

Fluid therapy rates in dehydrated patients: A clinical audit

RCVS Knowledge Quality Improvement (QI) in Practice Award Champion 2025

Vets Now, Bristol.



Introduction

Vets Now, Bristol, wanted to assess how fluid rates were being calculated for dehydrated patients due to the risk of fluid overload in critically ill patients.

Patients are admitted to the clinic out of hours for overnight/weekend care, then are discharged home or back to their partner practice if stable to transport. As the patients often have a short treatment time at the clinic, it limited how much information about ongoing fluid therapy plans could be audited. Therefore, this audit focused on the fluid therapy plan devised upon initial presentation and admission.

Retrospective data revealed that fluid therapy rates were only calculated according to current guidelines in 23% of cases. Following interventions, calculated fluid rates improved to 87% of cases.

1. Choose a topic relevant to your practice

The topic should be amenable to measurement, commonly encountered and with room for improvement.

a. What topic was chosen?

The audit investigated if fluid therapy rates for dehydrated patients were being calculated according to current guidelines.

b. Why was this topic chosen?

A fluid therapy plan should be tailored to each individual patient as advised by the AAHA/AAFP guidelines (2013)¹, and inappropriate fluid rates may put patients at risk of harmful side effects, prolonged hospital stay and increased cost to owners. The author's work in an out-of-hours clinic means many patients are critically ill, and this population has shown to be particularly susceptible to fluid overload in veterinary and human literature. The practice wanted to assess how fluid rates were being calculated for dehydrated patients, and if this was in line with current recommendations.

2. Selection of criteria

Criteria should be easily understood and measured.

a. What criteria was used?

At the time of audit, the most current recommendations were the AAHA/AAFP Fluid Therapy Guidelines for Dogs and Cats 2013¹. The criteria used were based on these guidelines, that being:

1. Admitted patients are to have their percentage dehydration recorded upon admission based on clinical signs outlined in the guidelines.
2. Admitted patients are to have their fluid rate calculated based on their percentage dehydration, maintenance requirement and ongoing losses as recommended in the guidelines.

Inclusion criteria:

- Canine or feline patients
- Presenting with signs of dehydration

Exclusion criteria:

- No fluid rate recorded on clinical notes or hospital sheet
- Patients admitted requiring aggressive fluid resuscitation by bolus therapy
- Patients transferred from a partner practice. These patients are admitted with a treatment plan from the referring veterinary surgeon so are not reflective of decisions made by this team

3. Set a target

Targets should be set using available evidence and agreeing best practices. The first audit will often be an information-gathering exercise, however, targets should be discussed and set.

a. What target was set?

A target of 100% was considered ideal as fluid therapy should be tailored to each individual patient and based on current recommendations. However, as it was understood certain barriers were likely to occur with change implementation, the target was set to 80%.

b. What evidence was used to define the target?

The AAHA/AAFP Fluid Therapy Guidelines for Dogs and Cats (2013)¹.

4. Collect data

Identify who needs to collect what data, in what form and how.

a. When was the data collected?

Retrospective data was collected in February 2024, covering January – November 2023.

b. What data was collected?

Retrospective data was collected from 30 cases. The data collected included:

- Date
- Case number
- Was the percentage dehydration recorded? (Yes/no)
- Was the fluid rate calculated by percentage dehydration + maintenance + ongoing losses? (Yes/no)

c. Who collected the data?

Emily Hudson, the Principal Nurse Manager.

d. How was the data collected?

The practice management system was searched for the terms 'dehydration' and 'dehydrated'. The cases were checked that they met the inclusion criteria and were not to be excluded. The data collected was input into Microsoft Excel.

e. Results:

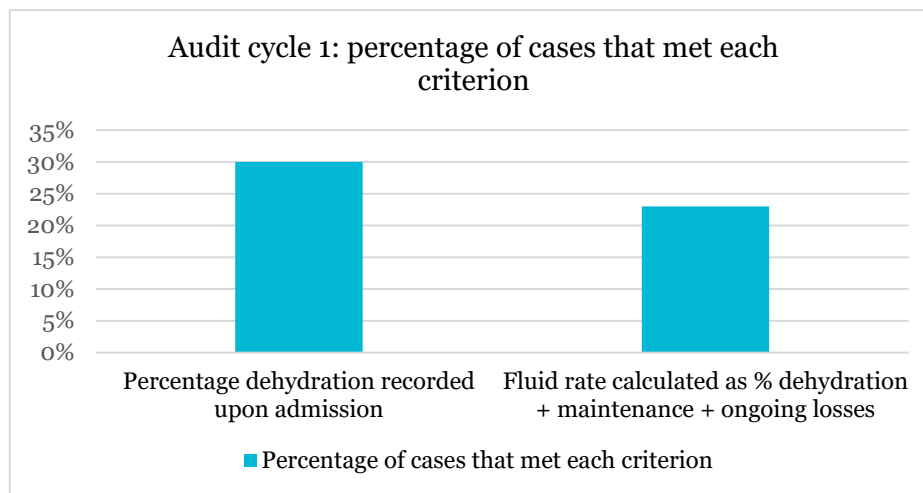


Figure 1: Percentage of cases that met each criterion in the first audit phase.

5. Analyse

Was the standard met? Compare the data with the agreed target and/or benchmarked data if it is available. Note any reasons why targets were not met. These may be varying reasons and can take the discussion from the entire team to identify.

c. Was the target met, if not, why not?

The target was not met. Team discussions were held to share the data and discuss the barriers and ideas for change implementation.

- 30% of cases had percentage dehydration recorded upon admission.
- 23% of cases had their fluid rate calculated based on percentage dehydration + maintenance + ongoing losses.

6. Implement change

What change or intervention will assist in the target being met? Develop an action plan: what has to be done, how and when? Set a time to re-audit.

a. What changes were introduced?

Potential barriers to meeting the target were taken into consideration when deciding upon change implementation, including time constraints with a heavy caseload, awareness of current guidelines and difficulty calculating fluid rates.

It was decided that a poster resource based on the AAHA/AAFP guidelines (2013)¹ would be put in the busiest area (prep), and would include subjective criteria for dehydration assessment, recommended fluid rates and formulae to aid fluid therapy calculations.

- See **Appendix 1** for the poster resource.

b. What was the overall action plan?

The author would create the poster resource and put it up in prep by the table where treatment plans are devised.

c. When was a re-audit planned?

After a two-week period to allow the change to settle in, prospective data was collected from 30 suitable cases.

7. Re-audit

Repeat steps 4 and 5 to see if changes in step 6 made a difference. If no beneficial change has been observed then implement a new change and repeat the cycle. This cycle can be repeated continuously if needed. Even if the target is not met, the result can be compared with the previous results to see if there is an improvement.

a. When did the re-audit take place?

Prospective data was collected from March to July 2024.

b. What data was collected for the re-audit?

Prospective data was collected from another 30 cases. The data collected was:

- Date
- Case number
- Was the percentage dehydration recorded? (Yes/no)
- Was the fluid rate calculated by percentage dehydration + maintenance + ongoing losses? (Yes/no)

c. Who collected the data?

Emily Hudson, the Principal Nurse Manager.

d. How was the data collected?

The same data collection method was used as in cycle 1. The practice management system was searched for the terms 'dehydration' and 'dehydrated'. The cases were checked that

they met the inclusion criteria and were not to be excluded. The data collected was input into Microsoft Excel.

e. Results:

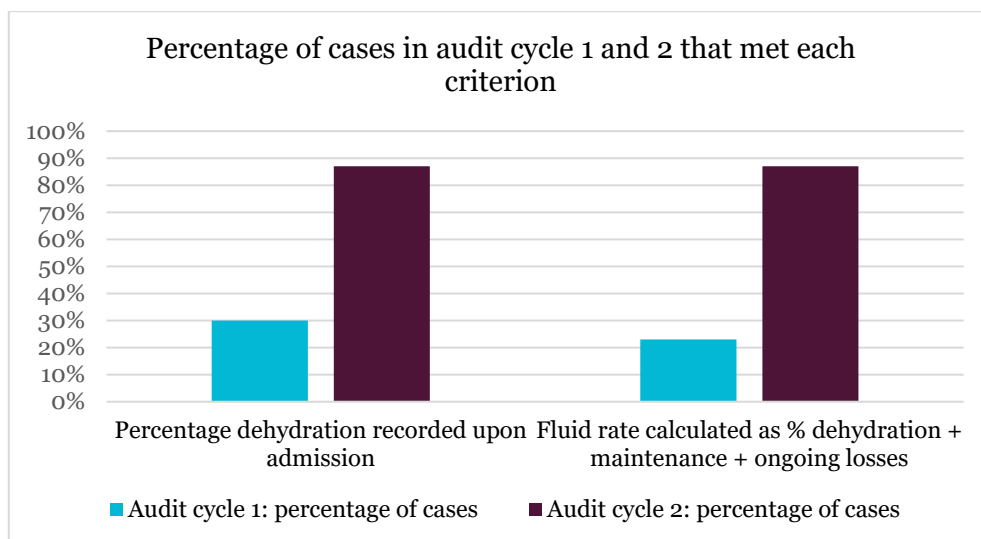


Figure 2: Percentage of cases that met each criterion in the first and second audit phases.

f. Was the target met, if not, why not?

Yes – 87% of cases had percentage dehydration recorded upon admission, improving from 30% of cases.

All 87% of cases had their fluid rate calculated based on percentage dehydration + maintenance + ongoing losses, a huge improvement from just 23% in cycle 1.

g. Were any further changes implemented?

Now that a more current version of the AAHA/AAFP guidelines (2024) have been released, the poster resource has been updated accordingly. A re-audit has not yet been done but is planned for future.

8. Review and reflect

Share your findings and compare your data with other relevant results. This can help to improve compliance.

a. At what stages were the team involved?

An initial team meeting for dissemination of the audit plan took place November 2023. An evidence-based rationale, the plan and the timeline was provided. The team were advised that their involvement would be ensuring clinical notes are clear regarding fluid therapy for prospective data collection, and that they would need to advocate for the audit when working

with locums on the weekend. A second team meeting took place March 2024 to disseminate the results from cycle 1, identify any training needs and to discuss change implementation. The team were able to voice any concerns, and potential barriers were discussed to aid decision on change implementation.

b. How were the team involved?

- Ensuring clear notes and record keeping regarding fluid therapy to aid with data collection.
- Following change implementation, the veterinary surgeon was to record percentage dehydration upon admit and prescribe the fluid rate, and the veterinary nurse was to calculate the rate and record it on the clinical notes and hospital sheet. Training was provided to assist with these tasks.
- Advocating for the audit when working with locums
- Involvement in two team meetings and discussions held in November and March

c. Did the team need any support? How was this given?

The team received support by the poster resource implemented and was advised they could contact the author with any questions or feedback.

d. What barriers did the project face, and how were they overcome?

The clinic can have a high caseload and limited staffing, meaning the team may have been reluctant to do calculations or implement other processes they consider more time consuming. This was overcome by providing training and an evidence-based rationale describing how inaccurate fluid rates may pose a risk to our patients, how we may improve patient safety by using current guidelines, and by ensuring the poster resource was easy to access and follow. Also, not all of the team were aware of the current guidelines, which was overcome by team discussion and the poster resource. Further, the team may have found the calculations challenging which was overcome by discussion and by making the poster resource easy to follow.

e. What consideration has been given for Human Factors?

Teamwork – the author advocated for shared workload so neither the veterinary surgeons nor veterinary nurses felt the change mostly affected them. It was decided that the veterinary surgeon assess patient hydration and prescribe the fluid rate, and the veterinary nurse would calculate the rate and record it on the clinical record and hospital sheet.

Workload and staffing – it was recognised that the team often work with minimal staffing and a high caseload, therefore the author did not want to create too much more workload and risk reducing compliance. The author made sure the resource was concise, easy to follow and in a readily accessible place for the team.

Appendix 1

Fluid therapy guidelines

Assessment for dehydration

Dehydration	Physical exam findings
Euhydrated	Euhydrated (normal)
Mild ~5%	Minimal loss of skin turgor, semidry mucous membranes, normal eye
Moderate ~8%	Moderate loss of skin turgor, dry mucous membranes, weak rapid pulses, enophthalmos
Severe >10%	Considerable loss of skin turgor, severe enophthalmos, tachycardia, extremely dry mucous membranes, weak/thready pulses, hypotension, altered level of consciousness

AAHA/AAFP Fluid therapy guidelines for dogs and cats (2013)

Correction of dehydration

Fluid deficit calculation: body weight (kg) x % dehydration x 10 = volume (ml) to replace

Replace deficit over 8-24 hours in dogs, 24-36 hours in cats

Maintenance rates:

Cat formula: $80 \times \text{body weight (kg)}^{0.75}$ per 24 hr (rule of thumb 2-3 ml/kg/hour)

Dog formula: $132 \times \text{body weight (kg)}^{0.75}$ per 24 hr (rule of thumb 2-6 ml/kg/hour)

Fluid rate ml/hour = [fluid deficit (ml)/number of hours to be corrected over] + maintenance (ml) + estimation of ongoing losses (ml)

- Percentage dehydration and fluid therapy calculation to be recorded on Helix and hospital sheet
- Mark the time that hydration replacement should be complete
- Patient to be monitored for improved hydration and signs of overinfusion and the fluid rate adjusted as required. Further ongoing losses are to be added to the fluid rate as necessary
 - Replacement of ongoing losses should be within 2-3 hours of the loss

Monitoring parameters for patients receiving fluid therapy:

- | | |
|--|---|
| <ul style="list-style-type: none"> • Mental status • Extremity temperature • Pulse rate and quality • Capillary refill time • MM colour • Respiratory rate and effort • Blood pressure • Lung sounds • Skin turgor • Body weight • Urine output | <ul style="list-style-type: none"> • PCV/TS • Serum lactate • Blood gases • BUN/Creatinine • Electrolytes • Urine specific gravity • O2 saturation |
|--|---|

Figure 3: The Vets Now Bristol fluid therapy poster resource.

Summary

Clinical audit is a process for monitoring standards of clinical care to see if it is being carried out in the best way possible, known as best practice.

A clinical audit can be described as a systematic cycle. It involves measuring care against specific criteria, taking action to improve it, if necessary, and monitoring the process to sustain improvement. As the process continues, an even higher level of quality is achieved.

What the clinical audit process is used for

A clinical audit is a measurement process, a starting point for implementing change. It is not a one-off task, but one that is repeated regularly to ensure ongoing engagement and a high standard of care.

It is used:

- ⇒ To check that clinical care meets defined quality standards.
- ⇒ To monitor the changes made to ensure that they are bringing about improvements and to address any shortfalls.

A clinical audit ensures concordance with specific clinical standards and best practices, driving improvements in clinical care. It is the core activity in the implementation of quality improvement.

A clinical audit may be needed because other processes point to areas of concern that require more detailed investigation.

A clinical audit facilitates a detailed collection of data for a robust and repeatable recollection of data at a later stage. This is indicated on the diagram wherein in the 2nd process we can see steps 4, 5 and 6 repeated. The next page will take you through the steps the practice took to put this into practice.

The veterinary clinical audit cycle

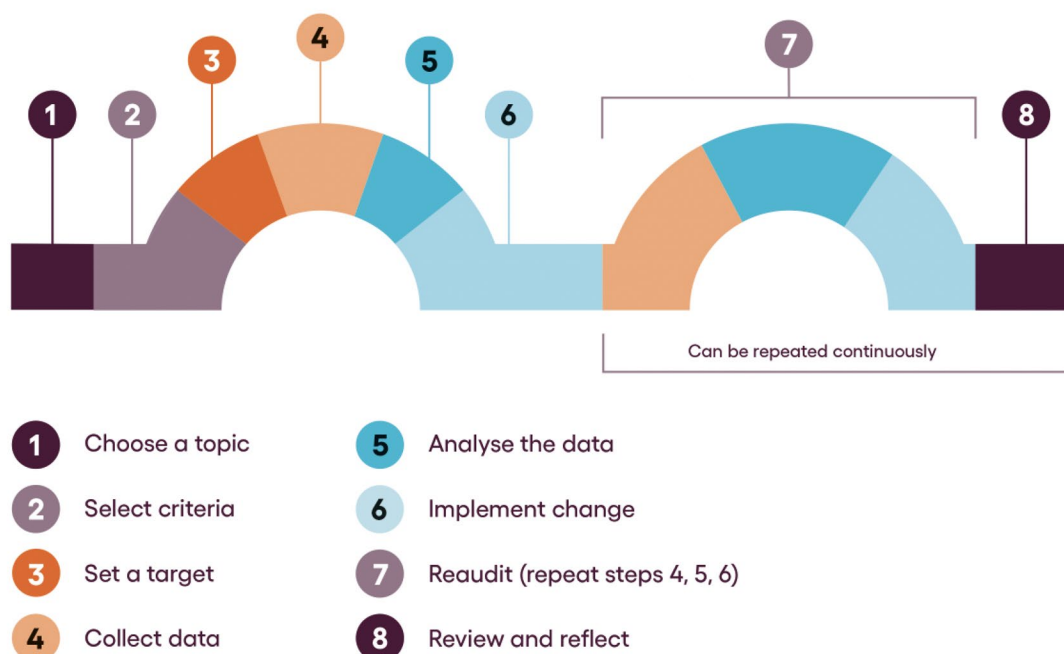


Figure 4: The Veterinary Clinical Audit Cycle by RCVS Knowledge. Available from www.rcvsknowledge.org. Developed by the Royal College of General Practitioners www.rcgp.org.uk/qi-ready

References

1. *2013 AAHA/AAFP fluid therapy guidelines for dogs and cats: Implementation toolkit* [American Animal Hospital Association and American Association of Feline Practitioners] [online]. Available from: https://www.aaha.org/wp-content/uploads/globalassets/o2-guidelines/fluid-therapy/fluidtherapy_guidelines_toolkit.pdf



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