Technology – Use it wisely.

In many ways, advances in technology have made our lives easier, more productive and more efficient. The health care industry, while slow to implement, now utilizes technology in a variety of ways including computerized physician order entry (CPOE) systems, clinical decision support systems, robotic dispensing, automated dispensing cabinets (ADCs), smart infusion pumps and barcode scanning, to name just a few. Automated systems employ recommendations, prompts, cues, and alerts to assist the clinician in the workflow process. Technology, however, does not replace human decision making and it is not infallible. It can malfunction, misdirect the user or provide incorrect information leading to error. Users may try to work around technology if it is burdensome and adds extra steps to a process. Conversely, users may trust and rely too heavily on technology leading to bias and complacency.

Automation bias is the tendency to favor information from technology and ignore conflicting information from a manual source of data, even if it is correct. *Automation complacency* refers to less frequent or careless monitoring of technology due to a trust and assumption that it is accurate. End-users of technology often forget that information from a device is often entered initially by a person and therefore should be carefully reviewed. Automation bias and complacency can lead to decisions that are not based on a complete analysis of all information. An automation bias *omission error* happens when users rely on technology to inform them of a problem, but it does not (i.e. warn of wrong dosage ordered), and therefore the clinician does not respond appropriately. An automation bias *commission error* occurs when users make choices based on incorrect information provided by technology.

Causes of automation bias and complacency include:
- Three basic human factors:
  1. Tendency to select the path requiring the least cognitive effort (due to multitasking, heavy workload, time constraints), which results in defaulting to technology to determine the path.
  2. Belief that the analytic capability of technology is better than humans, leading to an overestimation of the performance and accuracy of technology.
  3. Reduce effort or relinquish responsibility in carrying out a task when an automated system performs the same function.
- Experience with technology can lead to desensitization, which may cause clinicians to doubt their instincts and accept erroneous technology information.
- Perceived reliability and trust in the technology: when automation is perceived to be reliable at least 70% of the time, people are less likely to question its accuracy.
- Lack of confidence in decision making results in greater reliance and trust in technology.

Strategies to reduce automation bias and complacency include:
- Analyze and address vulnerabilities:
  o Conduct a risk assessment for new technologies to identify unanticipated issues.
  o Encourage staff to report technology-associated risks to administrators and the Risk Management Department.

Reference
Institute for Safe Medication Practices. (2017). Nurse Advise-ERR. Retrieved from Institute for Safe Medication Practices: http://www.ismp.org/newsletters/nursing/issues/NurseAdviseERR201701.pdf

- Limit human-computer interfaces: enable all technology to communicate seamlessly, limiting the need for human interaction with technology.
- Design technology to reduce over-reliance:
  - For example: avoid "auto-complete" functions for drug names after entering the first few letters as this often leads to the selection of the first, but incorrect, choice.
  - Providing too much on-screen detail may decrease the users' attention and increase automation bias.
- Provide training:
  - Include information about the technology limitations, identified gaps and areas for error.
  - Expose staff to automation failures during training (i.e. technology does not issue an important alert; discrepancies between technology entries and handwritten entries; auto-fill or auto-correct errors; incorrect calculation of body surface area due to wrong input of weight).
- Reduce task distraction:
  - Use technology only when uninterrupted.
  - Do not multitask when using technology.

Technology can certainly be a friend to clinicians and improve the delivery of patient care, however, it should supplement clinical judgment, not replace it. Health care professionals should continue to use their critical thinking skills to monitor technology and prevent errors. Efforts should be made to improve the reliability of the technology and support clinicians to assess technology, so that monitoring and verification strategies can be implemented.

Reference
Institute for Safe Medication Practices. (2017). Nurse Advise-ERR. Retrieved from Institute for Safe Medication Practices: http://www.ismp.org/newsletters/nursing/issues/NurseAdviseERR201701.pdf