Clinical Audit Case Example: Applying Clinical Audit for Quality Improvement in a UK Primary Care Emergency Practice Setting: A Dystocia Case Study.

Name of the initiative:	Applying Clinical Audit for Quality Improvement in a UK Primary Care Emergency Practice Setting: A Dystocia Case Study.
Initiative start date:	2018
Submitted by:	Vets Now Ltd

Introduction

Vets Now treats companion animal patients registered at over 1000 primary-care practices, providing out-of-hours emergency care at over 60 sites across the UK. The VetCompass Programme at the Royal Veterinary College shares, analyses and disseminates veterinary clinical information from UK primary-care and emergency-care veterinary practices for epidemiological research that aims to develop an improved evidence-base to support companion animal welfare initiative.

Dystocia represents an important canine welfare challenge, with mortality rates reported at over 20% for puppies, and 1.7% for dams. Canine dystocia has a reported prevalence of 3.7 % in an emergency caseload (O'Neill et al., 2017[1]). Early diagnosis and rapid intervention are known to be crucial in decreasing puppy mortality. However, there is limited evidence-based data available to guide clinicians on objective management of canine dystocia cases, and there is variation in recommendations between experts. For example, the threshold for identification of foetal distress based on monitoring foetal heart rates varies from 140 bpm – 180 bpm; and whilst it has been recognised that lower oxytocin doses are likely to minimise the risk of tetanic uterine contractions (Runcan and Coutinho da Silva., 2018[2]), this has not yet been reflected in the data sheet recommendations (NOAH, 2022[3]).

In 2018 the topic of dystocia was identified as a key focus for a planned team training programme at Vets Now. Feedback from clinical teams indicated that it is a topic that team members can find difficult to manage - clinically, professionally, and ethically. It was considered that clinical management of canine dystocia cases would be amenable to change, with significant potential to improve patient welfare and clinical outcomes. Since this time, canine dystocia cases have been increasing in number at Vets Now, and the Veterinary and Nursing Standards (VaNS) team have been receiving an increasing number of communications from clinical teams, asking for support in this area. This may have been accelerated by the increase in the breeding population of dogs, and resultant increase in the puppy owning public as a result of the societal impact of the Covid-19 pandemic.

Aims of the clinical audit

The objectives of the study were to audit the clinical management of dystocia cases, and as part of a wider QI (Quality Improvement) project to develop internal benchmarks, guidelines, and resources to support clinicians with objective decision-making, ultimately aiming to improve patient welfare and maternal and neonatal outcomes.

Further data collection was planned to assess the impact of the QI project. Furthermore, using dystocia as a case study, the benefits and pitfalls associated with designing and implementing a QI project in a multi-site primary-care practice would be investigated, and options explored on how to overcome common barriers to uptake and success of projects. The final report proposed to create a template for implementing clinical audit as part of QI in primary-care practice and may encourage increased and more enthusiastic uptake of QI projects across the veterinary profession.

Actions

Audit Phase 1

A working group examined data from the electronic patient records of 701 canine dystocia cases seen at Vets Now between 1st September 2012 and 28th February 2014, to examine dystocia risk factors, management, and outcomes (O'Neill et al., 2017, 2019 [4]). The dataset was created within the VetCompass Programme[5]. The clinical notes free-text field of each electronic patient record was searched using the terms: dyst, disto, labour, labor, cesa, caes, csec, c-sec, birth, partur, whelp, foet, fetal, con- traction, litter, breach, breech, oxyto, neonat. The client-reported presenting signs field was searched using the term for trouble giving birth. The clinic-reported presenting signs field was searched for dystocia. Provisional diagnoses are coded using VeNom Coding standardised terminology (VeNom Coding Group, 2022[6]). The VeNom diagnosis field was searched for any terms that included dystocia or pregnancy and the drug treatment fields were searched using the search terms: oxyt and dopr. A dystocia case was identified if the following two criteria had been met: presentation for emergency clinical care related to whelping; and assessment of the bitch by the attending veterinary surgeon as having at least part of one puppy retained internally.

In this study canine dystocia had a prevalence of 3.7%, with French bulldog, Boston terrier, chihuahua, and pug identified as breeds with the highest odds of dystocia. Caesarean section was performed on 48.6% of dystocia cases, Oxytocin was administered to 54.2% of cases, with varying prescribed doses, and calcium gluconate was administered to 11.7% of cases. Diagnostic imaging was used in 27.3% of cases. This last metric identified an aspect of care with significant potential for improvement.

Collaboration between clinical leaders at Vets Now led to the creation of a checklist to assist clinicians with the management of dystocia cases, and an increased focus on dystocia management for new clinicians undertaking internal training programmes.

Audit Phase 2

In 2018, after dystocia had been identified as a high priority topic for team training, a working group was formed to plan, and project manage the next phase of data collection. A pilot study of 40 cases preceded the main data collection from 753 canine dystocia cases seen at Vets Now between 1 June 2018 and 31 May 2019, and key clinical questions were defined associated with signalment, clinical presentation, ultrasonography, foetal heart rate recording, drug administration, surgical care, and outcomes. A structured query language search was used to retrieve relevant electronic patient records from the Vets Now practice management system. Search terms mirrored those used in Audit Phase 1.

The aim of the pilot study was to check that the data collected was unambiguous and relevant to the topic, and evaluation of the process was used to develop a standard operating procedure and training material for wider data collection, which was presented through Vets Now's digital learning platform, Tessello. Areas of focus included: technical considerations (practice management system use, exclusion criteria, systematic electronic patient record examination, Excel use); principles of clinical audit; confidentiality; clinical and professional standards; and the spirit of the audit, in the context of a learning/just culture.

Vets and veterinary nurses were encouraged to volunteer as auditors via a recruitment piece on the digital learning platform, and in a clinical newsletter to team members. The following incentives were highlighted: the opportunity to improve maternal and neonatal outcomes; professional growth and development; and the recognition of clinical audit by the Royal College of Veterinary Surgeons as a Continuing Professional Development activity. Individual email communications were sent to team members who had participated in previous clinical audits.

An auditing team of 21 auditors was assembled who completed the training material and then systematically reviewed clinical cases according to set criteria to answer specific clinical questions. Cases were randomised and distributed between the auditors. The clinical journal section of the electronic patient record for each case was inspected using filters to consecutively segregate contemporaneous clinical notes, invoiced items, and administrative comments, to allow focused examination. The following uploaded documents were reviewed: hospitalisation sheets; anaesthetic records; images; laboratory results; ECG traces; blood transfusion records; checklists; consent forms. Data was recorded using Microsoft Excel in Office 365 ProPlus. Drop-down menus, number ranges and TRUE/FALSE conditional formatting were used to minimise error. Auditors left Excel cells blank if the required information appeared to be absent or equivocal. A free text column was included, to record concerns or request a second opinion. Column headers contained clarification about the parameters to be recorded, to reduce ambiguity and error.

Once data collection was complete, the working group was expanded to manage the knowledge gained from the audit and disseminate the learnings across the business.

The working group discussed the results and identified several areas that were thought to be amenable to improvement and would have the greatest impact on patient welfare if improvements were seen. These included improving the consistency of neonatal monitoring with the inclusion of APGAR scoring, as well as the opportunity to utilise better prescribing practice in terms of pharmacovigilance with oxytocin dosages, non-steroidal anti-inflammatory drug use and antimicrobial surveillance, to improve efficacy and patient safety. A text document and infographic were designed

to report the results in an engaging and easy digestible format, and these were released in the company newsletter to all team members.

There is limited easily available, high-quality, published evidence on managing dystocia in primary-care practice. Existing pathways of care within Vets Now for dystocia cases were reviewed by clinical leaders in the business. Additionally, current peer-reviewed evidence was examined, to inform the production of a range of resources to aid with the management of canine dystocia cases, including a dystocia telephone triage checklist, an updated dystocia clinical management checklist, an early neonatal survival guide and a canine caesarean section post-operative sheet for pet owners. Explicit criteria for clinical interventions included recommended drug dosages for oxytocin, calcium gluconate, and drugs or practices no longer recommended for use in these patients. Guidelines included not 'swinging' neonates, not using doxapram hydrochloride for neonatal resuscitation, recommending foetal heart rate monitoring as part of the decision-making process for medical *versus* surgical management, and APGAR scoring to support decision making in neonatal resuscitation (Titkova et al., 2017[7]). A consensus-driven standard, with a target for achieving foetal heart-rate recording in 75% of canine dystocia cases was suggested.

Following release of the infographic and text document, all clinical teams were invited to a live discussion panel event. The following aspects of care were featured: team perspective; client expectations; bias and its effects on care; medical management; anaesthesia and analgesia; safe prescribing; decision to delivery time in caesarean section; foetal and neonatal monitoring; and early neonatal survival. Opportunities were included for interaction with participants using Poll Everywhere and live webchat. Time was allocated for a question-and-answer session, to offer support on specific challenging cases or issues. Team members were also encouraged to submit questions by email prior to the event.

Audit Phase 3

Following implementation of these resources, a third data collection from 302 canine dystocia cases seen at Vets Now clinics between 1 June 2021 and 25 August 2021 was performed, with an interval of 4 weeks between the discussion panel and the start of this data collection phase. The same methods and criteria were used as previously.

Results

Table 1. Comparison of variables relating to the clinical management of canine dystocia cases seen at Vets Now between 1 September 2012 and 25 August 2021

Audit criteria	Phase 1 (1 September 2012-28 February 2014) n (%)(total 701 cases)	Phase 2 (1 June 2018-31 May 2019) n (%)(total 753 cases)	Phase 3 (1 June 2021-25 August 2021) n (%)(total 302 cases)
Bodyweight recorded	237 (33.8%)	445 (59.1%)	207 (68.5%)
Diagnostic imaging performed	191 (27.3%)	393 (52.2%)	219 (72.5%)

Radiography performed	113 (16.1%)	111 (14.7%)	36 (11.9%)
Ultrasonography performed	92 (13.1%)	337 (44.8%)	197 (65.2%)
Foetal heart rate recorded	Not measured	206 (27.3%)	147 (48.7%)
Oxytocin administered	380 (54.2%)	386 (51.3%)	184 (60.1%)
Calcium gluconate administered	82 (11.7%)	67 (8.9%)	51 (16.9%)
Oxytocin median first quantity (iu/dog)	5 (IQR 3.0–8.0, range 0.2–50.0)	4.0 (IQR 2.0–6.0, range 0.1–46.0)	4.0 (IQR 2.0–8.0, range 0.16–23.0)
Oxytocin median first dose (iu/kg)	0.36 (IQR 0.22–0.52, range 0.01–2.08)	0.29 (IQR 0.17–0.46, range 0.001–2.0)	0.25 (IQR 0.17–0.47, range 0.01–2.32)

Between Audit Phases 1 and 2, significant ($P<0.05$) increases were observed in the proportion of canine dystocia cases with recording of bodyweight, recorded usage of diagnostic imaging and recorded usage of ultrasonography. Significant ($P<0.05$) decreases were observed in the median first quantity (iu/dog) and median first dose (iu/kg) of oxytocin (Table 1).

Between Audit Phases 2 and 3, significant ($P<0.05$) increases were observed in the proportion of canine dystocia cases with recorded bodyweight, recorded usage of diagnostic imaging, recorded usage of ultrasonography, recorded measurement of foetal heart rates, and recorded usage of oxytocin and calcium gluconate (Table 1).

Additionally, between Audit Phases 2 and 3, significant ($P<0.5$) increases were observed in the recorded use of intravenous therapy during caesarean section, recorded post ex-utero timing of opioid product during caesarean section, recorded choice of full agonist as the opioid product during caesarean section, recorded usage of paracetamol during caesarean section, recorded usage of local anaesthesia during caesarean section and recorded usage of multimodal analgesia during caesarean section. Significant ($P<0.05$) decreases were observed in the recorded usage of a non-steroidal anti-inflammatory drug (NSAID) during caesarean section.

Impact of Intervention

Auditing the use of ultrasound during dystocia cases and setting a benchmark has been associated with an increase in the usage of foetal heart rate monitoring during ultrasound examination of the dam from 27.3% to 48.7% of canine dystocia cases between Audit Phases 2 (2019) and 3 (2021). This will support clinicians with objective decision-making regarding medical *versus* surgical interventions. A focus on safe drug prescribing, pain management, multimodal analgesia, and use of local anaesthesia during the discussion panel webinar has been associated with an increase in use of local anaesthesia during caesarean section from 26.0% to 37.5%, increased use of pure opioid analgesia

from 78.9% to 85.3% and increased number of patients receiving paracetamol as additional analgesia from 31.7% to 78.7% between Audit Phases 2 (2019) and 3 (2021). This is likely to improve patient welfare and may ultimately have a positive impact on dam recovery times and neonatal ability to thrive. Overall, we can see a clear clinical improvement in the quality of care for dams and neonates since the educational resources were released. Improving data collection with the aim of continuously monitoring neonatal outcomes will be an important ongoing focus.

Encouraging clinical teams to record foetal heart rates and body weights demonstrates better use of technology and improved data collection, which could be beneficial for future audits, and as clinicians become more confident with using the ultrasound machine to monitor foetal heart rates, it is likely to improve the return on investment from the equipment used and may support future investment in this area.

Excellent engagement with the auditing process was seen –

"*I really enjoyed auditing clinical cases; I feel I got a lot out of it: it is really interesting to see in how many different ways the same situation can be managed*."

Team member involvement with the auditing process may increase the chances that QI processes will be embedded as part of daily clinical life and is likely to lead to greater engagement in the subject area.

Feedback regarding the new information resources was positive –

"Just read through all the documents that you and your team have put together. I have learnt some really useful information and shall definitely be incorporating them into my work in future. Many thanks for the best thing that's come down to me at Vets Now yet - by far. In short, it's a very useful topic area as it's frequently encountered in clinics and the info provided is concise, easy to read, yet touches on all the things I wanted to know about, very readable and formatted excellently, and pitched at the perfect level of technical detail for the whole practice team."

"*Having just watched the dystocia forum recording, I was absolutely blown away by its real-world approach to an actual challenge. The group managed the talk with grace and professionalism. It's such a massive and controversial subject… making a tedious subject enjoyable to watch*."

It is important to note that the online resources and discussion panel webinar were aimed at and are available to all members of the veterinary team. Discussion focussed on different areas of the client and patient journey, emphasising the importance of the whole veterinary team in improving care, as a result supporting inter-professional learning and greater engagement in the subject area.

Important factors considered during the planning phase of the QI project included careful topic selection (listening to feedback from clinical teams, considering the importance of relevance of topic, ease of data collection and level of potential impact), overcoming barriers such as lack of existing published standards, and supporting and encouraging team members from all levels of the organisation to engage in the quality improvement process.

For any planned QI project, data must be accessible, and easily interrogated. For this reason, prior to the implementation of a specific data collection phase, a pilot audit was carried out to explore the

capabilities of the practice management system and identify areas for further consideration or mitigation. Explicit criteria were developed to support effective data collection, as this is an area that has been identified as being essential for an effective QI cycle. Furthermore, specific training was provided on how to complete the data collection phase, and auditors were supported by the working group throughout the process. Creating protected time for QI activities is reported as being essential for those with competing clinical priorities so the current study ensured adequate time and resources were made available by the organisation for both the auditors and the working group, in an environment that supports a learning culture.

Team involvement was considered essential to combat audit failure and in the current study, engaging clinical leaders, as well as team members from all levels of the organisation helped to gain collective involvement and subsequent endorsement, which is likely to be beneficial in terms of effectively changing practice. It was important to the working party that results were communicated in a positive and constructive manner, whilst avoiding criticism and blame for any perceived negative results and encouraging and facilitating teams to implement key changes that may improve specific aspects of care for canine dystocia patients. Furthermore, it has been reported that where education is interactive, includes discussion of evidence, local consensus, feedback on performance (by peers), making personal and group learning plans, it is more effective strategically in changing practice than simply using educational materials or didactic continuing professional development sessions. The current study utilised a range of learning resources which included a live discussion panel to which all members of the veterinary team were invited. The discussion panel aimed to provide clinical information and recommendations, whilst allowing a platform for discussion of more contentious welfare and professional standards issues.

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 QI.

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.

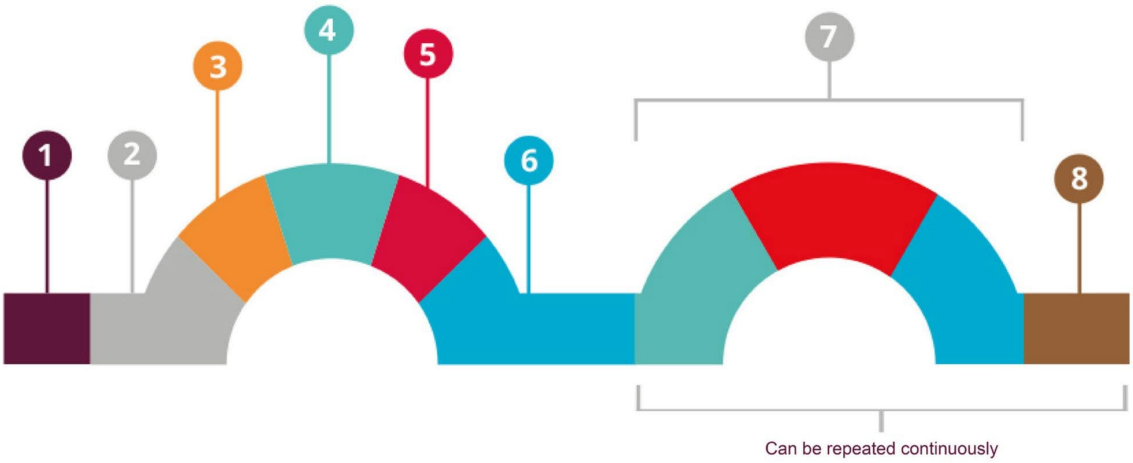

Figure 1: The Veterinary Clinical Audit Cycle by RCVS Knowledge. Available from www.rcvsknowledge.org. Developed by the Royal College of General Practitioners www.rcgp.org.uk/qi-ready

1. Choose a topic relevant to your practice

The topic should be amenable to measurement, commonly encountered and with room for improvement. Clinical team feedback identified dystocia case management as an area for internal training.

2. Selection of criteria

Criteria should be easily understood and measured. A pilot study of 40 cases was designed to evaluate the data collection process and inform further data collection to assess the impact of QI initiatives.

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 target of improving consistency of neonatal monitoring, improved prescribing practice and pharmacovigilance, and achieving foetal heart rate recording in 75% of canine dystocia cases was set.

4. Collect data

Identify who needs to collect what data, in what form and how. A team of 21 vets and veterinary nurses collected the data from the electronic patient records retrospectively.

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. An improvement in foetal heart rate monitoring was seen, along with improved pharmacovigilance and multimodal analgesia use.

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. The team discussed a number of changes, which led to the creation of internal educational materials, and the development of checklists, guidelines and client information sheets, and the team working together for a common goal.

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 them 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. Further audits have been carried out which show a continued improvement, greater engagement with and the further embedding of QI as part of daily clinical life.

8. Review and reflect

Share your findings and compare your data with other relevant results. This can help to improve compliance. Findings, updates and learnings from educational materials are regularly given to the team.

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