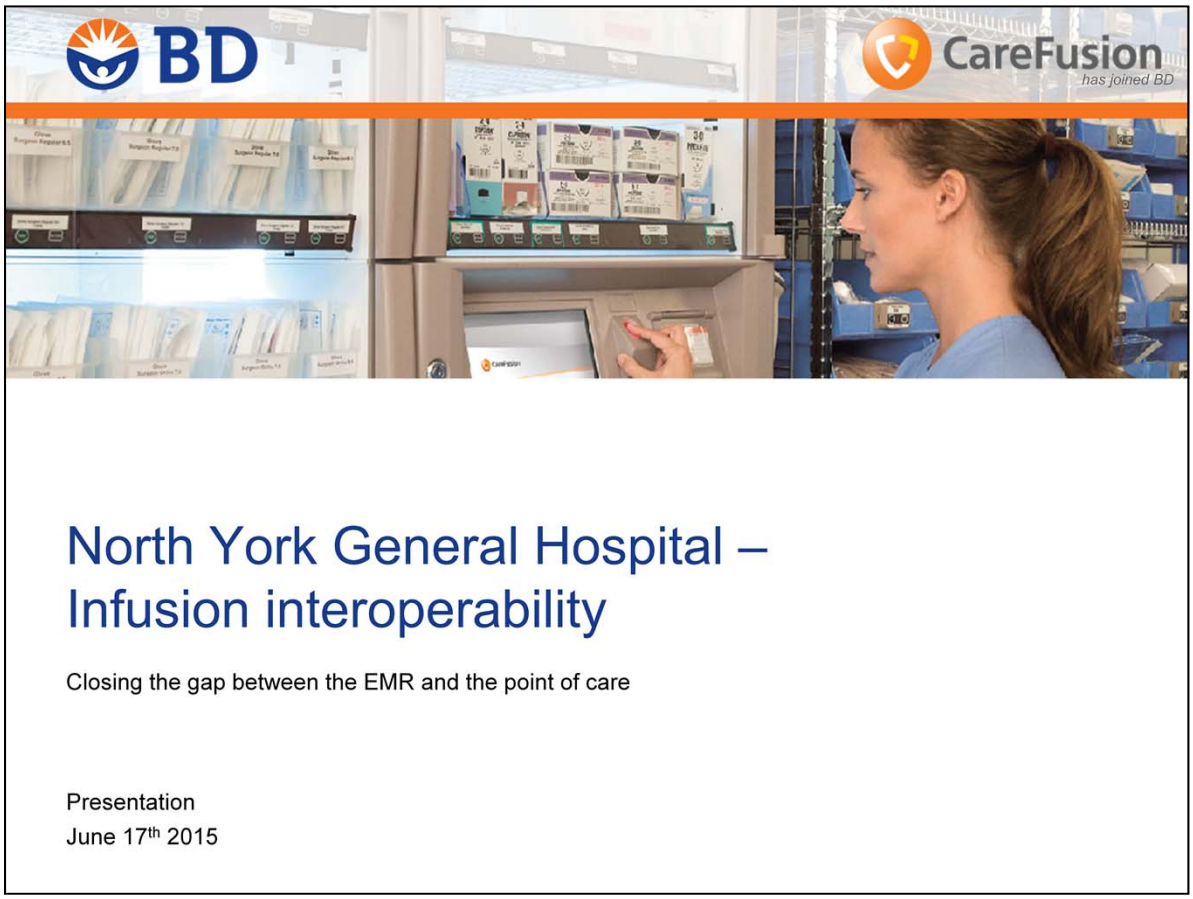

Background on Interoperability:

Infusion Interoperability is the ability of a smart pump infusion device to receive and transmit information in near real-time. Specifically, to receive patient medication orders and their parameters to automatically program the infusion pump. The pump can then send back infusion status and history back upstream.

The benefits are clear – pump pre-programming removes the potential for entry errors by the nurse during programming. Documentation is also more precise and communicates the entire flow of the infusion, not simply start and stop times. This allows for events like titrations (adjusting rate/volume of administration during the infusion), pauses and alarms to be sent back, giving better data for long-term analytics

CareFusion currently partners with two EMR vendors for interop – Cerner and Epic. While agreements exist with other vendors, such as Meditech, they are currently not supported.

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Finding a solution

A main concern for NYGH leaders were Canadian ADE rates, representing 7.5% of acute care admissions and potentially causing 9.250 to 23,750 preventable death each year. They also needed to enhance care compliance to new internal workflow, including order sets.

- NYGH launched their eCare program in 2007, with CPOE implementation in 2010.
- They now required an advanced infusion platform to complete a vision of a fully integrated system. CareFusion's Alaris pump was the only one that met their needs.
- NYGH also requires precise data as a research leader, notably for diabetes and chronic disease research.
- Interoperability contributes greatly to meet these goals.

SOURCE: Source

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NYGH's eCare program was launched to enhance patient safety via the movement of documentation into electronic form. This also included efforts to standardize care and drive compliance rates within their teams. Hospital leaders were keenly aware of ADE impact on patients and needed to drive down these rates.

Another aspect of NYGH's needs were linked to documentation, as they are strongly leveraging their EMR to gather data for diabetes and chronic disease research. Manual documentation provides imperfect, incomplete data at best.

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Closing the gap – the last 100 feet

Investment in Electronic Medical Record (EMR) systems is growing and implementation of these systems is now a reality or part of the near-term vision for many hospitals

- Canadian hospitals have invested more than $10 billion on EMR systems in the past 15 years[1]
- Implementation of Computerized Physician Order Entry (CPOE) and Barcode Medication Administration (BCMA) is now a reality for larger urban acute care centers

While gains in efficiency and patient safety are measured, the gap is still present between these systems and the point of care, specifically for infusion devices

- 67.7% of medication errors occur at the administration phase[2]
- Medication errors affect 1.5 million patients and cost $3.5 billion annually to treat[3]

Another gap is linked to documentation of the administration, an increasing part of a nurse's day

- 35% of a nurse's time daily is spent on documentation[4]

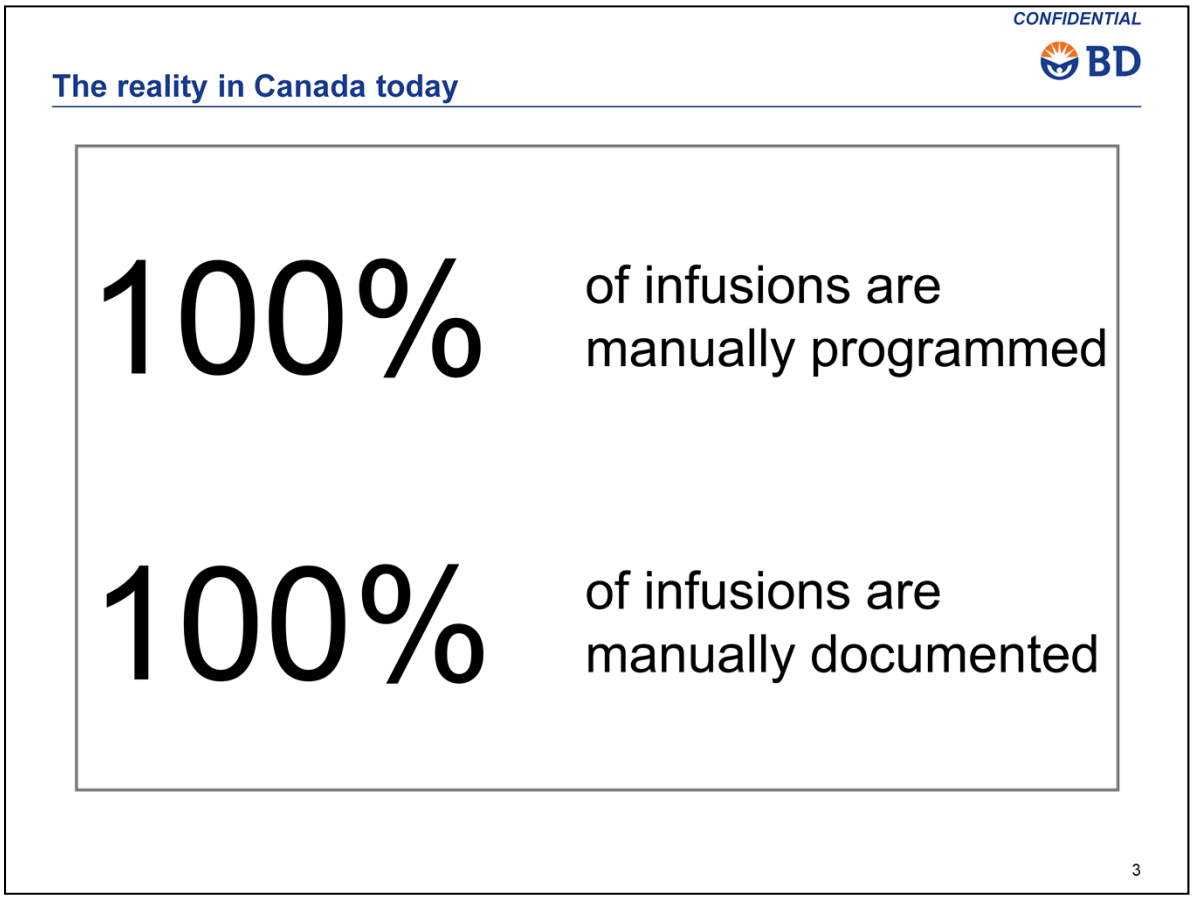
SOURCE:
[1]Canada Office of the Auditor General. 2010. "Electronic Health Records in Canada – An Overview of Federal and Provincial Audit Reports."
[2]Charlotte Huber, RN, MSN; Barbara Rebold, RN, MS; Cynthia Wallace; and Karen P. Zimmer, MD, MPH. ECRI Institute PSO Deep Dive™ Analyzes Medication Events. Patient Safety and Quality Healthcare. www.psqh.com September/October 2012.
[3]Arnold, J. W. (2012). Cost of hiring new nurses. Advance for nurses. Retrieved from: http://nursing.advanceweb.com
[4]Gurses, A.P., and, Carayon, P. (2007). Performance Obstacles of intensive care nurses (Abstract). Nursing Research; 56(3):185-94

2

Infusion smart pumps help address some of these concerns, but can also introduce new types of errors. Nurses need to understand the pump's interface and programming. One possible error during programming is called a "tenfold" error, or missing a decimal point during programming. The difference between **1.5** ml/hr and **15**ml/hr can be drastic.

Another feature of smart pumps is the use of DERS (Drug Error Reduction Systems), a set of drug limits that can warn and alarm a user if programming the dose rate is under or exceeds limits set by pharmacy. However, it is a "high and low" system, addressing the outliers but not addressing the precision of the actual order.

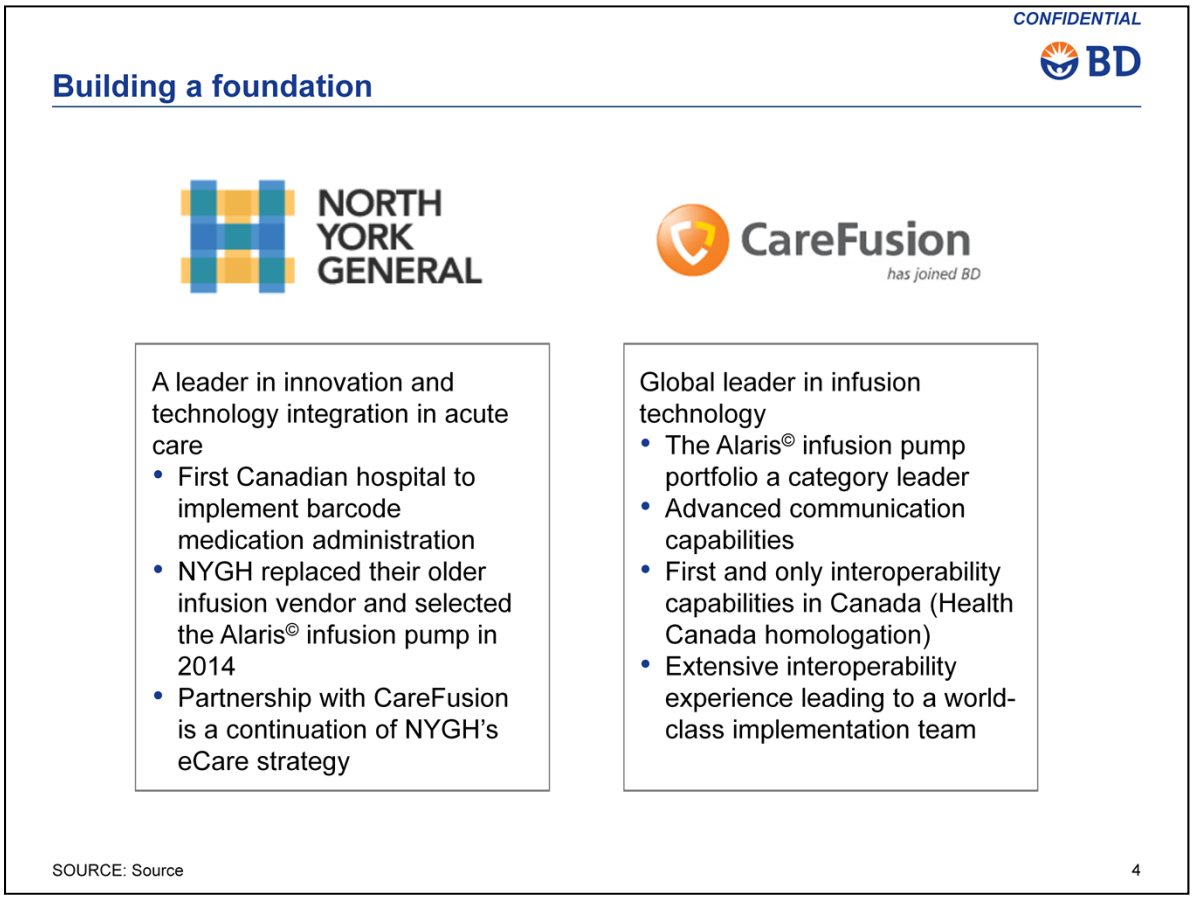
Industry statistics are mostly US-based, but a great paper out of UHN (Toronto) by Trbovich, Jeon and Easty in 2009 highlighted the great benefits of smart pump technology but also the need to move towards integration with Electronic Medical Record systems (EMR) to unlock greater benefits. Interoperability is key.



This statistics calls back to the reality of today's smart pump use in Canada. Despite the investment in electronic medical record systems and smart pump technology, the fact remains that this is still a vast gap between these systems. At the bedside, the nurse would review the order on the EMR's system, typically a "WOW", or workstation-on-wheels or increasingly a handheld platform. She would then have to turn around and enter the order manually at the pump.

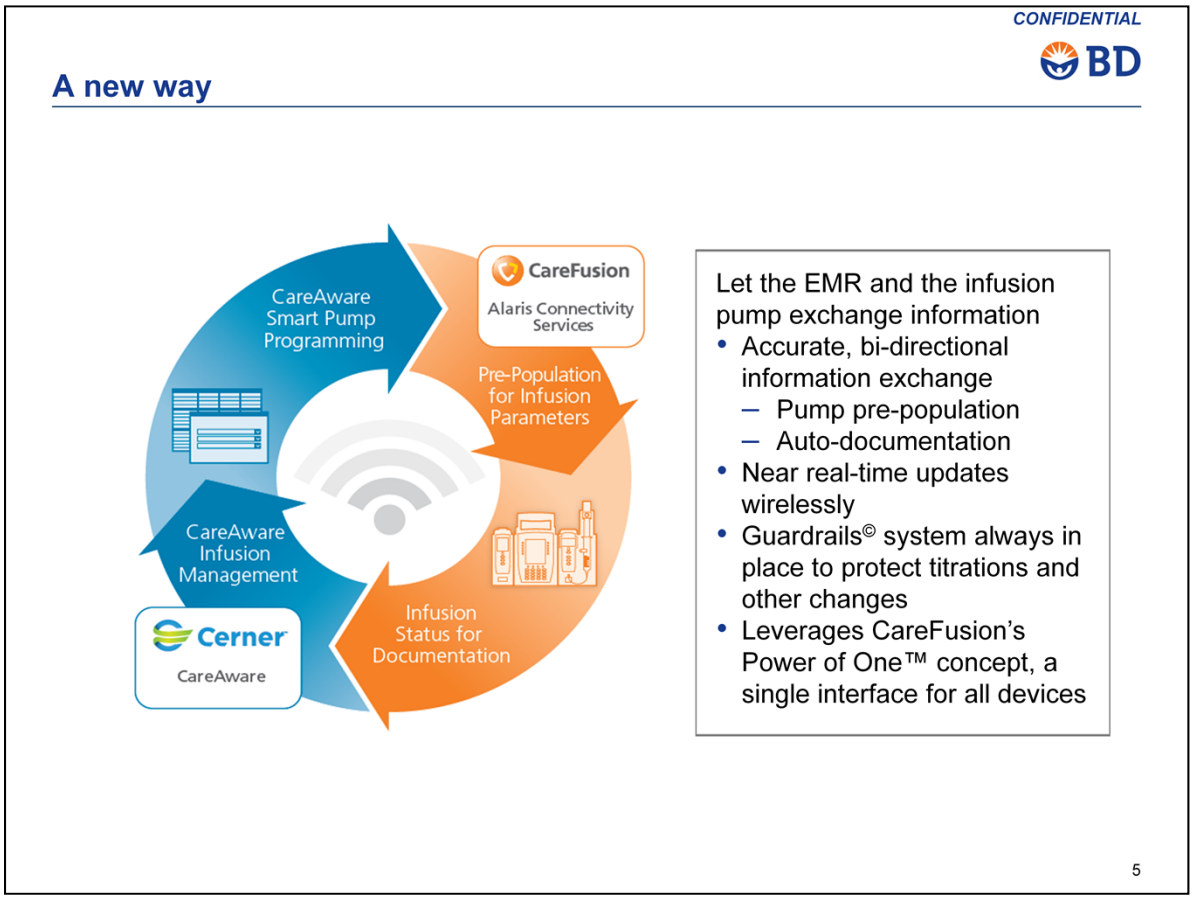
The key concept – all this technology, all this investment, and yet a human hand still has to move information from one side to the other, with all the risks of errors involved.

The flipside is also true. Nurses often document infusion start and stops on pieces of paper, on scrubs or on gloves. They then transfer to the EMR at the end of their shift.



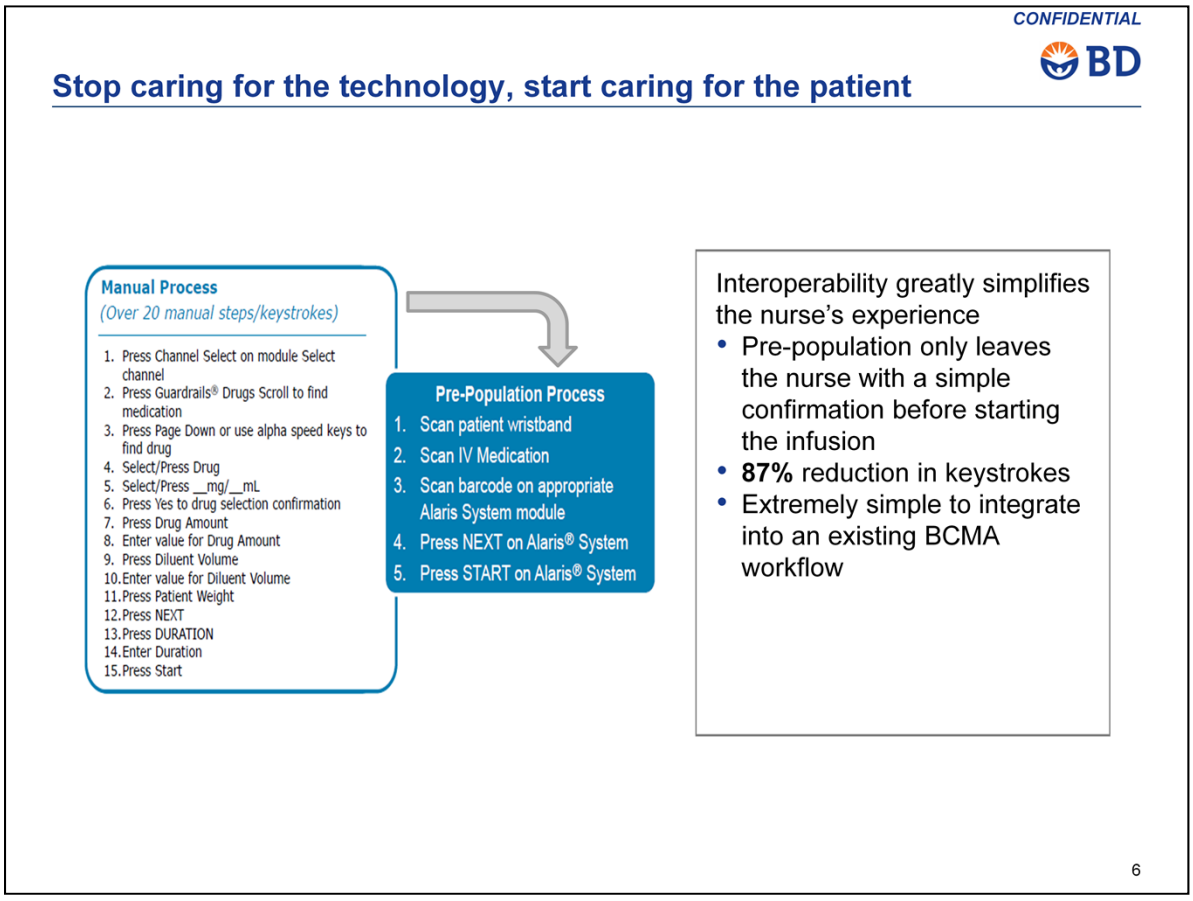
North York General's goal is a continuation of their **eCare** program, launched in 2009. This program aims to leverage technology to enhance patient safety, a core tenant of their Patient Values. They immediately recognized the value in interoperability.

They selected the Alaris pump in part due to its existing capabilities (fully wireless, server-managed) but also to the vision that CareFusion and NYGH shared, which is bridging that gap between the EMR and the point of care. They loved that the Alaris system not only provides a great platform today, but will also help them grow and continue to unlock value as their systems mature – interoperability is a great example of this.



This slide gives a quick view of the flow of information between the Cerner EMR (which NYGH uses) and the infusion pump. Quickly:

- The doctor enters the order in Cerner's CPOE (order entry) system. It becomes an accurate piece of information
- This order then moves to Pharmacy for checking. The pharmacist verifies, approves and then order then moves down the line to the nurse
- At the bedside, the nurse pulls up the order on their workstation or handheld. She hangs her bag to be ready for infusion. She will then start a process commonly called Barcode Medication Administration, or BCMA. BCMA aims to accurately cover a safety concept called the Five Rights – **Right Patient, Right Med, Right Dose, Right Route, Right Time (see next slide notes)**
- Using a barcode scanner attached, the nurse can then scan her badge, scan the patient's wristband ID, scan the drug and then scan the pump. This ties in all information required for administration.
- Once launched, the pump then sends information back to the EMR for accurate recording of the infusion.

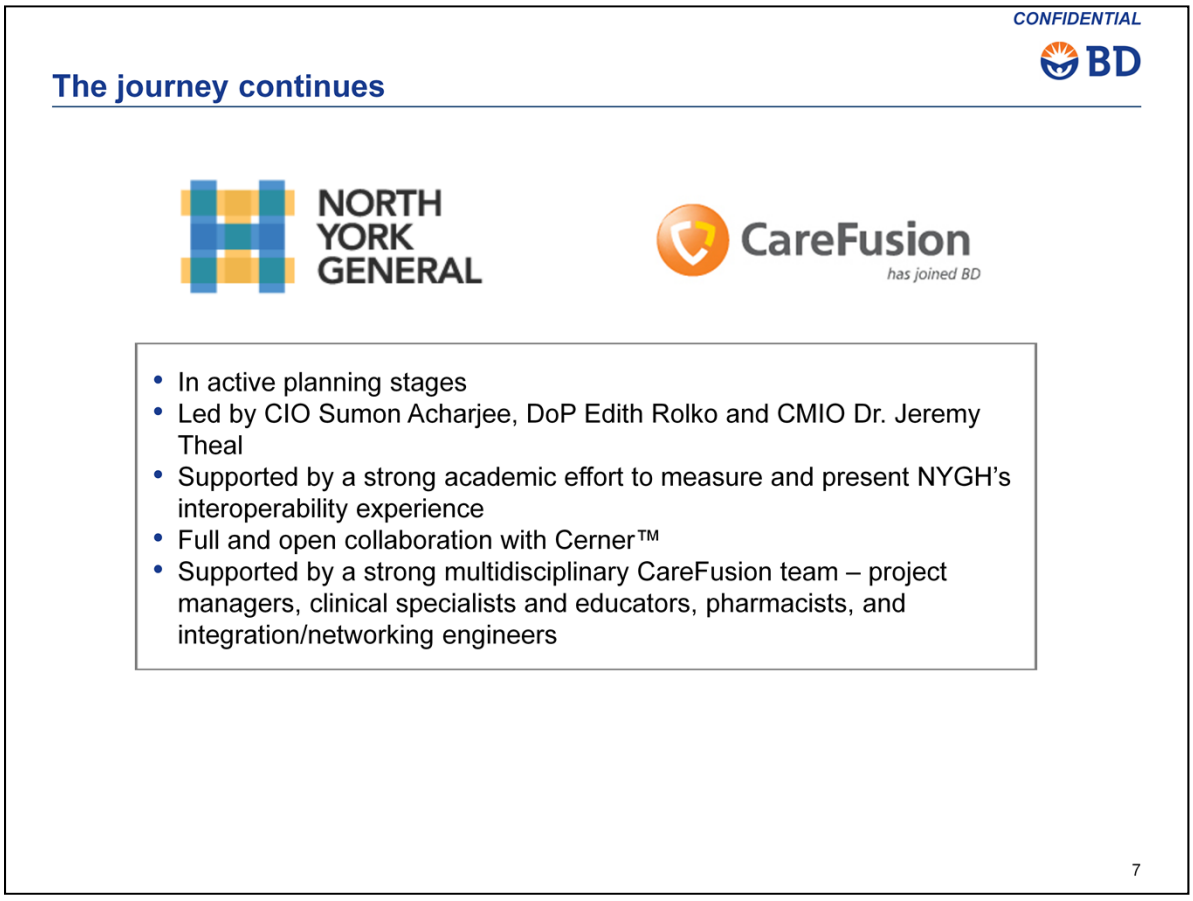


This slide illustrates the vast difference between manual programming and the new interoperability workflow. In a nutshell, you move from anywhere between 10 and 20 keystrokes to a smooth barcode-driven 5-step process, with the only keys being pressed to confirm the programming and launch the infusion.

A question may arise to how this workflow compares to "traditional" barcode medication administration (BCMA). Interoperability adds a single extra step to the process. Typically, BCMA entails this:

- Nurse scans her badge
- Nurse scans the patient's wristband
- Nurse scans the barcode on the medication (syringe, IV bag, etc.)
- We simply add ONE extra steps – scan the pump.

That one extra step is all it takes for the EMR to know the specific infusion channel used for the medication administration, and send the order to that specific pump.



The project is currently in planning phases.

CareFusion has supported NYGH's effort to get provincial money to support this project – specifically for the Ontario Centres of Excellence "AdvancingHealth" grant process. This grant also includes monies specifically for academic effort. NYGH's Office of Research and Innovation, led by Michael Wood and NYGH's Chief Medical Informatics Officer, Dr. Jeremy Theal, will drive the effort to analyze NYGH's interop. journey and present. CareFusion will support them as required to make it happen.