I've been thinking about, Boston, Belichick, UPS, and transporting properly prepared IVs to the right patients on time.

Boston is my favorite public transit city. I'm like a kid while being transported by user-friendly Charlie through the labyrinth beneath her historic streets.

It's not uncommon for outsiders to say Bostonians are not so user friendly. Stereotyping suggests they are not terribly diplomatic, sometimes condescending, and always in a rush. Sort of the way the Patriot's Coach Belichick comes across on Sports Center's post-game interviews.

Last Thursday, however, *I* was in the rush when I shot an e-mail to Al Patterson, director of pharmacy at Boston Children's. What audacity to inform a man I'd never met that Jerry Fahrni and I would be in Boston on Monday and wondered if there was any chance we could come out on the Green Line, drop in, and tour his pharmacy. An immediate autoreply informed me that he was on vacation through Monday. Early Friday morning, however, Al picked up my message and personally replied, "Happy to help! Would 3 p.m. on Monday work for you?"

Jerry and I are conducting research and site visits for a report on barcode-enabled medication preparation (BCMP) systems. We really wanted to observe Boston Children's (BC) as we've heard they use a good technology well.

Upon arrival, seasoned veteran Al and his young, bright meds-process pharmacy-informatics specialist, Tom Moniz, warmly welcomed us.

I first learned about Al from John VanEeckhout, cochair and vice president of clinical services at Child Health Corporation of America. John has been a friend, coach, and sounding board for two decades in my efforts to make a living and a difference in researching and reporting on medication safety technology. Al was every bit the good person John led me to believe. Not only did Al and Tom accommodate our last-minute request, but also they stayed well beyond end of business to make sure we got what we came for. They were neither impatient nor condescending in answering our questions, of which mine displayed plenty of ignorance.

Each BC person we encountered in the halls, elevators, pharmacy, and care units that knew Al was visibly happy to see him. You could feel the respect and sense the love. During introductions Al preceded titles with affirming adjectives. "These are our *fantastic* pharmacists." "Meet our *awesome* clean-room technicians." If the hospital pharmacy world had something like Fortune's Best 100 Places to Work, I'm certain BC pharmacists would vote theirs into the top few.

As impressive is the way Boston Children's pharmacy team does its work. Jim, Pam, Andy and the Dunder Mifflin gang seem to enjoy each other at the office, but the few moments we've actually witnessed them working have been embarrassing and

inefficient. In contrast, these Boston peeps demonstrate efficiency and accuracy worth emulating. Under Al's coaching, they know the playbook and stick with a great game plan.

In the mix, BC utilizes various scanning technologies, including a bar-code medication administration (BCMA) system to help ensure that the right medications are given to their patients at the right time.

BCMA requires that medication labels include bar codes. Today, virtually all manufacturer packages arrive dockside with source-applied bar codes. Many of these are dispensed as is and make it to the point of care without requiring manipulation by the pharmacy. But some orders require that medications be prepared in the pharmacy, followed by the application of order-specific bar codes before being sent to patient-care units.

Leaning on the 80/20 rule (which I'd suggest is valid about 80 percent of the time), the typical adult hospital prepares about 20 percent of all medications dispensed while children's hospitals must prepare closer to 80 percent. To complicate matters, most of these are compounded medications for intravenous administration involving the more expensive and higher risk drugs on the formulary. It's much easier to harm or kill patients with IVs than with pills.

At the core of the bar-code medication-preparation (BCMP) system we observed is software, which governs a sound process. Orders appear on computer screens in queue as entered—with STAT orders grouped at the top for immediate processing. Interestingly, some normal orders are discontinued and fall off the screen while STATs are being processed, saving time and avoiding waste.

Upon selecting the next order, technicians are led step by step to obtain the materials required for fulfillment. One by one, each product required must be verified with a bar-code scan before technicians are directed to the next. Simultaneously, cameras capture images of each item used (bags, syringes, diluents, drugs, etc.), enabling pharmacists to remotely check technicians' work and intercept preparation errors before drugs leave the pharmacy. Images also serve as a record of activity to reference should product integrity be questioned at the point of care or after an adverse drug event (sort of like flight navigation logs in black boxes are accessed following airplane crashes).

Data collected from over 35 million doses prepared utilizing their particular automated IV admixture workflow system have shown a highly consistent product-selection error rate of about 5.5 percent distributed across a dozen error types, the largest of which is the presentation of a completely inappropriate product for the preparation of a dose. Think of these as errors that are intercepted before they ever leave the pharmacy.

After admixtures are confirmed, technicians also utilize bar-code scanning to verify that the right completed IVs reach the right care units. Products make their way through the BC labyrinth with a simple homegrown user-friendly bar-code medication tracking (BCMT) [my term] system, which resembles UPS drivers scanning packages from doorstep to doorstep. En route, technicians scan bar codes on each item and a bar code by the door leading out of the pharmacy. At the other end bar codes on care units med room doors are scanned, either confirming locations or interrupting and redirecting errant deliveries. Just as we track a packages on UPS's Website, pharmacists and nurses may hop online and see if and when a given admixture left the pharmacy or arrived on the unit. Collected data is used to increase efficiency, promote accountability, and nonemotionally arbitrate delivery disputes between pharmacy and nursing.

Some technologies are better than others. Theirs is excellent. But even the best technologies must be used the right way. BC takes care to train and hold technicians accountable for sticking with sound processes and resisting the temptation to engage in workarounds. When scanning reveals wrong product selections, BC traces and attempts to fix the problems upstream so they are not repeated.

When people ask me where I grew up, I answer, "Why would I do that?" Any chance you think this could qualify me for being admitted to Boston Children's when I need treatment? All this and Charlie too! Otherwise, nothing against Belichick, but I think I'll stick with the Seahawks and Coach Pete Carroll's childlike enthusiasm.

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