

Markham Stouffville Hospital

Highlights

Built in 1990, Markham Stouffville Hospital's original Markham facility was designed to serve the region's 100,000 residents. As the city's expanding population was expected to surpass 300,000 residents, the hospital embarked on a major project to double its overall size in anticipation of demand. Part of planning for that growth, was an examination of MSH's administrative systems and equipment, including its document output infrastructure and associated services and its physician order process.

While cost reductions and cost avoidance were a welcome outcome for MSH, its primary objectives for this IT initiative aimed squarely at patient-care quality and giving minutes and hours back to clinicians and other employees so the time could be used to care for patients.

In addition to the productivity and process improvements achieved in support of its patient-care objectives, which are discussed throughout this study, Markham Stouffville Hospital will earn an 18% ROI in the first three years, with total benefits of \$715K over three years, as a result of its investment in Lexmark products, solutions and services (Figure 1).

Financial benefits

- ▶ \$360K in consumables cost optimization
- ▶ \$269K in third-party maintenance cost avoidance
- ▶ \$68K in device fleet optimization
- ▶ \$18K analog fax line cost savings
- ▶ 1,000+ pharmacist hours reclaimed
- ▶ 83% improvement in physician order processing time
- ▶ 75% reduction in the number of follow-ups required on physician orders

"We wanted a vendor to manage our whole print environment and wanted to step away from the day-to-day handling of devices, paper, consumables and maintenance that had become an operational burden and a productivity drain on employees and the hospital's budget."

Tim Pemberton
Chief Information Officer
Markham Stouffville Hospital



About Markham Stouffville Hospital

Background: Located northeast of Toronto, Canada, Markham Stouffville Hospital (MSH) is a progressive, two-site, community hospital with leading diagnostic services and clinical programs in acute care medicine and surgery, addictions and mental health, and maternal and child health. The hospital's 330 physicians and 1,800 staff, in partnership with other specialist providers, comprise a vital center of community care for the residents of the City of Markham and the nearby towns of Stouffville and Uxbridge. MSH is an award-winning hospital and has earned an advanced 5.1+ EMR Adoption ModelSM score. Developed by HIMSS Analytics, the EMR Adoption Model identifies and scores hospitals using an eight-step scale that charts the path to a fully paperless environment.

Location: Markham, Ontario, Canada

Executive summary

With the planned expansion of its facility on the horizon, Markham Stouffville Hospital (MSH) wanted to ensure that its business infrastructure and physician order process was primed for the forthcoming surge in patients. At the same time, MSH saw this expansion as an optimal time to take a closer look at ways it could streamline its physician order process in an effort to further improve patient care and give minutes and hours back to clinicians.

MSH took aim at its existing fleet of printers and output devices that produced more than six million pages a year. To create the best strategy around its unique objectives, the hospital chose Lexmark to evaluate its output environment and processes and propose steps to optimize paper consumption, control costs and automate and accelerate key paper-based procedures—specifically its physician order processing system.

The resulting strategy called for replacing much of MSH’s aging assortment of printers with a standardized and optimized fleet of strategically-placed multifunction products (MFPs) and other output devices from Lexmark—all connected to the hospital’s data network and maintained under a comprehensive managed print services agreement with Lexmark. After installing the new fleet of Lexmark products, the hospital tackled its physician order system, a process that relied on hand delivering paper forms via interoffice mail from nursing stations to the pharmacy. Working with Lexmark, the hospital designed and deployed a new system in which clinicians scan physician orders using a nearby Lexmark MFP and instantly transmit digital images of the physician orders to pharmacy staff.

As a business assessment by Mainstay showed, MSH has seen clear financial and productivity benefits from the move to a Lexmark-based managed print services approach and physician order management solution. Lexmark handles all device management and maintenance, including replenishing toner and other consumables automatically

based on alerts triggered by the devices themselves. This proactive approach to device and consumables management ensures that equipment is always up and ready to do its part in caring for patients. In doing just that, the approach gives time back to employees to focus on their core jobs. Late-night, after-hours calls from nursing stations to security to find, retrieve and deliver the right toner cartridge from an off-site central storage area are a thing of the past.

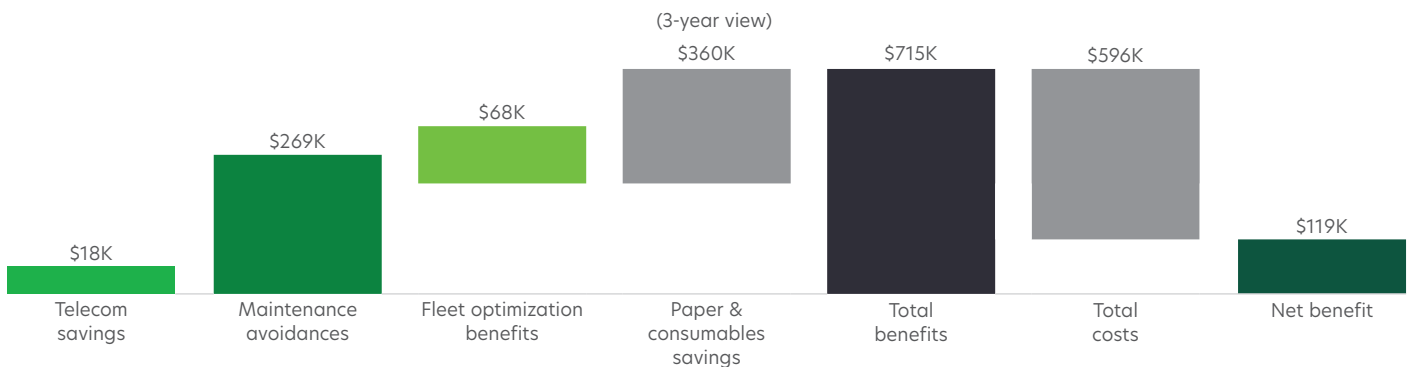
Meanwhile, with the new approach to physician orders, clinicians and pharmacists are working more efficiently and administering medications to patients with less paper and fewer hassles and delays—an improvement that is expected to improve patient care and satisfaction.

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Figure 1

Total cost and benefits by category



Challenge

Like all successful medical centers, MSH depends on an efficient clinical and business infrastructure to fuel growth and deliver the highest level of patient care. Despite the emergence of digital technologies, a large percentage of the hospital's business processes remain paper based. From patient forms to physician orders to compliance reporting, MSH generates a steady stream of paper documents to keep clinical and administrative operations running smoothly.

While paper and printing processes can't be eliminated entirely, they can be significantly streamlined to help reduce or avoid costs and accelerate critical clinical workflows. MSH sought to achieve these goals and more as it planned for a massive expansion, assessed its enterprise output environment and physician order process and the associated cost trends.

Print volumes were steadily rising at the time and that put increasing pressure on the hospital's aging fleet of more than 250 printers and output devices, which had amassed 70 different models from seven vendors. Nearly 80% of the devices were at least five years old, and only 60% of the devices were connected to the hospital's data network, limiting their usefulness and thwarting the hospital's need for data about employee printing habits and device operation history upon which to make decisions (Figures 2 & 3).

Figure 2

Percentage of devices connected to the network

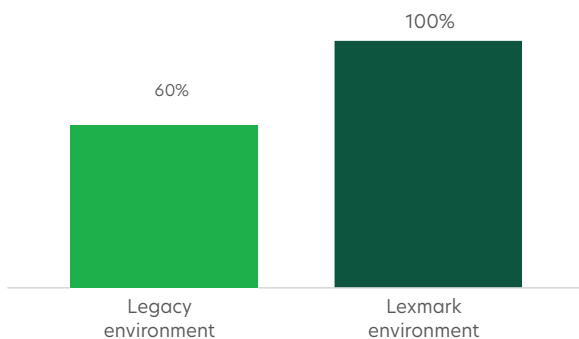


Figure 3

Consolidating to fewer, newer Lexmark MFPs

| | Legacy environment | Lexmark environment |
|-------------------------------|--------------------|---------------------|
| # of device models | 68 | 6 |
| Device age % > than 60 months | 78% | < 1% |
| # of device vendors | 7 | 1 |

Security was also a concern, as employees sent print jobs but forgot to pick them up, potentially exposing confidential information to unauthorized users. Replacing supplies like toner and other consumables also posed problems. Toner often ran out unexpectedly, prompting late-night calls to security to retrieve just the right part number from a central storage room and deliver it to the right nursing station so that clinicians could change out the depleted cartridge. Meanwhile, business as usual slowed to a crawl.

"With our existing printer fleet, we did not have a good understanding of what we were printing or how much we were spending," said Tim Pemberton, chief information officer at Markham Stouffville Hospital. "Many of the printers were approaching a decade in age and we were not actively managing or maintaining the fleet." Strain on the hospital's printing infrastructure would only increase, hospital administrators reasoned, as they looked ahead to the hospital's expansion that would almost double the size of the facility.

We could clearly see that there was a significant cost savings and cost avoidance opportunity for us," said Pemberton. "With our growth plans, we could also predict that these metrics were going to trend in the wrong direction, unless we took action."

Pharmacy orders: Improving patient care, speeding up processes and unburdening staff

Hospital administrators also saw a significant opportunity for efficiency gains in the area of physician orders. For years, the process for ordering and filling physician orders involved a highly manual, paper-based routine. Doctors, working with nurses on the floor, wrote out prescriptions on four-part forms and deposited them in interoffice mail bins located at the nursing stations throughout the facility. About 300 orders a day were picked up by couriers and delivered to the pharmacy every hour.

The system was ripe for improvement. The paper slips could get misplaced, and occasionally orders came in that lacked key information, such as the patient's name and ID number. This led to delays while pharmacists tracked down the source of the order and gathered essential, missing information. These extra steps to ensure patient safety were never circumvented, but added time and inefficiency to an already labor-intensive process.

Furthermore, nurses could only determine the status of an order by calling the pharmacy. These calls slowed the process more and interrupted busy pharmacy staff. Was an order en route to the pharmacy? Was it in the process of being filled? Had it been misplaced? Was it being delivered? With the legacy approach, nurses had no way of knowing the answers to these questions without placing a call to the pharmacy. "With our paper process, nurses couldn't track the pharmacy orders quickly and there was always the possibility of an order getting misplaced. Now we track everything electronically," said Georgina Mikhail, pharmacy manager.

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Solution

MSH decided it needed a new strategy—specifically a holistic, "printing-as-a-service" approach that would enable the hospital to optimize its fleet of output devices and relieve employees of the day-to-day handling of devices, paper, consumables and maintenance. It also wanted to take advantage of new scanning and routing technologies to improve the speed and accuracy of its physician order process.

The hospital started by asking Lexmark to conduct a hospital-wide assessment of its printing infrastructure, laying the groundwork for a comprehensive managed print services agreement and the deployment of more than 200 Lexmark MFPs, replacing most of the existing output fleet. Working with Lexmark to carefully analyze usage patterns throughout the facility, the hospital found it could actually reduce the overall number of printers and MFPs and position the devices closer to where they were needed.

Lexmark impressed us by not replacing every device with a Lexmark product," said Pemberton. "If an installed product from another vendor met users' needs and was operating properly, Lexmark advised us to keep it and put it on an asset management schedule, along with the Lexmark models."

The managed print services agreement handed over device management and maintenance duties to Lexmark, giving hospital employees more time to focus on their core jobs. Now, Lexmark remotely monitors the device fleet, performs diagnostics and dispatches technicians as needed. The devices automatically send alerts when toner levels run low, triggering replacement supplies to be shipped to the printer's exact location. That means the hospital no longer worries about printers running out of toner and no longer has to maintain costly stocks of supplies on site. It also means that late-night calls to security to retrieve toner are a thing of the past. The proactive, rather than reactive, approach to toner management means that devices are always ready to print whatever documents are needed to support patient care and hospital operations.

After connecting all of its printers and MFPs to the network, MSH introduced print release capabilities, part of the Lexmark Print Management offering. This Lexmark solution sends print jobs to a central queue and lets employees "release" the job from whatever networked printer or MFP is most convenient or has the features or capabilities they need. The feature improves security because employees are required to swipe their badge before releasing a print job. Unreleased jobs are deleted from the queue after a set period of time, eliminating abandoned print jobs, saving paper and heightening document confidentiality.

Faster, more accurate physician orders

The switch to Lexmark's networked MFPs—combined with adding a workflow automation solution from Lexmark—made it possible to dramatically improve the way MSH handles physician orders. Now, instead of dropping prescription forms into mail bins, clinicians scan medication orders on the Lexmark MFP in the nursing unit, creating a digital image of the order that is automatically barcoded, linked to the patient record, and immediately routed to the pharmacy through the Lexmark workflow platform.

"Automating medication orders allows us to leverage our Lexmark MFPs and speed the delivery of effective patient care."

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The result: Nurses receive prescriptions from the pharmacy faster and can administer them to patients sooner, boosting clinical outcomes and patient satisfaction. Orders are no longer misplaced or lost.

“Automating medication orders allows us to leverage our Lexmark MFPs and speed the delivery of effective patient care,” Pemberton said. Pharmacists can even view incoming physician orders on mobile devices from anywhere, further accelerating the process.

If questions arise about an order, the networked Lexmark system details exactly where the scanned order originated, so staff can reach out to the nursing unit immediately to clarify the order. Plus, orders can be archived for easy retrieval in the event of an audit.

“Our legacy process was beyond inconvenient,” said Clayton Antliff, application consultant, Information Technology at MSH. “Our goals were to speed the order process at the nursing station and eliminate missing information on order sheets that had to be resolved by pharmacy staff.” According to Antliff, the new process accomplished those goals and eliminated the costly four-part paper forms that were previously required.

Results

Consolidating devices drives savings

After consolidating its output fleet to a smaller number of networked Lexmark MFPs and about 90% fewer models, MSH is expected to spend about \$68K less on purchasing and replacing output devices. The hospital is also expected to avoid about \$90K annually in third-party maintenance fees under the Lexmark Managed Print Service agreement. The new Lexmark products have advanced features that the legacy devices at MSH didn't have and operate at a 99% uptime rate, compared to its former devices which were prone to breakdown, sparking countless help desk calls and work interruptions to be serviced.

The hospital will also save about \$6K per year by reducing analog fax-line charges, the direct result of Lexmark's usage assessment that recommended removing about 68 under-utilized fax machines.

The hospital benefits in other ways from moving to a 100% networked output environment. For example, employees now have the flexibility to print to a wider selection of devices and choose the type of printer and feature set that is best suited for the job.

\$120K in annual consumables cost savings

Abandoned pages left at the printer wasted both paper and toner in the legacy MSH environment. MSH is now reducing paper and toner waste with Lexmark's Print Release solution by never printing those pages at all. Now, the hospital consumes less toner and paper, yielding savings of about \$120K per year.

The hospital's new proactive consumables management service from Lexmark contributes to these savings by automatically replacing cartridges just before they run out of toner. As a result, the hospital no longer carries costly inventories of toner and that storage space can now be used for other purposes.

With visibility into printing usage patterns over the network, MSH has been able to target high-volume areas and work cooperatively with those departments to make improvements over time.

Faster, more efficient physician order workflow

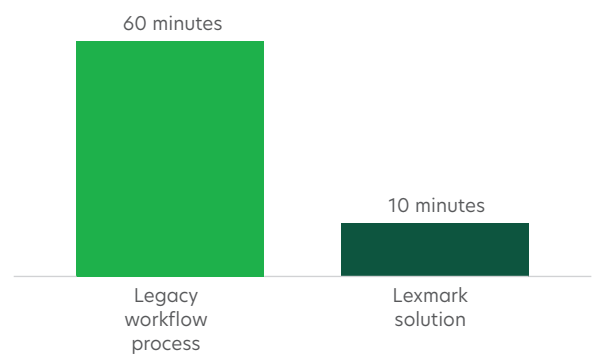
The hospital is seeing dramatic improvements from its fleet of Lexmark MFPs and the physician order processing solution. Rather than sending medication orders through interoffice mail, clinicians scan orders into Lexmark's digital imaging and workflow system using a nearby MFP. The solution automatically barcodes each order and links it to the patient's medical record before transmitting it to the network to the pharmacy—a process that now takes less than 10 minutes (Figure 4).

The result: Medication orders are filled and delivered to nurses sooner and administered to patients more quickly.

Lost or misplaced orders have been reduced to nearly zero. Ultimately, the hospital expects the new solution to translate into better patient care and satisfaction and heightened employee productivity. In addition, the hospital has now phased out its expensive, four-page order forms, in favor of a simple single-page order slip, using plain paper.

Figure 4

83% Faster physician order processing

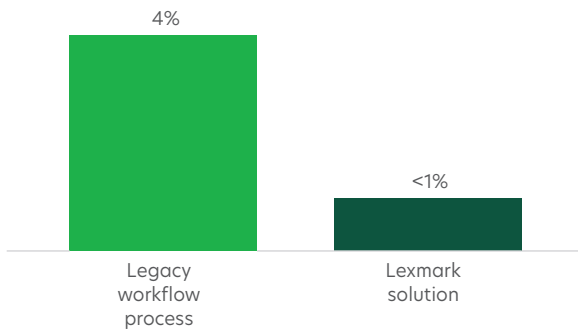


Improved order tracking and visibility

Pharmacists are working more efficiently after moving to the new physician order process, in part because they can securely view digital images of orders on screen from anywhere, including on mobile devices when they're away from the pharmacy. Moreover, the system's quality control and tracking capabilities have helped reduce the percentage of orders requiring follow-up by about 75% (Figure 5). For example, the system automatically detects when an order lacks key information, such as the patient's barcoded account number, and immediately initiates a printout from the originating device that tells staff the information that is missing and to resubmit a corrected order.

Figure 5

Percentage of orders requiring follow-up



In addition, when follow-up is necessary, the system helps pharmacists quickly resolve questions by pointing staff to the location of the originating device. This is boosting the productivity of pharmacists, who previously spent an average of 15 minutes fixing each inaccurate or misidentified order. For the seven-person pharmacy team, the new solution has returned more than 1,000 hours of time annually.

"What we value most about working with Lexmark is its commitment to helping us achieve our goals," said Pemberton. "Together, we have truly made a difference that will continue to yield benefits for MSH and its patients for years to come."

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About this ROI and business benefits assessment

Research and analysis for this business impact study was conducted by Mainstay, an independent consulting firm and was based on interviews with officials at Markham Stouffville Hospital and Lexmark and searches of industry literature. ROI calculations use industry-standard assumptions regarding the time value of money.

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