach

Today’s U.S. healthcare industry faces many challenges such as increasing regulations, new demands from patients and rising costs.

For healthcare providers and manufacturers alike, the supply chain holds considerable opportunity to better control and reduce accelerating costs by addressing a major contributor—errors.

To eliminate transaction errors, BD and ROi/Mercy took a phased approach to implement GS1 standards, enabling automated EDI transactions to reduce human intervention in their procurement and replenishment processes.

“Achieving the perfect order has helped us become a more efficient business partner, streamline our internal procure-to-pay processes and enabled us to provide better care for our patients,” explains Matt Mentel, Executive Director, Integrated Performance Solutions with ROi/Mercy. “In addition, through this work we have helped our own operations by reducing redundancies and the overall cost of doing business.”

### What makes an order “perfect”?

Defined by the Strategic Marketplace Initiative (SMI), the perfect order is “a purchase order processed electronically (from order to payment) without human intervention, delivered to the correct location, on time, undamaged, at the right price, with the desired quantity, on the first attempt.” This process ensures effective use of available resources by eliminating errors and maximising the use of technology.

Dennis Black, BD's Director of e-Business, Solutions Group, adds, "Over the past few years, we have continued to look for new opportunities to leverage GS1 data standards in our business processes. We continue to realise new benefits as our experience and network of partners grow."

## Taking first steps with identification

For ROi/Mercy, the decision to use GS1 standards was a straightforward one. As Mercy's supply chain company, ROi fully understood how improved supply chain processes could have a positive impact on clinical operations.

For example, Mentel stresses the importance of having accurate product data for consumption at the point of care by clinicians.

"Having and using GS1 standards enables us to automate the scanning and documenting of product at the point of consumption, while also automating the replenishment of that product back to inventory. This removes the burden of manually tracking product consumption and replenishment from our clinicians and allows them to focus on their patients, knowing the right products will be available at the right time and place."

The transformation started with BD assigning GS1 Global Trade Item Numbers (GTINs) to uniquely identify its products and Global Location Numbers (GLNs) to identify its locations. Subsequently, ROi assigned GLNs for its distribution centres and Mercy hospital locations, sharing these GLNs with BD and other suppliers to ensure shipments were delivered to correct locations and traceability records are fully aligned.

Black advises, "From the beginning, we decided that we would only use GLNs assigned by our respective trading partners. If we want accurate location data on Mercy Health and ROi/Mercy, we need to use their interpretations, not the work of a third party. Accurate GLN assignments can help us reduce pricing and shipping errors."

## Enabling seamless EDI transactions

When ROi/Mercy and BD first began working to establish the perfect order, both companies worked to ensure that every BD product had an established GTIN for every item in Mercy's item master at each unit of measure. Today, ROi leverages these GTINs when ordering, picking and shipping BD products throughout Mercy.

Where applicable, Mercy also uses GTIN data to scan products at the point of care and to store product usage information in the patient's electronic health record (EHR) and registries.

BD and ROi/Mercy also use GS1 standards in their EDI transactions for the instant exchange of business transactions for improved efficiencies and accuracy throughout the order-to-cash process.

By transitioning from manual data entry to automated, EDI-driven processes, both trading partners have realised a wealth of benefits such as significantly improved accuracy, reduced costs, increased product availability and improved productivity.

"Adopting and leveraging GS1 standards across the healthcare industry is essential, providing us improved efficiencies in our supply chain operations and affording us the ability to continue to improve the patient experience."

Gene Kirtser, CEO, ROi

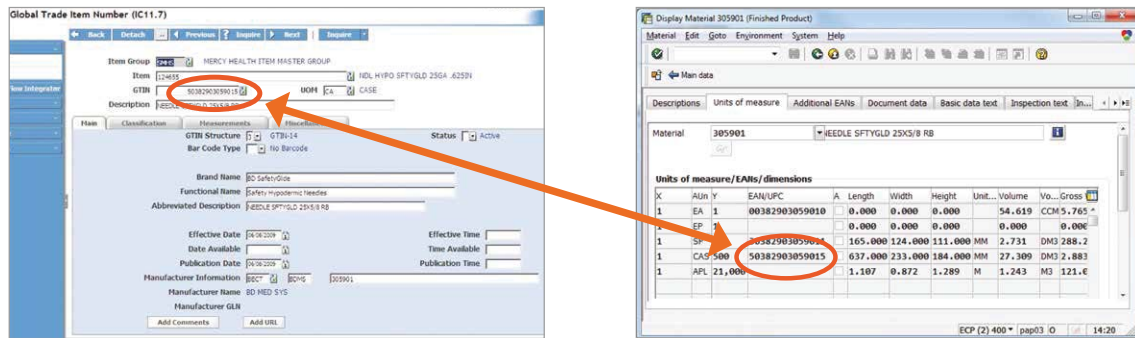
In December 2015,

**97.64%** of BD products purchased by ROi were via EDI and

**96.46%** of the line items were "touchless," accounting for some items that require human intervention as part of the fulfilment process.

The effective error rate during this month was an impressive

**1.18%**, considering that EDI transacted orders can fail for a variety of reasons.



Aligned Master Data

BD and ROi/Mercy began transacting via EDI long before they began using GS1 data standards. The use of GLNs and GTINs in EDI transactions has created further efficiencies and enabled the two trading partners to speak the same business language. Both have the exact understanding of the data represented by a specific GLN or GTIN.

The value of EDI is evident based on its growing use by companies worldwide. In its 2015 EDI implementation survey, GS1 found the implementation of GS1 EDI standards—GS1 EANCOM® and GS1 XML—by responding member companies has continued to show steady growth for the past 10 years.

“BD uses EDI transactions for more than 90 percent of our sales volume in the U.S. region,” says Black. “EDI is an efficient process for purchase orders, advanced ship notices (ASNs), invoices and other procurement transactions. We have worked with Mercy Health and other leading healthcare providers to use GLNs and GTINs in EDI transactions. The use of data standards in EDI transactions can help to reduce master data errors and add to the efficiency of using EDI.”

**Gaining accuracy and visibility of orders**

When placing an order, ROi/Mercy uses the GTINs on purchase orders (POs), which takes the guesswork out of ordering the right products.

“GS1 standards provide a common language for our EDI transactions, directly impacting data quality,” says Mentel. “The GTINs associated with BD products in our materials management information system (MMIS) match the data in BD’s ERP system. We no longer confuse levels of packaging or have errors due to the use of internal product numbers.”

Each BD product’s GTIN with lot/batch and expiry data is encoded in a GS1 barcode, which is printed on the product’s package label in BD factories. As orders are assembled for shipping, the BD distribution centre uses the GS1 Serial Shipping Container Code (SSCC) to identify a single logistic unit and its contents. A Global Shipment Identification Number (GSIN) is also used to quickly identify the shipment and access the groups of logistic units that are included. In application, the pallet is coded with an SSCC license plate label, which provides a common means to identify pallets across partner’s systems and a link to their contents using the product GTINs. The pallets are then shipped, identified with the GSIN that can be encoded to allow for instantaneous access to the shipment information. With GS1 standards for products, logistic units, shipments and EDI communication, the trading partners have the needed foundation for seamless and error-free transactions.

BD is also experimenting with publishing and managing their product data in the GS1 Global Data Synchronisation Network™ (GDSN®). “We currently use several different methods to share product data with ROi/Mercy and other customers. We are now experimenting with GDSN to provide product data in a trusted and secure way for any product a hospital consumes,” says Black.

As a shipped order travels from a BD factory to its distribution centre, it then moves on to the ROi/Mercy distribution centre and eventually gets distributed throughout Mercy. Through this process, ASNs containing the GTINs and GLNs are used to verify the receipt and accuracy of the order, providing visibility of the shipment and its products, each step of the way.

Upon receipt, the ROi/Mercy distribution centre scans the shipping label to verify receipt of

products included in the shipment and record the product information in its inventory system. From there the product is distributed to the facility where the GTIN is scanned to the shelf and made ready for consumption. As a result, quality control processes are improved through this workflow as ROi/Mercy can use the manufacturer-provided production data for managing inventory. With immediate access to accurate information, this speeds both the BD and ROi/Mercy supply chain processes and helps ensure overall accuracy of orders.

### Ensuring the chain of custody

When shipping products to any of its hospitals, the ROi/Mercy distribution centre transmits an ASN to the Mercy location receiving the shipment for ease of product receipt and verification. As products travel throughout Mercy's hospitals, their GTINs enable ROi to trace products from points of replenishment to points of use.

Where applicable, ROi/Mercy uses GTINs to track products for use in its procedural areas, pharmacies, storage locations and patient care areas. GTINs can also be scanned to help search for products in Mercy's materials management information system.

Caregivers scan patient wristbands to identify the patient and location where care takes place. They can also scan GTINs on consumed products, capturing critical information to drive product consumption, near real-time usage and inventory control as well as patient invoicing.

As products are consumed in Mercy facilities, a replenishment order/PO is generated with the needed product GTINs as well as the GLN of the hospital where the products should be shipped. The PO is automatically transmitted via EDI to the ROi/Mercy distribution centre where products are picked and shipped.

Mentel advises, "Scanning and tracking of a GTIN throughout the supply chain and on to the point of consumption is key. The scanning of the GTIN allows us to manage and remove the risk of an expired product being used at the point of care. In addition, once GTINs are more extensively used in recalls, we will also be able to leverage this same scan to remove the risk of recalls being used on patients, accurately track the recalled product to the patients who received it and trace it back to the supplier who sourced it. GS1 standards also help us confirm the authentication of products received, verifying their chains of custody."

Patient MRN #	OR Procedure Name	Supply Item Type	EPIC Supply Item Name	Manuf Cd	Item Nbr	Part Nbr
E1402260637	APPENDECTOMY	Basin	BASIN SUROK-START SOL 31144333	TYCI	120234	31144333
E1402260637	APPENDECTOMY	Catheter	CATH FOLEY 16FR TRAY 900016A	CRBA	77894	900016A
E1402260637	APPENDECTOMY	Lab	BACTERIAB AEROBIC C/S R723115	ATC	181335	R723115
E1402260637	APPENDECTOMY	Lab	CULTURETTE SPECIMEN ANAEROBIC	BECT	129066	40382902265006
E1402260637	APPENDECTOMY	Laparoscopic	ENDO CATCH 10MM 1730500	TYCI	259427	1730500
E1402260637	APPENDECTOMY	Laparoscopic	SPNG ENDO KITTNER 13300	VICN	207726	13300
E1402260637	APPENDECTOMY	Clip	APPLIER ENDO CLIP II 1-USE W/MED-L	TYCI	288114	176657
E1402260637	APPENDECTOMY	Dressing	DRSG BANDAID 0.75X3 3065LF	TYCI	42376	3065LF
E1402260637	APPENDECTOMY	Dressing	DRSG OZE 4X4IN 10PK 2539	TYCI	182350	2539
E1402260637	APPENDECTOMY	Glove	GLV SURO BIOEEL 6.5 30465	MOLN	13319	30465
E1402260637	APPENDECTOMY	Glove	GLV SURO BIOEEL 8.0 30480	MOLN	9928	30480
E1402260637	APPENDECTOMY	Gown	GOWN SURG ULTRA X/LG 95121	KIMB	4140	95121
E1402260637	APPENDECTOMY	Lab	BACTERIAB AEROBIC C/S R723115	ATC	181335	R723115
E1402260637	APPENDECTOMY	Lab	CULTURETTE SPECIMEN ANAEROBIC	BECT	129066	00382902265006
E1402260637	APPENDECTOMY	Laparoscopic	ENDO CATCH 10MM 1730500	TYCI	259427	1730500
E1402260637	APPENDECTOMY	Laparoscopic	SPNG ENDO KITTNER 13300	VICN	207726	13300

Use of BD GTIN Data in a Mercy Health Electronic Health Record

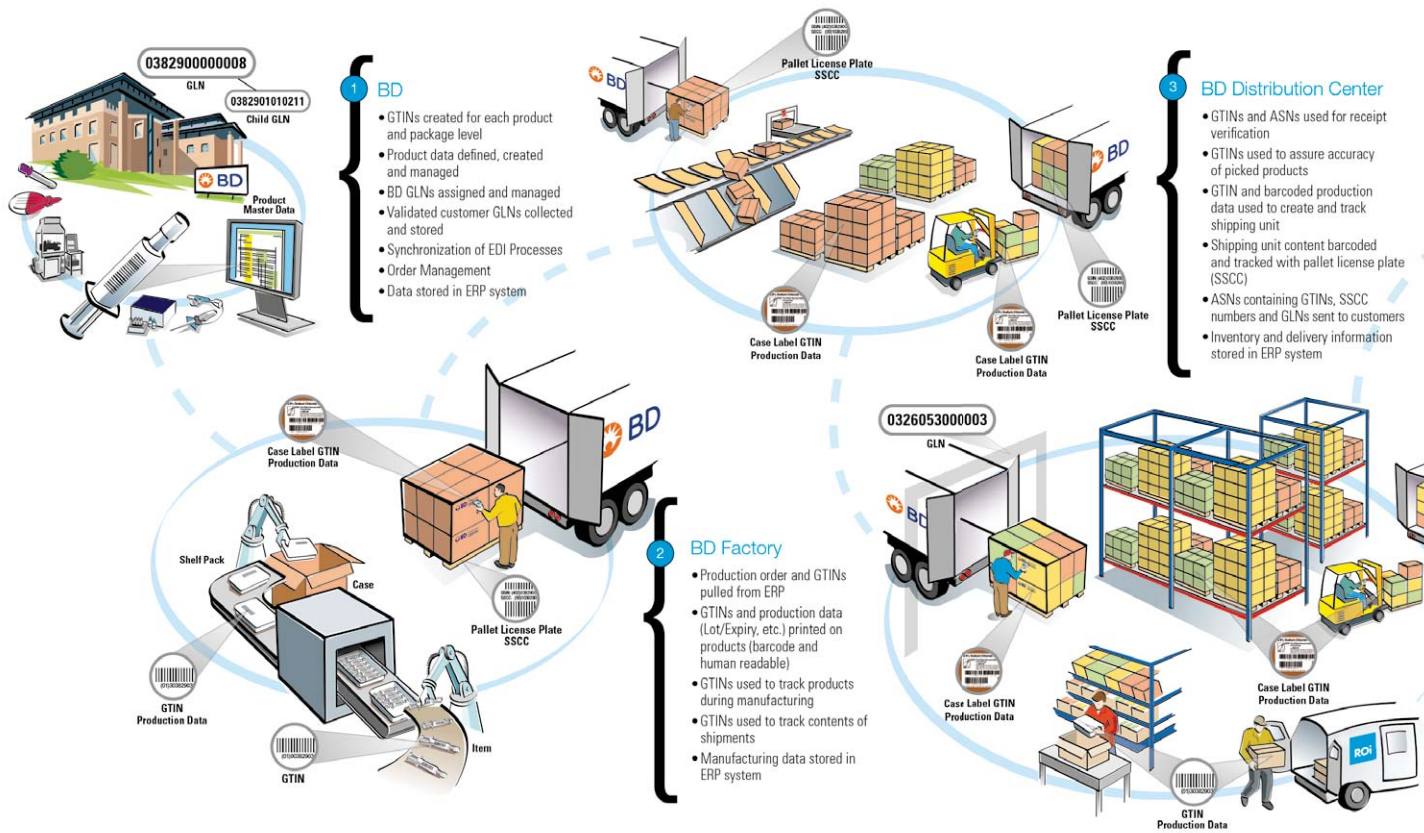
"BD is investing in product master data, applying accurate barcodes to our labels, and perfecting business processes so that we can better serve our customers. This work is an example of the offerings included in our Signature Solutions program where we are offering up resources and expertise to further collaborate with our customers."

David Ortiz, Director, Solutions Group, BD

"To be successful with EDI transactions, we need to align master data, agree on business rules, select a common EDI format and manage many other variables. By synchronising product master data using GLNs and GTINs with our customers, we can enable our ERP systems to speak a common business language and help eliminate EDI errors."

Carol Harrison-Bradley, Manager, e-Business, BD

## End-to-end integration: GS1 global standards go where the product goes



## Perfect order for improved patient care

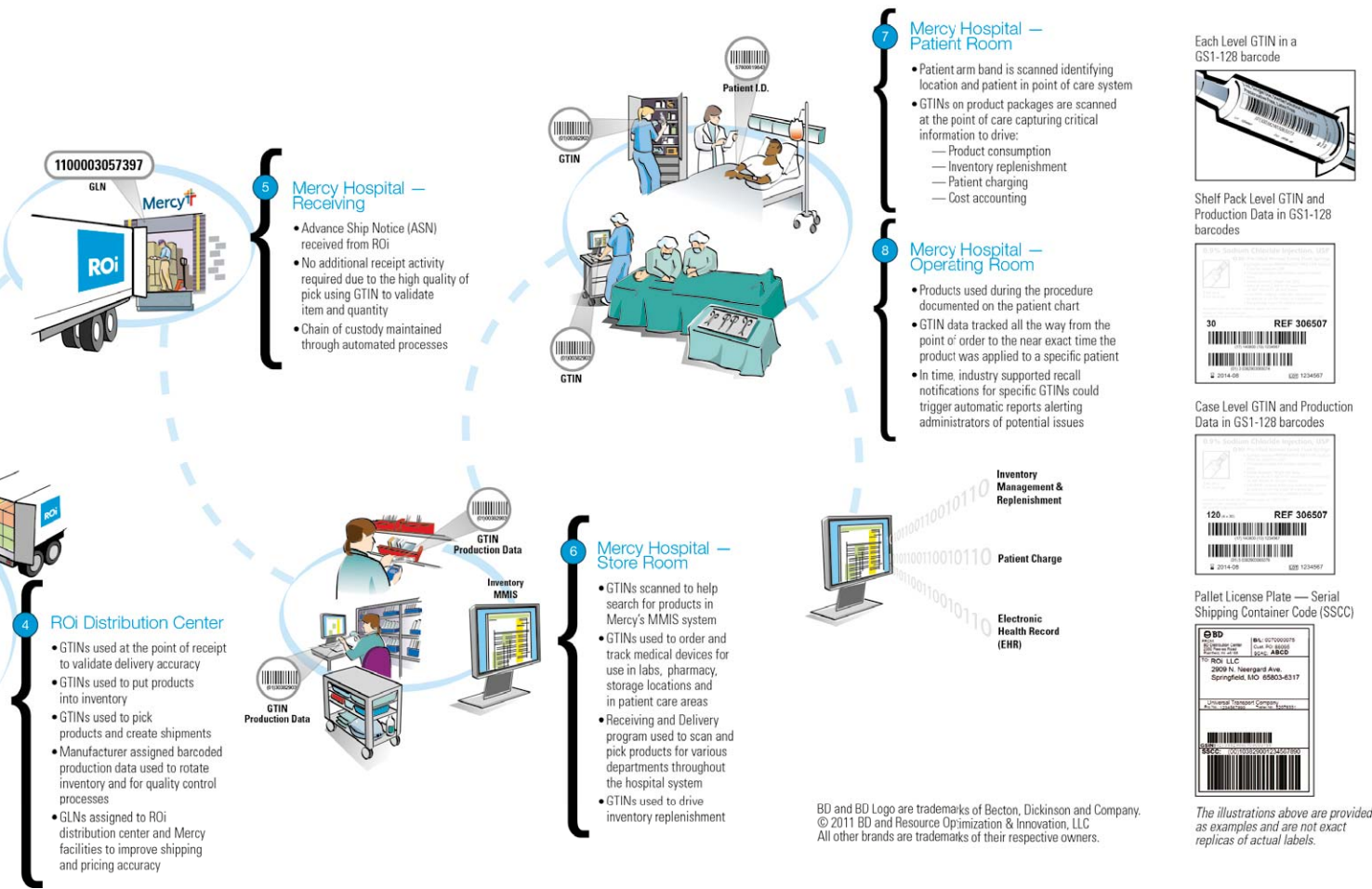
Three years after instituting the Perfect Order programme between BD and ROi/Mercy, EDI utilisation remains high and error rates remain very low.

In December 2015, 97.64 percent of BD products purchased by ROi were via EDI and 96.46 percent of the line items were “touchless,” accounting for some items that require human intervention as part of the fulfilment process.

The effective error rate during this month was an impressive 1.18 percent, considering that EDI transacted orders can fail for a variety of reasons. This continually high EDI success rate has been achieved without expending significant resources. To maintain a high EDI success rate, the trading partners continue to share master data. For example, BD and ROi/Mercy have established a process to add GTIN data and other key product data attributes into their IT systems before new BD products are purchased.



By using GTINs, trading partners can eliminate cross-reference tables for translating provider-assigned product numbers to a manufacturer’s catalogue number, thus reducing potential errors.



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The illustrations above are provided as examples and are not exact replicas of actual labels.

This means that BD and ROi/Mercy continue to achieve many of their targeted perfect-order benefits, including:

- 31.1 percent improvement in the ROi/Mercy ready-to-pay timing
- 75 percent improvement in the ROi/Mercy receive-to-match timing
- 30 percent reduction in days payable outstanding, improving cash flow
- 73 percent reduction in discrepancies on purchase orders, increasing accuracy and costs savings due to significantly fewer reworks
- Increased productivity, increasing the time people can work on other value-added activities
- Fewer number of calls to customer service, increasing satisfaction
- Improved inventory management with fewer stock outs, increasing product availability for improved patient care

The use of GTINs and EDI transactions also leads to a range of benefits for both sides of the trading relationship.

- By using GTINs, trading partners can eliminate cross-reference tables for translating provider-assigned product numbers to a manufacturer's catalogue number, thus reducing potential errors.
- GTIN usage can also eliminate confusion when dealing with products containing multiple levels of packaging. Each unique GTIN is assigned to a unit of measure; so there is no need for the healthcare provider to supply a UOM in the EDI message, ensuring that the correct level of packaging is ordered, shipped and invoiced.
- By assigning GLNs, healthcare providers are not required to use the manufacturer-assigned, or distributor-assigned customer numbers for EDI, again eliminating the need to map tables and resulting potential errors.



Being more efficient and eliminating supply chain errors means healthcare providers can focus their resources on patient care instead of supply chain rework. Also, eliminating supply chain errors helps to ensure that the right products arrive at the right location when needed by the clinicians.

## Exploring clinical applications

Using GS1 standards in EDI transactions and business processes is really only the beginning. Today, Mercy uses GS1 standards, where applicable, to track products throughout its supply chain all the way down to the point of consumption in the clinical setting.

Awarded a grant by the U.S. Food and Drug Administration (FDA) in 2012, Mercy began by tracking and documenting the consumption of coronary stents in its cardiac catheterisation laboratories. To automate this capture and gain better visibility to product, Mercy implemented a scanning solution, first within its cardiac cath labs, to document the receipt, storage, consumption and reordering of stents—all using Unique Device Identification (UDI) enabled by GTINs.

These GTINs could be linked to attributes contained within the FDA's Global UDI Database (GUDID) as well as key clinical attributes in Mercy's Supplemental UDI Database. These GTINs have also been integrated in Mercy's ERP software, its inventory management system, and electronic health record system to uniquely identify stents as they are managed as inventory and used in patients.

Since this project, Mercy has been awarded another FDA grant to continue to expand this research with two other health systems.

"We continue to expand the tracking of UDI and GTINs beyond our cardiac catheter labs, which involves a relatively small number of products, to other procedural areas, such as the OR," explains Mentel. "By documenting consumption, we have access to accurate inventory and replenishment practices to ensure that needed products are always there. This information can also provide our clinicians with some very compelling data about these products, how they are used, and their effectiveness levels."

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"The barcode scanning capability in our Cath Labs enabled us to capture coronary stent GTINs and associate them with the patients in which the devices were implanted. That was the key to bringing device and clinical data together so that we could track stent performance over time assessing both safety and effectiveness by key device attributes such as dimensions or impregnated drug. This is powerful information for physicians and patients and will have applicability to all implanted devices."

**Dr. Joseph Drozda**, Director of Outcomes Research, Mercy Health System

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**Matt Mentel**, Executive Director,  
Integrated Performance Solutions, ROi/Mercy

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“In the U.S. and many other countries, there’s a tremendous amount of discussion about migrating to GS1 standards. We’re sharing our work as much as possible to help move the industry forward. Our priority is not about gaining a competitive advantage—it’s about making our healthcare system work better for everyone.”

**Dennis Black**, Director, e-Business, Solutions Group, BD  
Integrated Performance Solutions, ROi/Mercy

## Looking to the future

ROi/Mercy continues to encourage its other suppliers to use GS1 standards and EDI communication for transactions. Simply put, storing GTINs in internal hospital systems creates a foundation for GTIN usage in scanning programs, electronic health records, comparative effectiveness research, recalls and other clinical applications.

BD is also urging its customers to use the GS1 data standards since they provide a common business language that can enable accurate business transactions and support many of the clinical initiatives that healthcare providers are implementing.

BD has a comprehensive EDI program in place and is looking to extend this further. Considering the EDI transactions exchanged with the largest healthcare provider systems in the U.S., over 96 percent of products purchased from BD are via EDI and error rates per order are very low, ranging between 0 to 3 percent of line items. BD’s goal is to have 100 percent of its products purchased via EDI with zero transactional errors in any given month—and many customers today are achieving this.

For hospitals, using GS1 standards is quickly becoming a fundamental element of their operations. “Using GS1 standards on all products is essential to the overall successful operations of hospitals, long term,” explains Mentel. “Going forward, we want to ensure the results and practices developed from our work with BD are extended to all Mercy suppliers and beyond to the entire industry.”

Black with BD agrees, “In the U.S. and many other countries, there’s a tremendous amount of discussion about migrating to GS1 standards. We’re sharing our work as much as possible to help move the industry forward. It’s about making our healthcare system work better for everyone.”



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## About the Authors



### **Dennis Black**

*Director, e-Business, Solutions Group, BD*

*With more than 25 years of healthcare industry experience, Dennis has responsibilities on the BD Signature Solutions team that include, leading collaborative initiatives with healthcare providers, UDI implementation, achieving the “Perfect Order”, and refining e-Business processes. Dennis is on the GS1 Healthcare Global Leadership Team, and the GS1 Healthcare U.S. Executive Leadership Team. He also participates in work groups within GS1, SMI, AdvaMed, MDSCC and other organizations that are focused on improving the healthcare supply chain. Dennis is currently involved in a number of pilot and implementation activities to enable BD and healthcare providers to achieve operational efficiencies using GS1 standards.*



### **Matthew Mentel, CMRP, M.H.A., M.B.A.**

*Executive Director, Integrated Performance Solutions, ROI/Mercy*

*As the Executive Director for Integrated Performance Solutions, Matt and his team are responsible for identifying, designing and implementing creative solutions as well as leveraging current technology to drive efficiency and expense reduction throughout Mercy. He oversees several key initiatives that seek to optimise the use of tools, technology, process improvement and metrics across the entire care continuum, driving more predictive and outcomes based decisions that help improve and enrich the Mercy experience for caregivers and patients. Matt has more than 24 years of experience in healthcare, including 15 years in supply chain and information technology. He has held various positions with Mercy— the sixth largest Catholic health care system in the United States. Matt’s career includes service to a variety of other healthcare providers, including ROI (Resource Optimization & Innovation), SSM Healthcare System, BJC Healthcare and St. Louis University Hospital, as well as a healthcare consulting/accounting firm. Matt is a member of the Association for Healthcare Resource & Materials Management (AHRMM) and Healthcare Information and Management Systems Society (HIMSS). Matt received a bachelor’s degree in Management Information Systems with a Certificate in Health Information Management, a Master of Health Administration, and a Master of Business Administration from St. Louis University.*

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## About BD

*BD is a global medical technology company that is advancing the world of health by improving medical discovery, diagnostics and the delivery of care. BD leads in patient and health care worker safety and the technologies that enable medical research and clinical laboratories. The company provides innovative solutions that help advance cellular studies and genomics, enhance the diagnosis of infectious disease and cancer, improve medication management, promote infection prevention, equip surgical and interventional procedures, optimize respiratory care and support the management of diabetes. The company partners with organizations around the world to address some of the most challenging global health issues. BD has more than 45,000 associates across 50 countries who work in close collaboration with customers and partners to help enhance outcomes, lower health care delivery costs, increase efficiencies, improve health care safety and expand access to health.*

[www.bd.com](http://www.bd.com)

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## About Mercy

*Mercy is the eighth largest Catholic healthcare system in the U.S. and serves more than 3 million people annually. Mercy includes 30 hospitals, more than 200 outpatient facilities, 38,000 co-workers and 1,500 integrated physicians in Arkansas, Kansas, Missouri and Oklahoma.*

[www.mercy.net](http://www.mercy.net)

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## About ROI

*ROI (Resource Optimization & Innovation) is a recognised leader in the healthcare supply chain management industry. Founded by Mercy in 2002, ROI provides a single source, fully integrated supply chain solution, including group contracting, clinical and operational consulting, pharmaceutical repackaging, custom procedure tray manufacturing, print operations, purchasing and master item management, and distribution and transportation management.*

[www.roiscs.com](http://www.roiscs.com)