Technology has continued to change healthcare since the stethoscope was invented in 1816. As with contemporary technology, the device didn’t replace the work of clinicians, but rather enhanced and expanded their capabilities. Digital thermometers, advanced wound care supplies, ECGs, and electric patient lifts are just a few of the technologies that have enhanced and expanded clinical practice.

As the healthcare industry faces the challenges of skyrocketing costs, decreasing reimbursement, nursing shortages, and increased patient acuity, technology may be able to help us meet our patients’ needs and optimize the work that we do.

Integrating technology into nursing practice doesn’t change the fundamental elements of nursing practice—assessment, planning, intervention, evaluation, education, support, documentation, and communication. For example, the University of Pittsburgh Medical Center is working with Welch Allyn to develop a machine that automatically obtains and downloads vital signs into the patient’s electronic medical record (EMR). This machine can be integrated with a nurse call system, sending an alert if the reading falls outside established parameters, but the machine can’t interpret the meaning of an elevated BP, for example. The nurse is the one who determines if the patient’s BP is elevated because of pain, an argument with a family member, or fluid overload. Yet, the automated technology saves the nurse time and effort, by not alerting the nurse until critical thinking is needed. In the meantime, the nurse can spend time with another patient. By collecting the information, the technology lets nurses do the work exclusive to the nursing process—assessing and interpreting vital signs. Now let’s look at four ways technology is improving nursing practice.

Distributing EMRs
We want to spend more direct time with our patients and less time on tasks such as running around looking for equipment or making phone calls to discharge a patient. A study conducted by architectural firm HKS, Inc., demonstrated that on average, a nurse walked a distance of 6.43 miles in a 12-hour shift. This was on a unit that had a typical central nursing station for all charting, phone calls, supplies, medication, and nutrition.

In a typical two-bed patient room, each patient has about 80 square feet of space each, not including the bathroom. Many healthcare organizations are building new facilities with all single-bed patient rooms that provide 200 to 250 square feet per patient. Assuming the same number of patients, this makes for a bigger unit and more walking for the staff.

HKS tested two unit models with different types of nursing stations and measured walking distance in those scenarios. The first scenario was a unit that had two smaller nursing stations; this reduced walking distance 26.8% (compared to a unit with a single central nursing station) and provided an additional 61 minutes per nurse per 12-hour shift to spend with patients.

HKS’s second scenario had charting available at each room (either a computer in the room, tablet computer, or a charting station outside the room); two small nursing stations; phone, medications, supplies, and linen at the bedside; and equipment in four locations on the unit. In this scenario, the
nurses’ walking time decreased 67.9%, providing an additional 154 minutes per nurse per 12-hour shift to spend providing direct care to patients.\(^1\)

This second scenario is made possible when the unit has EMRs, and computers can be placed in or outside of each patient room. Paper records can’t be kept in the patient room due to privacy requirements. Even if the EMR took more time to document than paper charts, nurses would still have significantly more time to spend with patients because they wouldn’t have to duplicate documentation.

**Real time locating systems**

All too often, when a patient needs an infusion pump or a wheelchair, the nurse must walk from room to room or floor to floor to find an available one, only to be unsure if the equipment is clean or if the infusion pump is up to date on its maintenance. Real time locating systems (RTLS) use technology such as radiofrequency identification tags, ultrasound, or infrared technology to tag and track equipment (see “Using RFID to solve problems in healthcare delivery” in the January issue of *Nursing2012 Critical Care*).

Once items are tagged, staff members can look on a computer screen on their unit to locate the nearest wheelchair. The clinical engineering staff would be able to track equipment maintenance and locate infusion pumps that were due for service. A study conducted by Indiana University-Purdue University Indianapolis found that using an RTLS system to track medical equipment reduced the time spent by staff in searching for medical equipment by 96%.\(^2\)

This same locator technology can help with patient flow and bed management. A sensor bracelet or clip-on tag is placed on a patient, and used to track the patient’s location and time in that location. Pacific Medical Center’s Canyon Park Clinic in Bothell, Wash., uses this type of system. The patient is given an RTLS tag on check-in. When the patient enters the exam room, the RTLS system changes the color of the room on the computer screens that are placed around the clinic. Different colors represent various statuses—patient in exam room, nurse in room with patient, patient ready to be seen by healthcare provider, and room ready for cleaning. A nurse who goes into an exam room only to find that the patient isn’t there could use the nearest map screen to locate the patient (for example, in computed tomography) and see how long that patient has been in that location.

The system also can be set up with alerts, for example, to alert the staff that the patient has been waiting for more than 15 minutes (if the facility’s goal is to see patients within 15 minutes of arrival). Because everyone on staff can see these screens, nurses no longer have to locate other staff and tell them the status of the patient or the room. This frees more nursing time for direct patient care.

**Patient logistics**

Typically, when you discharge a patient, you must call the transportation department to come pick the patient up. You must then wait and continuously check to see when the patient has actually left. Then you must call Environmental Services to come clean the room, and you may or may not be notified when the room is clean and ready. When the room is ready, you have to call the central office to let them know they have a bed available.

Lehigh Valley Hospital and Health Network in Allentown, Pa., has found a better way. The hospital’s patient logistics software program tracks not only the patient’s location but also the status of the patient’s room. The hospital’s bed turnaround time—the time from discharge until a room is clean and ready for the next patient—went from 240 minutes to 60 minutes at the Cedar Crest location, 45 minutes at the 17th and Chew Street location, and 37 minutes at the Bethlehem location.\(^3\)

This software can be coupled with a workflow panel from the nurse call system that makes patient discharge a smooth and efficient process. When you determine that the patient’s ready to be discharged, you can push a button on the workflow panel. This sends an alert through the nurse call system to a pager or wireless phone, notifying the transportation department to come to the patient’s room. After picking up the patient, the transportation worker pushes another button on the workflow panel, alerting Environmental Services to clean the room. When the room is clean, the Environmental Services worker pushes another button, alerting the patient logistics center that the room is clean and ready for a new patient.
This has all happened automatically without any further actions on the nurse’s part. At each step of the way, the software changes the appearance of the room on the computer screen, indicating the stage of the turnaround process. This system can help avoid delays in notification, improve patient flow and bed management, and conserve nursing time for direct patient care.

**Patient education**

Imagine a system that provides a personalized website for a preadmission patient, filled with education about why the patient is coming to the hospital, a reminder to bring a list of all medications, and directions to the proper area of the hospital. Also imagine that same system picking up the diagnosis codes when the patient is admitted, automatically selecting and sending the appropriate patient education video to the patient’s TV, and notifying the patient that these videos have been recommended by their nurse.

These features are available in some patient entertainment and education systems. The systems provide TV, movies, music, video gaming, Internet, e-mail, and a wide range of patient education materials. Patients also can use the systems to order food from dietary services, see their schedule for the day, answer surveys, and receive reminders about activities they need to complete before discharge. The hospital can post welcoming information, introductions to the staff, and directions to other parts of the hospital.

After the patient watches the educational video, the patient entertainment and education system asks if the patient watched and understood the video. If the patient answers "yes," the system sends appropriate documentation to the EMR. If the patient responds "no," the system alerts the nurse via wireless phone, so the nurse knows to follow up with the patient and reinforce the teaching.

Once the patient is ready to go home, discharge instructions and appropriate patient education can be provided on the patient’s personalized, secure section of the hospital’s website, which the patient can access from a computer at home. The information on this site reinforces the discharge instructions that the nurse reviewed with the patient before leaving.

**Available at a hospital near you**

These are but a few of the technologies available to hospitals. Other technologies include robots delivering pharmaceuticals, lab specimens, and supplies to the different areas of the hospital; smart beds that register and record vital signs and patient weight; and tablet computers that convert handwriting on the screen to typewritten medical record entries. These technologies are all used at hospitals around the country.

**Embrace the change**

In our personal lives, we’ve adopted many new technologies, such as ATMs for banking and e-mail for communication. Embracing new technologies in healthcare can help reduce our physical workload and put needed resources in the proper locations. New tools can improve communication between nurses and patients, with other providers, and with families. Patient safety can be improved by having the patient’s medical information available at every site in the hospital.

By identifying how technology can improve our work and the service we provide, we’ll be able to spend more time in direct patient care.

**REFERENCES**


Debby Ramundo is senior technology consultant at Sparling, Inc., in Seattle, Wash.

The author has disclosed that she has no financial relationships related to this article.

DOI: 10.1097/01.CCN.0000414163.87766.84