

Clinical Audit Case Example: Review of dental X-ray machine use

RCVS Knowledge Quality Improvement Award Highly Commended 2022

Filham Park Veterinary Clinic, CVS

Introduction

Filham Park Veterinary Clinic is an RCVS approved, first opinion, small animal practice. We are passionate about animals and the team is dedicated to providing the highest quality of patient care.

First established in the 1960s the practice has continued to grow and develop. The practice has a positive culture and is continually striving for improvement, ensuring that we continue to uphold professional excellence and provide high-quality care to both our clients and patients.

In 2018 the practice purchased a CR dental X-ray machine. As part of clinical governance, the practice continually reflects on current practice to look for ways to improve. As part of this dental procedures are regularly audited. In August 2021 we used clinical audit to review the use of the dental X-ray machine, to ensure it was being used to its full potential or whether there was room for improvement.

Aims of the clinical audit

In a review of the evidence, Moore and Niemiec (2014)¹ found that 82% of dogs and 92% of cats suffered retained tooth fragments following extractions. Peralta (2010)² reported that tooth resorption affects around 53% of dogs, as well as cats and 30% of dogs will have teeth that do not erupt. On periodontal assessment around 30% of normal teeth have clinically relevant lesions on dental X-ray (Verstraete 1998)³.

All of these figures highlight the benefit of dental X-rays, with this in mind we should ideally be completing dental X-rays in 100% of our dental cases regardless of extractions. We acknowledged we may have faced limitations, such as cost concerns, client restraints, and patient safety. As a minimum, all patients who have dental extractions should have dental X-rays.

For the client to be fully informed prior to their dental procedures they should receive an

estimate for dental x-rays, therefore we expect this figure to be at 100%.

This audit aims were:

- To see an overall improvement in the standards of dental treatment that we offer.
- To increase the number of dental X-rays being taken – Target 80% of patients who have dental extractions. This figure accounts for the limitations discussed above.
- To increase the number of estimates produced for dental treatment to include dental X-rays – Target 100%.
- To increase the overall dental procedures that we were completing.

Actions

The data was collected retrospectively. To collect sufficient evidence the data was collected over 3 months (1st June to 31st August 2021). The Practice management system (PMS) was used to identify all canine and feline patients that underwent general anaesthetic and dental treatment.

The results revealed;

Total number of dentals; 63 (18 cats and 45 dogs)

- Total number of estimates for dental X-rays - **15/43** (excluding Charity) - **(35%)**
- Total number of dental X-rays - **20/63** - **(32%)**
- Total number of dentals with extractions - **48/63** - **(76%)**
- Total number of patients who had extractions and dental X-rays - **17/48** - **(35%)**
- Meaning **31/48** (**65%**) had extractions but NO X-rays.

This audit to establish the baseline highlighted that we needed to improve the dental care that we were offering.

Following these results, a vets meeting was arranged in which all vets were encouraged to attend as well as our nurse representative. We discussed the results of the clinical audit, and ways that we could improve, as well as reviewing the current protocol at the time. These points were then taken by our nurse representative and disseminated to the nursing team.

It was felt that the clinical team would benefit from some dentistry CPD. Therefore, we arranged an in-house CPD day with Cherish Sibbing BVetMed PGCertVBM CertAVP MRCVS.

We completed training on;

- Benefits and limitations of dental X-ray
- Dental X-ray positioning (with practical)
- Periodontal and endodontic assessment
- Dental charting
- Overview of common dental diseases
- Overview of dentistry techniques (with practical)
- Estimating for dental treatment
- Managing client expectations

This CPD was highly beneficial to the clinical team. 70% of the clinical team attended the CPD day and for those who did not attend, notes were saved in our practice handbook. Another vets meeting was arranged to reflect on the CPD, review our current protocols, and discuss how we would like to improve, the limitations associated, and how we were going to overcome them. Again, this information was disseminated to the nursing team via the nurse representative.

As a team, we went on to implement many changes;

1. We introduced a dental grading scoring system.
2. We produced a new practice policy for booking dental procedures, specifying either 2 x grade 1-2 dentals or 1 x grade 3-4 dentals per day.
3. We produced a new practice policy for staging dentals, especially those undergoing extensive dental treatment or those where patient safety was a concern.
4. We updated our client advice sheets.
5. We produced a new practice policy for pre-operative dental assessments carried out by Veterinary Surgeons (VS) before dental treatment. This allowed a thorough dental examination, dental grading, and discussion with the owner to help manage client expectations and correct booking of the procedure.
6. We discussed how to correctly estimate dental procedures and decided it was sensible to have a 'blanket' estimate for the various levels of dental treatment, allowing us to inform clients of costs quickly and accurately.
7. We invested in new dental instruments.

- Moved the location of the dental X-ray machine to allow ease of use. This allowed us to obtain dental X-rays without having to move the patient. In line with Radiation Safety Guidelines set out by our RPA; we fitted a warning light, and an isolation switch and ensured there was a safe distance.

Results

A repeat clinical audit was then carried out using retrospective data from 1st September – 30th November 2021, to establish whether we had met our aims.

The results revealed;

- **Total number of dentals; 82** (32 cats and 50 dogs)
- Overall increase of 32%
- Total number of estimates for dental x-rays; **40/60** (excluding Charity) - (**67% - an increase of 32%**)
- Total number of dental x-rays; **40/81** (1 previously had dental x-rays) - (**49% - an increase of 17%**)
- Total number of dentals with extractions; **58/82** - (**71%**)
- Total number of patients who had extractions and dental x-rays; **33/58** (**57% - an increase of 22%**)
- Meaning **26 (45%)** had extractions but NO x-rays (**a decrease of 20%**)

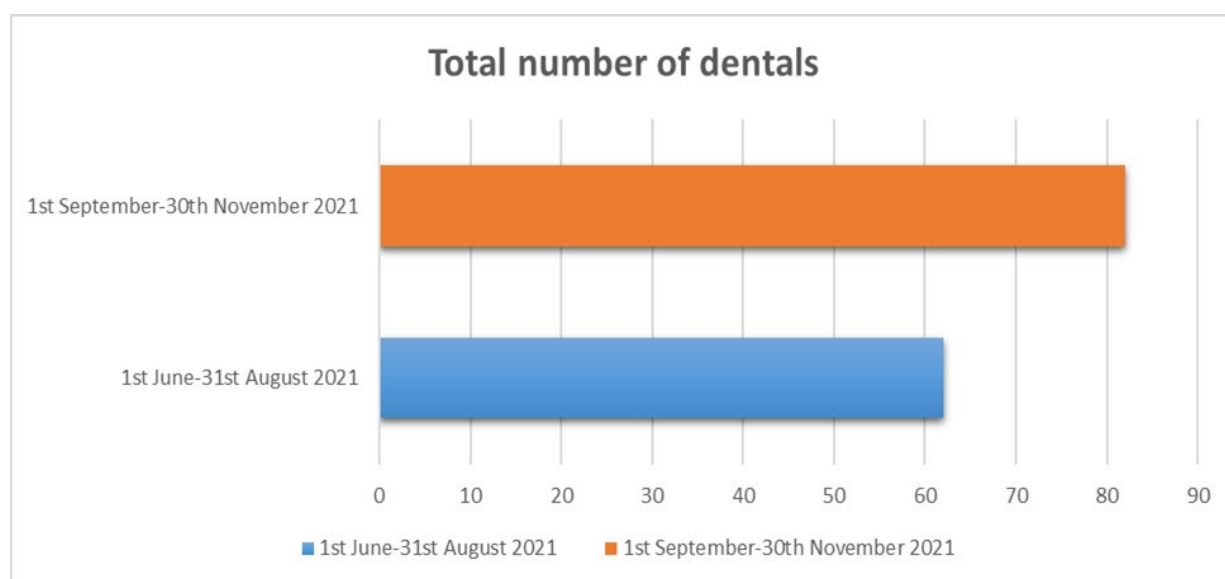


Figure 1: Total number of dental procedures across both audits

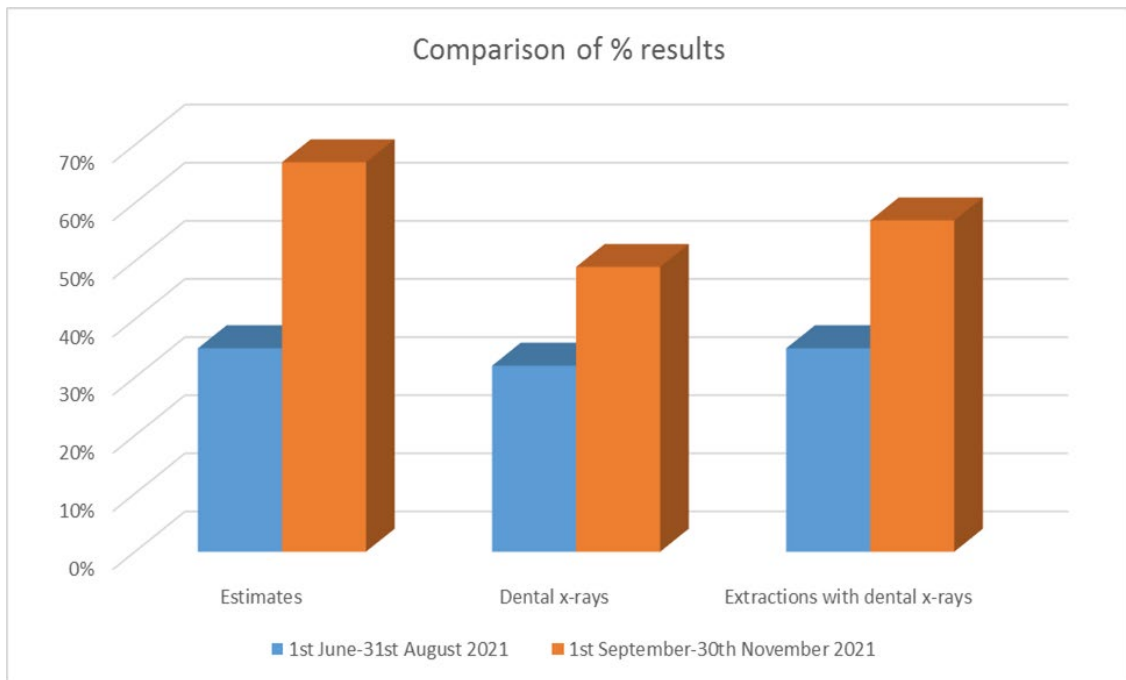


Figure 2: Comparison of completed estimates, and the number of X-rays carried out in dental procedures with and without extractions.

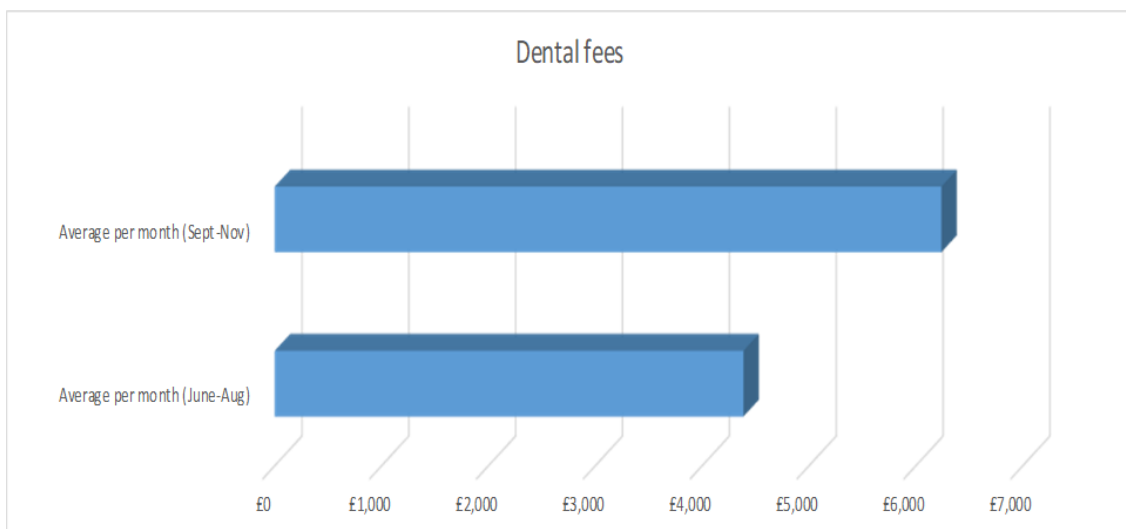


Figure 3: Comparison of dental fees before and after the implementation of the changes.

From these results, we found:

- We saw an overall improvement in the standards of dental treatment that we offer.
- We increased the number of dental X-rays being taken but didn't meet our initial target of 80% of patients who had extractions. This is something we continued to work towards.

- We increased the number of estimates produced for dental treatment to include dental X-rays but again didn't meet our aim of 100%. This is also something we continued to work towards.
- We significantly increased the overall dental procedures by 32%

We appreciate that there were a lot of changes, and it can take many months for a complete uptake of the changes, so we continued to work towards this and re-audit on an ongoing basis to assess the impact.

Impact of intervention

This QI initiative had an extremely positive outcome. We saw improvements in the following areas;

Clinical outcomes - this was due to team training, improved knowledge, better use of the technology (dental X-ray), and overall improved team engagement. Implementing the changes allowed us to improve the dental treatment we are offering.

Case examples;

- 6-month-old, male, domestic shorthair presented for general anaesthetic and castration. On pre-operative assessment, it was noted that he had retained deciduous canines. Owner consent was gained for dental X-rays. The X-rays revealed retained teeth and partially erupted and retained crowns. This patient required gingivectomy of 4 molars and 1 carnassial, crown removal, and removal of deciduous teeth. Ordinarily, without dental X-rays, we would have proceeded to remove the deciduous teeth only. This case demonstrated the benefit of dental X-rays and how they can improve the clinical outcome.
- 9-month-old, male, crossbreed presented for general anaesthetic and castration with retained testicles, dental X-rays, and removal of deciduous teeth. The X-rays revealed multiple retained teeth, some missing permanent teeth and some partially erupted. This required orthodontics as the eruption was already complete, therefore this patient was referred for specialist dental treatment.
- 6-year-old, male, Yorkshire terrier presented for general anaesthetic and dental. Dental X-rays were obtained. They revealed teeth 309 and 409 had curved roots and were sitting close to the bone edge, so presented a high risk of mandible fracture if extracted, therefore the owner opted to leave in place and continue with regular dental

treatment. Without dental X-rays, these teeth would have been removed which would have likely resulted in a jaw fracture.

Better use of technology – we purchased the dental X-ray in 2018 but unfortunately, had slow uptake. This was due to team resistance, lack of knowledge, time constraints, a lack of confidence in managing client expectations, and poor location of the machine. With the actions taken, we saw a significant increase in its use.

Improved client satisfaction – this has improved by providing better client advice sheets, pre-dental checks, accurate estimates, and improved patient care.

Client testimonial;

“Due to having dental X-ray results prior to proceeding with my dog’s dental treatment, the VS was able to diagnose that the bone surrounding his canine was very narrow and therefore there was a high risk of fracturing the jaw if we proceeded with dental extraction. I am very happy with the service I received and know that my dog was in the best care”.

Improved premises – moving the dental X-ray machine, allowing us to safely X-ray on the dental table without moving the patients improved our premises overall.

Improved productivity – We were able to proceed with more dental procedures and take more dental X-rays.

Improve team wellbeing – We saw greater engagement and overall confidence across the team.

Team member testimonial;

“Having higher standards of dentistry care has been positive for my well-being as I personally feel like I am now able to deliver a good standard treatment. The use of dental X-rays has improved the ease of extractions, by knowing how to approach the teeth which may have awkward roots. This greatly diminishes the frustrations involved with extractions. Furthermore, being able to take post-extraction radiographs removes the stress of worrying about having left any root fragments behind”.

Interprofessional learning – arranging CPD with a member of the veterinary profession with a certificate in this area allowed us to share this knowledge.

Greater engagement– we have since seen greater engagement in dentistry from the clinical team.

Financial – although we invested approximately £2000 (fee for moving dental X-ray, RPA visit, CPD day, and dentistry equipment) in improving our dentistry we have seen a 42% increase in dental sales (including GA dentals, charged dental extractions and dental X-rays) and a 146% increase in dental X-ray sales alone (based on an average of the 3 months).

The positive impacts of this QI initiative significantly outweighed the negatives, but it seems only fair to acknowledge them;

- Financial investments as discussed above.
- Completing all aspects of this QI project was time consuming
- Dental procedures are generally taking longer to complete which can create some time constraints.

Working in a supportive practice with a positive culture makes completing QI much easier. Communication is key! As you can see throughout this report, we have maintained team communication.

Having everybody engaged and involved in making the changes made implementing change much easier and therefore meant this project was overall well received.

Continued on the next page.

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.

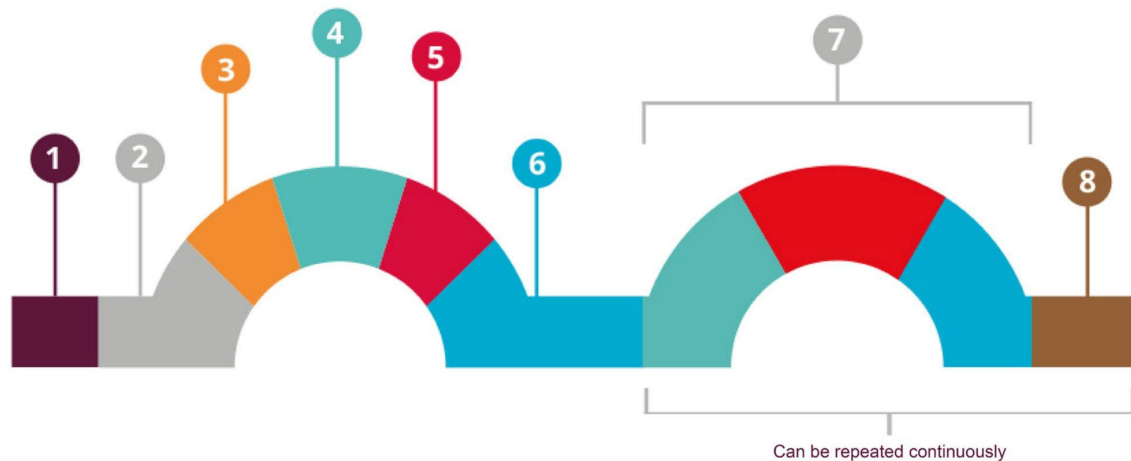


Figure 1: The Veterinary Clinical Audit Cycle by RCVS Knowledge. Available from www.rcvsknowledge.org. Developed by the Royal College of General Practitioners www.rcgp.org.uk/qi-ready

1. Choose a topic relevant to your practice

The topic should be amenable to measurement, commonly encountered and with room for improvement. Clinical audit was used to review the use of the dental X-ray machine, to ensure it was being used to its full potential.

2. Selection of criteria

Criteria should be easily understood and measured. All canine and feline patients undergoing general anaesthetic for dental procedures were included in the audit.

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. The target was set to 80% of patients having dental extractions to have dental X-rays taken and 100% of estimates produced for dental treatment, both with and without extractions, to include dental X-rays.

4. Collect data

Identify who needs to collect what data, in what form and how. Data was collected retrospectively over 3 months (1st June to 31st August 2021) from the practice management system (PMS) to identify all canine and feline patients that underwent general anaesthetic and dental treatment.

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. The initial audit of 63 patients to establish the baseline found that 35% of patients had estimates for dental X-rays, with X-rays performed in 32% of the total number of patients undergoing dental treatment. 76% of patients undergoing dental procedures also had extractions, but only 35% of these patients also received an X-ray. This equates to 65% of patients undergoing dental treatment and extractions had no X-rays performed.

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 the findings, carried out CPD for all team members, and agreed on and implemented changes to practice protocols to include dental grading scores, scheduling of procedures, client advice guidance, and the provision of estimates. New dental equipment was purchased, and the dental X-ray machine was relocated to aid ease of use.

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 repeat clinical audit of 83 patients was then carried out using retrospective data from 1st September – 30th November 2021. 67% of patients had estimates for dental X-rays, with X-rays performed in 49% of the total number of patients

undergoing dental treatment. 71% of patients undergoing dental procedures also had extractions, with 57% of these patients also receiving an X-ray – an increase of 22%. This equates to 45% of patients undergoing dental treatment and extractions had no X-rays performed – a decrease of 20%.

8. Review and reflect

Share your findings and compare your data with other relevant results. This can help to improve compliance. The findings from the complete audit cycle were fed back to the team and discussed at team meetings. Although the target of 80% of patients having dental extractions to have dental X-rays taken and 100% of owners provided with estimates were not met, improvements have been made and the team is looking to identify further areas for improvement.

References

1. Moore, J. and Niemiec, B. (2014) Evaluation of extraction sites for evidence of retained tooth roots and periapical pathology. *Journal of the American Animal Hospital Association*, 50 (2), pp. 77-82. <https://doi.org/10.5326/JAAHA-MS-5977>
2. Peralta, S., Verstraete, F.J.M. and Kass, P.H. (2010) Radiographic evaluation of the types of tooth resorption in dogs. *American Journal of Veterinary Research*, 71 (7), pp. 784-793. <https://doi.org/10.2460/ajvr.71.7.784>
3. Verstraete, F.J., Kass, P.H. and Terpak, C.H. (1998) Diagnostic value of full-mouth dental radiography in dogs. *American Journal of Veterinary Research*, 59 (6), pp. 686-691.



This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/). This information is provided for use for educational purposes. We do not warrant that the information we provide will meet animal health or medical requirements.

It is ok to: share, discuss and learn! You can share this resource and adapt the ideas/templates contained within it with your teams, colleagues, and organisations with credit to RCVS Knowledge and the case study author. You can share downloadable links on your socials and within internal networks.

It is not ok to: edit, change, or add to this resource, or claim it as your own. Although you are welcome to use it, adapt the ideas contained within the resource, and reference it, you should not copy and paste it in its entirety. You should always provide a link back to this online resource. You may not use it for commercial purposes, for example, charging for its use, providing it behind a paywall, or providing it as part of a paid-for subscription service.

You should reference this resource like this: RCVS Knowledge,. Filham Park Veterinary Clinic (2024). *Clinical Audit Case Example: Review of dental X-ray machine use*. [Online] Available at www.rcvsknowledge.org/KAQI-dental-x-ray-use/

Interested in submitting your own case example? Email us at ebvm@rcvsknowledge.org.