Advice on minimising the risks to patients when preparing injectable medicines

Preparing injectable medicines safely

In this article,...

How to ensure injectable medicines are prepared safely in a clinical situation

Ways in which pharmacy can support nurses in preparing injectable medicines

Ensuring that policies and procedures are in place

Although various reports have recommended that all injectable medicines be prepared in pharmacy (Audit Commission, 2001; Breckenridge, 1976), nurses continue to perform this task in most cases (Beaney and Goode, 2003; NHS North West, 1997). Risks to patients are greater when injectable medicines are prepared in clinical areas, both in terms of medication errors (Cousins et al, 2005; Taxis and Barber, 2003) and from microbiological contamination, which can lead to infection (Pharmacy Practice, 2004).

Injectable medicines prepared in NHS pharmacies are made in specialist clean rooms. They are prepared according to defined national standards and pharmacies are regularly audited to ensure standards are maintained (Beaney, 2006). By contrast, standards in clinical areas vary widely, both in terms of the environment in which injectables are prepared and in nurses’ level of training and the procedures available to them (Beaney and Goode, 2003). This justifies the premise that ideally all injectable medicines should be provided in a ready-to-use format, either by pharmacy or by pharmaceutical companies. It also suggests that high-risk injectable medicines should be prepared in clinical areas, which is a requirement for those with higher risk - particularly for tuberculosis, which is a disease that affects many clinical areas, including those where high-risk injectable medicines are used. This is not always the case, however, as high-risk injectable medicines are still prepared in some clinical areas.

Local risk-reduction measures

A study on the ward-based preparation of parenteral medicines showed that the environment in clinical areas is of variable standard (Beaney and Goode, 2003). To assess the risk of contamination microbiologically in a clinical area, a trained pharmacy operator undertook a series of broth transfers using a non-touch technique. Seven of the 20 containers prepared on the ward showed contamination with staphylococcus, a skin micro-organism. This illustrates that the risk of microbiological contamination is much greater when manipulations are carried out in an uncontaminated environment such as a ward, as opposed to a pharmacy cleanroom that is supplied with filtered clean air and in which the operators are clothed to prevent contamination of the product. The study recommended reducing risks by:

- Improving the environment - for example, cleaning, avoiding thoroughfares, wearing gloves and putting on glasses before preparation.
- Improving non-touch manipulation techniques.
- Minimising the time between preparation and administration of injectable medicines (so that any contamination has minimal time to grow) (Beaney and Goode, 2003).

These principles are still relevant and form the cornerstone of any procedure involving preparation of injectable medicines. Indeed the Department of Health’s (2008) Clean, Safe Care initiative was based on the same principles, although it applies more widely than simply the preparation of injectable medicines.

5 key points

The majority of injectable medicines are prepared in clinical areas

The risk is reduced by preparation of these medicines in ready-to-use form

Risks to patients are greater when injectable medicines are prepared in clinical areas

Areas rather than in pharmacy

High-risk injectable medicines should be prepared in pharmacy or be provided by pharmaceutical companies in ready-to-use form

Nurse patient safety on Injectable medicines

The National Patient Safety Agency (2007a) became aware of a high level of errors reported in relation to injectable medicines and produced a patient safety alert on the topic. Evidence from the National Reporting and Learning Service and research indicated some of the major problem areas (Taxis and Barber, 2003). As a result, the NPSA (2007a) required the NHS to carry out six actions (Box 1).

How to assess risk

The first action in the patient safety alert required risk assessment of practices and individual injectable products prepared in all clinical areas using a risk assessment tool (NPSA, 2007b), which was based on a study carried out by Beaney et al (2005). Table 1 lists the risk factors for injectable medicines prepared in clinical areas.

The study recommended that all injectable medicines should be prepared in pharmacy, but it also recommended that nurses preparing lower-risk items still deal with in clinical areas be supported by pharmacy involvement in their training and given advice on non-touch techniques (Beaney et al, 2005).

Patient safety alert on injectable medicines

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To make best use of the capacity within pharmacy to prepare injectable medicines, it is sensible to risk assess products needed in clinical areas so that those with higher risk can be transferred to pharmacy preparation, providing the shelf life of the prepared product allows this in practice. To help with this, the RPSGB developed a risk-assessment tool to pharmacy, a risk assessment tool was developed (Beaney et al, 2005). Risks (including administration and manipulations, calculations, patient factors, nature of the drug factors and so on) were given a weighting and injectable medicines in clinical areas were assessed against the criteria; the higher the score, the greater the risk to the patients.

The study concluded that the risk assessment tool could be used to identify high-risk injectable products that should be targeted for pharmacy preparation. It also recommended that nurses preparing lower-risk items still deal with in clinical areas be supported by pharmacy involvement in their training and given advice on non-touch techniques (Beaney et al, 2005).

The recommendations on preparation risk assessment in the NPSA’s (2007a) alert must continue to be implemented as they have been carried forward in the DfH’s (2011) Never Events policy. This penalises trusts for failing to make with the preparation of high-risk injectable medicines that result in severe patient harm. The issue is relevant to all healthcare settings; it is in every trust’s interest to reduce risks with injectable medicines – that is, to convert red-risk preparations to amber or ideally green, and to not make errors.

Protocols and procedures

The second action in the NPSA’s (2007a) safety alert required up-to-date protocols and procedures for prescribing, preparing and administering injectable medicines in all clinical areas. A supplementary document identified the 12 main risks involved with injectable medicines and gave safer practice standards (NPSA, 2007c). Many trusts have used this helpful document as the basis for their own local guidelines or policies; nurses should be aware of the content of such a policy at their place of work (usually available on the trust’s intranet). Similarly, the NPSA (2007d) also produced a template procedure for preparing and administering injectable medicines in clinical areas, which included detailed stepwise instructions for preparation using a non-touch technique.

There is often confusion around the terminology describing the techniques used when preparing and administering injectable medicines, which can lead to errors. Although the pharmacological industry has been encouraged to produce ready-to-use formulations, these are slow to come on stream and, on occasions where they have been made available, they have not been taken up due to cost implications for the NHS (Black et al, 2007).

Nurses worry that if injectables are provided in a ready-to-use format, they will become less skilled and may not be competent to prepare them if required to do so.

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Injectable medicines. While some favour the term “aseptic”, this is usually reserved for truly sterile procedures, so the term “non-touch technique” is often used for preparing injectables. Many trusts have now combined these terms and use “non-touch” or ANTT as described by Rowley (2001) and later updated (Rowley et al, 2010). The philosophy behind ANTT is to identify and protect key points and key sites regardless of the procedure being under- taken, differentiating between surgical and standard procedures. ANTT has repeatedly been shown to significantly reduce infections in comparison to the so-called “standard method” when audited 6-12 months after implementation (Rowley, 2001). This “ANTT effect” has been recognised in the epic guidelines (Pratt et al, 2007), which recommend ANTT as a standard aseptic technique.

ANTT has been implemented within Newcastle upon Tyne Hospitals Foundation Trust. Fig 1 shows the required procedure when preparing injectables using the ANTT process.

It is extremely important to have any injectable by simulation independently checked unless an individual trust has specifically excluded staff from this requirement. The checker must ensure that all calculations, preparation (including choice of diluents and confirmation of correctly measured volumes) and labelling have been carried out in line with the injectable medicines policy.

**Essential technical information**

Another requirement of the NPSA’s (2007a) alert was that nurses have access to essential technical information on all injectable medicines they have to prepare. Since the alert was issued many hospitals have subscribed to Medsum, the NHS injectable drug administration guide. This online guide provides monographs for a vast number of individual injectable medicines with clinical and technical information (including suitable diluents, compatibilities, sample calculations, and so on) and also gives a risk assessment; if nurses are asked to prepare injectable medicines but do not have access to this type of information, they should query this with their managers or pharmacy.

Numerous medication incidents are reported because of the absence of essential technical information. Pharmaceutical companies have provided more information over the years since the NPSA’s (2007a) alert was published, although it is still missing in some cases. New products can also present a risk to patients, so nurses should be vigilant in this area.

**Purchasing for safety**

Most trusts have now implemented a “purchasing for safety” policy where any new injectable product is risk assessed before purchase. It is important that this continues so that high-risk “red” preparations do not creep into common use in clinical areas. Ready-to-use products should be purchased wherever possible, nurses can help purchase identity potential products that would be more safely provided in a ready-to-use form. They can also lobby the pharmaceutical industry to produce more nurse-friendly (and ultimately patient-friendly) preparations.

**Training for healthcare staff**

Action 5 of the NPSA’s (2007a) alert requires trusts to provide training for, and supervision of, all healthcare staff who are involved in prescribing, administering and monitoring injectable medicines (Box 3). In many ways this action has been the most challenging for those charged with implementing this alert. In a large NHS organisation, the sheer number of people to whom this training must apply means that it must be delivered in a broad, generic manner.

At Newcastle upon Tyne Hospitals Foundation Trust non-medical training and infection control competency has improved since this safety alert was implemented, with the introduction of preceptorship coordinators and clinical educator posts doing much to help. A training pack and competency assessment for preparing, administering and monitoring injectable IV medicines has been implemented alongside the development of electronic training packages. For large staff numbers, this represents a good balance between individualised training and the need for all staff involved with injectable medicines to receive the same key messages, regardless of their profession or designation.

Alongside this, much work has been done for junior doctors’ training with the Foundation Programme (Williamson, 2009). This includes a competence assessment of injectable medicine preparation technique using a checklist. ANTT has been adopted by the NPSA’s (2007d) Risk Assessment Tool for the Preparation and Administration of Injectable Medicines to receive the same key messages, regardless of the procedure being undertaken.

**Conclusion**

Although the benchmark for implementing the NPSA’s (2007a) patient safety alert has passed, there is an ongoing requirement to audit medication practice with injectable medicines. Nurses should be aware of the risks with preparing injectable medicines and the ways in which these can be reduced. Working together with pharmacy and ensuring training initiatives are in place can support nurses and protect patients, not just the organisation.

**References**


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