

Automation and IT in drug distribution

Drug distribution is an essential part of the work of the hospital pharmacy and the process is determined by aspects of safety and efficiency.



Ana Valladolid Walsh PharmD JanCees van Niel PharmD

There has been a significant development in the automation and information technology utilised in the robotic systems for drug prescription, distribution, dispensing and administration. Ms Ana Valladolid Walsh (Complejo Hospitalario Universitario de Albacete, Spain) began by describing the automated systems which are centralised in the pharmacy and designed for filling of individual patient prescriptions and unit dose medication orders. Horizontal and vertical carousels have an automated computer controlled system which accurately manages and tracks the inventory and identifies expiring medications. These carousels have a very high storage capacity which enables the efficient management of space. The “Goods to Man” principle also eliminates unproductive, long search times. However, there is a high initial cost and each pharmacy should carry out its own cost-benefit analysis. Ms Valladolid Walsh explained that robots can also be used to automate storage, dispensing, returning, restocking and crediting of bar coded medication and they also operate 24 hours a day! Automated dispensing systems (ADS) can be used on nursing units and long-term care facilities.

However, different problems can arise from the implementation of ADS and

may affect the work of nurses. Therefore, it is very important to work with systems that offer good technical support and have 24 hour a day service. The pharmacy must also train nurses to use the ADS correctly and ensure enough systems are installed in order to cover the needs of patients and not block the work of nurses. Ms Valladolid Walsh emphasised that the use of any of these new technologies requires major changes in traditional pharmacy, nursing and medical work systems. The correct training and transition period, before full implementation, will determine the success of the project.

Mr JanCees van Niel (Isala Clinics, Zwolle, The Netherlands) then reminded the audience that the main point of automation was not just efficiency in the drug distribution process but medication safety. *The right product for the right patient at the right time through the right route and in the right dose.* He pointed out that to help attain this goal drugs must have a machine readable code, which is often printed on the package, but not on the blister/unit dose. Mr van Niel then guided the audience through the different types of automated dispensing machines and their advantages and disadvantages from the viewpoint of patient safety. It was clear that there are many issues, such as the frequency and type of wards to be delivered to, and options which the pharmacy should take into account. Each pharmacy when calculating the return on investment must also decide how realistic the numbers/costs are for their hospital. Mr van Niel then concluded by saying that in the case of patient safety we often talk about pills but mistakes also occur with IV drugs. These medication errors are less in number than with pills, but constitute a much higher percentage, with potentially much more dramatic consequences. Therefore, Mr van Niel said invest in smart pumps and stringent controls first and an enormous return in investment in the form of patient safety will be yours!

The interface between humans and machines – managing the risk

Risk is always present in hospital pharmacy. From cytotoxic handling to dosage errors, pharmacists need to avoid complacency to ensure safe care.

Need for improvement

Hospital pharmacist and quality manager Mr Dag Haugedal from Ullevål Hospital Pharmacy, Norway, opened this revealing seminar. Having recently surveyed safe handling during the reconstitution of cytotoxics, Mr Haugedal warned that pharmacists can never be complacent about safety.

His Internet-based survey asked Norwegian professionals (pharmacists and pharmacy technicians) how they handled risk, assessed risk and attempted to improve practices. Many of the answers were surprising.

For example, when questioned about the production of cytotoxics, 89% of respondents said they received training in theory and practice. Yet, 5% only received theory training, and a startling 6% said they had received no training before working in production!

When asking about the whereabouts of laboratory spill kits, 70% knew where it was stored. Worryingly, 10% were unaware of its location, and 18% said their laboratory had no spill kit.

The Norwegian stressed that managing risk is an ongoing task that requires frequent training. Best practices must be maintained and updated. Complacency quashed.

As a result of the work in this project, Mr Haugedal’s organisation have established best practices for the handling and reconstitution of cytotoxics that are in compliance with the latest knowledge.

Opening doors, reducing risk

Following Mr Haugedal’s thought-provoking presentation came Mr Stuart

Levine from the US-based Institute of Safe Medication Practices (ISMP). This non-profit, non-regulatory organisation aims to understand why medication errors occur and then provide carers across the globe with strategies aimed at how to avoid errors.

Mr Levine said being a non-regulator helps the ISMP open doors and encourages health workers to speak openly about their experiences – something they may avoid with regulators. This openness means ISMP can work together with health services to improve care.

Confirmation bias – seeing what we want to see

The ISMP has found that a major cause of medication errors is confirmation bias. This occurs, for example, when staff misread a label and mistake one medication for another. Mr Levine said the similar names of many medicines contributes to this bias. To avoid this he suggested pharmacy generated labels:

- That focus on a patient specific dose rather than the dosage form
- Communicate only essential information
- Use bold fonts to identify important details

He also advised pharmacists to check guidelines recommended on the ISMP website: ismp.org/Tools/guidelines/labelFormats/default.asp

A common technology in the US that is starting to emerge in Europe is automated dispensing cabinets. ISMP has developed multidisciplinary guidelines to foster the safe use of this technology. These are also available on their website at smp.org/Tools/guidelines/default.asp

One example of these guidelines is to return medications to a centralised area rather than to the individual bin from which they were obtained. This reduces the risk of returns going to the wrong location inside the cabinet. Further, he stressed the importance of separating drugs with look-a-like names, different

doses of the same drug and high alert medications by placing them in individual lidded bins rather than open matrix drawers.

Automation in reconstitution and small-scale preparation Automation and information technology can have a positive impact on safety, traceability and efficiency.



Professor Pascal Bonnabry

Aseptic production is a complex process which, combined with the high frequency of preparations and also the low probability of detecting errors, means there is an increased risk of mistakes being introduced. This can have potentially dramatic consequences for patient safety and, therefore, it is important that “helping” systems must be put in place. Automation can make an important contribution to safety and traceability during small-scale preparation. “Automation must be integrated with information technology and therefore requires a strategic approach.” explained Professor Pascal Bonnabry from the Geneva University Hospitals, Switzerland. It is important to first set priorities, starting with the most critical processes, such as cytostatics and total parenteral nutrition, then the most critical steps, the prescription and preparation. Professor Bonnabry highlighted the advantages and disadvantages of, for example, weighing and automated systems and showed the audience how IT can dramatically improve traceability in batch production and cytostatic preparation. However, he emphasised that each pharmacy must define its own

requirements and priorities for automation and IT. There must be a global approach, from the prescription to administration, to connect the different steps of each process. This can be a challenge since, as well as the high costs, there must be, for instance, acceptability by the users, a training programme initiated and a reliable IT infrastructure. Therefore, it is essential that adequate resources must be dedicated to the project.

Mr David Leonard, from the Imperial College Healthcare NHS Trust, London, UK, explained that although there was a history of the use of dispensary and ward based automation, only Baxa pumps had been used for the preparation of cytotoxics. However, since April 2007 the Trust has been one of three pilot sites taking part in a European project called SafeChemo. This project hopes to address issues of safety, for both patient and pharmacist, as well as efficiency and reduced costs. Mr Leonard showed the audience a short film of Cytocare[®], a robot for the complete preparation of injectable solutions in a sterile environment. They also hoped the use of Cytocare[®] would reduce repetitive strain injury amongst pharmacy technicians. However, first the robot had to be validated to convince not only the pharmacy itself of its safety but also to meet the requirements of the Medicines and Healthcare Products Regulatory Agency (MHRA). This has included tests for filter integrity, particulate contamination, microbiological cleanliness of chambers, sterility of prepared doses, sterility of partially used vials, precision of preparation, correct vial recognition, accuracy of final container labelling and software reliability! Finally, after lots of highs and lows over the last two years, Cytocare[®] was approved by MHRA in principle in November 2008. Mr Leonard said that this exciting piece of automation is now in operation preparing 5-fluorouracil syringes and bags and they are still discussing ways of improving its use.