CPD article

Reducing medication errors in practice: part 2

In part 1 of this article, the authors looked at the enormous possibilities for medication errors to occur (https://doi.org/10.12968/coan.2021.0033). In this second part, the authors consider what can be done to avoid medication errors happening in veterinary practice and how systems of work can be used to help. As identified in the Institute of Medicine's report To Err Is Human, most errors result from faulty systems and processes, not individuals. Before steps can be put in place to avoid medication errors, it must be acknowledged that we are all human and thus susceptible to cognitive biases and external influences that cause us to make mistakes. Hence, any interventions put in place to avoid errors should focus on adjusting systems of work to make it easier to do things right and more difficult to do things wrong.

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Pamela Mosedale BVetMed FRCVS, Quality Improvement Clinical Lead RCVS Knowledge, Chapel en le Frith, UK;
Kathrine Blackie BVetMed Cert AVP MRCVS, Clinical Standards & Quality Improvement Manager, Linnaeus.
pam.mosedale@btinternet.com

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As identified in the Institute of Medicine's (1999) report *To Err Is Human,* most errors result from faulty systems and processes, not individuals. Before steps can be put in place to avoid medication errors, it must be acknowledged that we are all human and thus susceptible to cognitive biases and external influences that cause us to make mistakes. Hence, any interventions put in place to avoid errors should focus on adjusting systems of work to make it easier to do things right and more difficult to do things wrong.

Technical solutions

Where possible, configuring the practice management system to block dispense certain products to certain patients, for example paracetamol to a cat, could be a worthwhile consideration. Pop-up alert warnings when dispensing certain high-risk drugs could also be a useful tool.

Fully computerised prescribing systems, with decision support, are reported to reduce medication errors by 55–83% (Agrawal, 2009). The decision support is embedded into the system and gives suggested doses and alerts for missing critical information, such as recent patient weight or baseline lab results, as well as for contraindications, drug interactions or pre-existing conditions. This type of system does not exist in the veterinary industry yet, but hopefully may do in the future.

Communication

As humans, we make a lot of assumptions about what is going on when we work with other people. However, sometimes these are wrong and mistakes can arise. Small changes in the way we speak, or write, can make a big difference.

Avoid verbal prescribing except in emergency situations, or when the drug will be given immediately (such as in anaesthesia). If this must be done, then use closed-loop communication, meaning one person makes a request and the person receiving the information repeats it. It may feel silly at first, but it has been shown to be very effective in checking understanding and picking up errors in communication. As an example: Vet: 'Please give this dog 0.4 ml of methadone IM'; Nurse: '0.4 ml of methadone IM', rather than 'OK'.

Asking open questions to double check requests can also be useful. For example, instead of saying 'Can you confirm this is methadone?', try saying 'Can you confirm what this is?'.

To maintain consistency, always communicate drug doses using the same units. Try not to mix them up, for example by varying between mg/kg, ml/kg, mcg/kg, total dose in ml and so on. Instead, agree on the format you wish to use as a team and stick to it.

To improve written communication and avoid mistakes, ensure to write as legibly as possible on inpatient charts. Never use abbreviations as this can lead to confusion, for example, 'dex' could mean several different things. When writing numbers, take care with zeros. Decimal points are very easy to miss and the correct use of zeroes helps to make this clearer. Avoid using a trailing zero. For example, what is written as '5.0 mg' may be misread as '50 mg', so instead, write 5 mg. Always use a leading zero, for example, what is written as '.5 mg' may be misread as '5 mg', so instead, write 0.5 mg.

Figure 1. A veterinary medicines dispensary.

Dispensary design

The design of dispensary areas can factor into reducing errors in dispensing medication.

Dispensaries should be well ventilated spaces that are kept tidy, with a clear impervious work bench area used for no other purpose than dispensing split packs. There should be enough room for label printers and computer equipment. Lighting should be suitable for dispensing medicines and for reading small print on drug packaging and inserts, as untidy crowded dark dispensaries can increase the likelihood of errors.

If the dispensary area has windows, these should have blinds to protect light-sensitive medicines and to keep dispensary temperatures below 25°C in summer months.

There should be sufficient, easily cleanable shelf space to enable medicines to be displayed clearly and logically. Pharmacy shelving, which has angled shelves to make stock rotation and organisation easier, is ideal. Dividers between products reduce the likelihood of the adjacent drug being picked in error if team members are rushing.

Stock should be organised logically on shelves, to ensure efficiency in locating the necessary medicine and to minimise the risk of dispensing errors. This will depend on practice preference, but there should be a clear and consistent system known to all team members. It is thought that arranging medication by therapeutic group may reduce the risk of medicines with similar packaging, but very different indications, being confused.

Keeping a list, either computerised or manual, of the location of stocks of each drug, and numbering shelves and cupboards in larger dispensaries, is helpful both for stock control and to help new or temporary team members locate products. The *BSAVA Manual of Small Animal Practice Management and Development* advises that in a group practice, having the same drug locating system at each branch is sensible and should reduce the possibility of errors (Clarke and Chapman, 2012).

Those products with the shortest expiry date should be positioned at the front of the shelves to ensure that they are used first and to make checking for out-of-date products easier. It is illegal to use out-of-date medicines, as it could be dangerous if the medicine has deteriorated. There should be effective stock control of all medicinal products. Out-of-date or damaged products should be moved from the dispensary and quarantined until their disposal to avoid them being used in error. Most multi-dose bottles or vials of injectable drugs have an 'in-use' shelf life, which is the period following the first broaching of the container. This is because they are susceptible to degradation or contamination, as most do not contain an antimicrobial preservative. Many of these are marked with the instruction 'Following withdrawal of the first dose, use the product within X days. Discard unused material'. Products with an in-use shelf life should be labelled on opening and discarded after the shelf life has elapsed, to ensure their safety and efficacy. There should be a clear protocol on how this is carried out.

Prescription only medicines (POM-V, POM-VPS) and non-food animal-veterinarians, pharmacists and suitably qualified persons (NFA-VPS) medicines should be stored in areas that are not accessible to the public as they can only be supplied with advice on their use.

Temperature monitoring should be undertaken wherever temperature-sensitive medicines are stored; this may include reception (for repeat medications awaiting collection), surgical and preparation areas, and vehicles. Maximum/minimum thermometers or data loggers should be used to monitor room and fridge temperatures to ensure that temperature-sensitive medicines remain effective. This is particularly important for ensuring the efficacy of vaccines and insulin. The cold chain should be maintained by ensuring that incoming medicines on delivery are transferred into a refrigerator immediately on arrival.

Intravenous fluids often have very similar appearances and labels. To avoid confusion, fluids with similar appearances should be carefully segregated in storage. Using extra labels or marking bags with Sharpies or with coloured tape can also be useful in preventing errors. In a study by Porat et al (2009), the use of colour-coded labels for high-risk intravenous medications was shown to improve identification of potential errors at the time of administration.

Automated dispensing machines, also called smart cabinets, combine storage of medication with computer-controlled drug dispensing and tracking. A study by Ahtianen et al (2020) found that these systems can improve medication safety and quality of care, mainly by decreasing medication errors, but that many error types, such as prescribing errors, still remained.

Team training

Under the Veterinary Medicines Regulations, veterinary surgeons must be satisfied that any team member handing over medication to a client is competent to do so. This means that all team members working in the dispensary, including receptionists who may be handing over repeat prescriptions to clients, must be trained and able to give advice on storing, administering and disposing of the medication.

Training can be 'in house' or external, but should include education on all the practice's standard operating procedures and protocols for the dispensary. Once trained, team members may dispense medication, but the vet remains responsible for the supply and dispensing. It is the responsibility of the vet to ensure that their team are adequately trained.

Systems such as double-checking medicines once dispensed can be useful as long as they are carried out diligently and carefully. Care must be taken to ensure that they do not become just a box ticking exercise. Team members should check the computer records, the label and the appearance of the medicine to ensure they all match. If two team members are present at the same time, using closed loop communication to read out the computer instructions and check the label is useful to reduce errors.

As well as being a legal requirement, ensuring that team members who work in the dispensary are adequately trained can reduce the possibility of errors. The last check, by receptionists, where they show the medication to the client and check that it is correct and the client understands how to use it, is vital and can often pick up on 'near misses'.

It is important that team members understand why they need to carry out certain tasks. For instance, monitoring fridge temperatures to ensure that medicines are stored at the correct temperature, but also to know what to do if fridge temperatures go out of range.

Team members administering medicines to inpatients should be given training, plus undisturbed time to calculate, draw up and administer drug doses. The NHS uses a tabard stating 'Medicines rounds – do not disturb' and this had been adopted by some veterinary practices. This is also an area where closed loop communication is important.

The Royal College of Veterinary Surgeons practice standards scheme awards allocate points for having a dedicated person responsible for running the dispensary and ensuring that dispensary standard operating procedures are updated regularly, and all team members are trained. This can be very helpful both in ensuring the dispensary runs efficiently, as well as in reducing errors.

Dispensary standard operating procedures and protocols

Creating good standard operating procedures that are understood by all team members is vital to ensuring that there is consistency and reliability in dispensing and to reduce the likelihood of dispensing errors. Well written standard operating procedures improve communication, reduce errors and improve consistency. When writing them, involve the people that carry out these responsibilities as they know it best. Drawing up the standard operating procedures this way should make them relevant and easy to follow. They should be reviewed regularly and shared with new team members as part of the induction process and with locums.

The standard operating procedure for dispensing should cover who does what at which steps of the process. Although there are different ways of doing this within a practice, it is something that should be done the same way each time as consistency reduces errors. In addition to standard operating procedures regarding the legalities of prescribing and dispensing, there should be other standard operating procedures designed to reduce errors, such as for:

- Unpacking the drug order
- Labelling medicines
- Double checking dispensed medicines
- Stock control
- Disposal of out-of-date medicines.

These standard operating procedures should be written into the dispensary manual and be available to all team members in the dispensary.

There should also be practice policies to reduce causes of error. These should include never distracting or interrupting someone while they are dispensing, and setting aside a block of time for processing and dispensing repeat medication requests.

Protocols for the safe use of injectable medicines should also be agreed, including using standardised systems for prescribing. This could include always using generic names instead of or in addition to the trade names of medicines, to avoid confusion if different brands are used. It could also include labelling syringes clearly, ideally with colour-coded stickers according to a standardised system, such as that recommended by the Association of Anaesthetists (2016).

Protocols for checking calculations are particularly important for safety critical drugs such as opioids, chemotherapy, non-steroidal anti-inflammatory drugs and anaesthetic drugs. It is much more effective to ask the second person to calculate the dose independently, rather than checking your own working.

Hospitalised patients should be clearly identified using ID collars and there should be a protocol for checking this before any medicines are administered.

Audit in the dispensary

The medicine module in the practice standards scheme awards gives points to practices carrying out audits of dispensing procedures. It also suggests that near misses should be discussed.

Near misses are a valuable source of information on where errors are likely to occur, and all near misses, as well as all errors that occur in the dispensary, should be recorded and discussed by the team. Some near misses may only have been stopped before they became an error through luck, but some will have been picked up because of attentive team members and these should be praised and celebrated.

We do not need to wait for errors to occur to put processes in place for safer dispensing of medicines. Instead, we can proactively audit dispensing procedures before there is a problem.

Clinical audit is a process for monitoring and assessing clinical care to identify and intervene in areas which need improvement. It is about looking at what we do and trying to do it better. This is just as applicable in the dispensary as in other areas of the practice. We can audit the outcomes of procedures or audit processes, such as whether we are following protocols or guidelines. We can also look at one incident from start to finish in a significant event audit. A simple audit of dispensed medicines could involve taking all the prescriptions awaiting collection and taking them out of their bags to check that:

- It is the correct medicine in the bag
- It is labelled correctly
- It has been initialled by two team members to evidence double-checking

Results from this audit can then be taken to a team meeting and discussed. If the results could be improved upon, the team members carrying out the task can help identify which barriers are present. For example, it may be that staffing levels do not allow time for a second team member to double check prescriptions, or that more team training is needed.

Once these problems have been addressed, the audit can be repeated to see if there has been any improvement. Even with good results, the audit should be repeated after a specified period of time to ensure the improvement has been maintained.

Compliance with protocols such as controlled drug standard operating procedures, repeat prescribing protocols, or consent for cascade medicines can also be audited.

An audit of reconciliation of schedule 2 controlled drugs clinical governance at a large corporate group (CVS Group plc, 2019) reduced discrepancies from 37% for methadone and 22% for ketamine to 4% and 2% respectively, making controlled drug use safer for practice teams and complying with legal obligations (RCVS Knowledge, 2019).

A regular programme of audits of medication processes, as well as investigation of near misses and errors, can be used to reduce the incidence of medication errors. *Box 1* lists the top ten error prevention strategies.

Significant event audit

A significant event is anything that is significant to the care of patients or the conduct of the practice, so medication errors or near misses certainly come in to this category. All errors or near misses should be reported either internally, or using a system like the Veterinary Defence Society's VetSafe, then discussed by the practice team.

The team should gather information then hold a no blame meeting to analyse what happened. This meeting would look at the root causes of what happened, including all contributing factors involved, what has been learned and what, if anything, needs to change. The results of this discussion might be the provision of more training or continuing professional development, the writing of new protocols or guidelines or making changes to the pre-existing ones. Once changes have been implemented, they should be reviewed to see if they have made a difference.

RCVS Knowledge (2020) gives examples of significant event audits of medication errors at a fictional vets practice, with one outlined in *Box 2*.

Example of a significant event audit

What happened?

Mr Smith, who is 82 but very fit apart from his arthritis, brought his old cat Fred into the surgery with an abscess following a bite from another cat. He saw a locum vet, David, who prescribed enrofloxacin tablets.

A new student veterinary nurse Harriet, who started at the practice that week, put up the tablets according to the instructions on the label. Mr Smith got to reception and told the receptionist that he did not think that he could give tablets to Fred.

The eagle-eyed receptionist, Andrew, who had been at the practice 20 years, noticed they were 150 mg tablets instead of 15 mg and went to see the vet, who got Mr Smith and Fred back in, gave a long-acting antibiotic injection and arranged to see Fred back in 48 hours. Andrew recorded this incident in the 'near miss' book in the dispensary.

The significant event audit meeting established the following:

David was really busy that morning, his appointments were double booked and he was in a bad mood as his car had broken down on the way to work and he was worried how much the repair was going to cost. He had left his glasses in the car but luckily had his spare reading glasses with him.

Harriet had not had any formal induction as the head nurse was off sick. She had not worked in the dispensary before, but the practice was very short staffed that day. She had never worked with David before. She had questioned a couple of things earlier, but he had been very short with her. She was not sure that the tablets were correct but was reluctant to say anything.

Box 1. Top 10 error prevention strategies

1. Create strong procedures
2. Appoint a 'head of dispensary'
3. Keep the dispensary tidy and well organised
4. Regular team training
5. Set the computer system up to help prevent or alert to errors where possible
6. Double checking
7. Clear and standardised communication
8. Stay aware of what can go wrong
9. Talk about mistakes, near misses and safety concerns
10. Report errors and learn from them

Box 2. Significant event audit: why did it happen?

System factors:
- No induction for Harriet
- No dispensary training for Harriet
- No clear dispensing standard operating procedures
- No double checking of tablets by a second person
- Antibiotic prescribing policy not shared with locum team members

Human factors:
- The team were busy, understaffed and rushed
- David was distracted by external matters
- The team had not worked together before or regularly enough

Patient factors:
- None

Owner factors:
- Mr Smith had not told David in the consultation that he could not give Fred tablets

Communication factors:
- Lack of communication between Mr Smith and David
- David was not asking whether Fred would take the tablets
- Poor communication between colleagues, especially David and Harriet

Other:
- Practice culture that junior nurses are not listened to and locums are not included in practice discussions and the resulting policy changes are not shared with them

Andrew said Mr Smith told him on reception he had no chance of getting tablets down Fred, as when he looked at the tablets he immediately saw they had a picture of a dog on as they were in a clear plastic bag. Andrew went through and told David what had happened, who was very embarrassed and upset that he had clicked on the wrong drop-down box.

What was learned from the significant event audit?

David was very embarrassed by the whole incident. In the discussion, other vets admitted they had found the drop-down boxes fiddly too and it had nearly happened to them. He felt better after the discussion. David then apologised to Harriet and said he always valued nurses' opinions, but was distracted that day.

The practice manager agreed to review the appointment scheduling once she had information from the client waiting times audit in view of overbooking at busy times.

The whole team congratulated Andrew on spotting the error and pointing it out politely to David so it could be rectified with no harm caused. The valuable role of the receptionist in being the last to check medicines was pointed out to the whole team. Further example outcomes are listed in *Box 3*.

Box 3. Significant event audit example outcome

What has been changed?

CPD/training required:

- Team training on dispensing protocol
- Better inductions and shadowing for all team members
- Team members not to be put in situations they are not trained for
- Senior nurse put in charge of dispensary and to organise team training
- Communication training for the whole team
- Training in the responsible use of antimicrobials

New or updated protocols/checklists/guidelines:

- New protocol on dispensing
- Introduction of double initialling system for dispensed medications
- Updated protect poster after team meeting with all vets, including locums

Further audit required?

- Process audit of how team were complying with dispensing protocol
- Audit of double initialling medications
- Audit of client waiting times

Other:

- Contact database provider to query making the dropdown boxes bigger and clearer
- Improving practice culture so that everyone's voice is listened to equally
- Sizes on packs of medicines highlighted and different sizes clearly separated. This was not the cause on this occasion but might have been if the correct box was ticked but the wrong medicine chosen

KEY POINTS

Medication errors in veterinary practice may be reduced by:

- Good communication
- Using systems of work and protocols
- Team training
- Dispensary design
- Auditing dispensing activities.

Conclusions

Although systems such as dispensary design, team training, communication, technical solutions, standard operating procedures and audits are very important in reducing errors, people will always have to be the final safety check and the last line of defence against medication errors.

Errors happen all the time, but most of them are noticed and corrected. Rather than being the unreliable bit of an otherwise perfect system, people are the heroes – their resilience and expertise enables the smooth operation of imperfect systems in changing and risky conditions. Being aware of what could go wrong is vital to this, as is putting in place the systems to reduce errors, as well as celebrating good practice and learning from all the occasions when dispensing goes right.

As a final note, look at your own dispensing systems and consider whether you can see where errors may occur. The authors hope this article may highlight some easy wins for improvement in your practice.

Conflicts of interest

The authors have no conflicts of interest to declare.

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