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Clinical Audit in Dentistry: Saudi Arabian Perspective

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Abstract

Clinical Audit (CA) is considered as one of the great tools of quality improvement in health care practice worldwide. Despite the fact that clinical audit concept has been implemented in several countries of the world, in Saudi Arabian context it is still not a well-performed practice. As such, many health professionals of Saudi Arabia including dental practitioners are still not aware of this concept though improving the quality of preventive and therapeutic health care services is one of the targets that has been set out by the National Transformation Program (NTP) based on 2030 vision of the Kingdom of Saudi Arabia (KSA). Hence, to improve the awareness, as well as, the knowledge of the positive implications and benefits of CA in practice, it is essential for dental professionals and other health practitioners to perceive the methodology of CA. In order to develop the quality of care and enhance evidence-based practice, activation of CA is of great importance. Hence, a clear view on the different stages in the implementation process of CA has been attempted to explain in this paper. Also, several study reports on the clinical audit in various dental specialities has been put forward in this review that may play an inspirational role for dental practitioners in grasping this procedure in providing a perfect dental health care.

Keywords: Clinical, Audit, Dentistry, Saudi Arabia.

INTRODUCTION

It has been demonstrated that best practices in health care can only benefit patients if the knowledge is converted into practice [1]. Studies confirmed that there has been a great variability in the care that patients receive in different regions or between different physicians, even within the same clinical institution due to difference in educational backgrounds, clinical experience and other factors [2, 3]. Moreover, it is claimed that [4] these variations in clinical knowledge and experience and in conjunction with lack of clear guidelines about the decision-making choices or the treatment modalities options; might result in discrepancies in the care received which generate low quality of treatment.

It is also evident [5, 6] that suboptimal clinical practices are observed for almost every type of patient problem, from primary prevention to trauma care, from investigations to prescribing. This inconsistency may turn ends into some legal complications as stated by Ramugade and Sagale [7].

To improve the quality of health care various efforts, such as, continuous education and training, enhance communication, management, and leadership skills, evolution in materials and technologies, as well as, shared decision making had been made. Apart from these methods, Clinical Audit (CA) is considered one of the most well-known means to improve health quality care [8, 9].

Although CA is considered as an important tools in health care quality improvement practice worldwide still it is not yet practiced in many countries. As such, many health practitioners of Saudi Arabia are also not aware of this concept. Thus, a clear view on the different stages in the implementation process of CA may broaden the insight of the health practitioners to implement a successful CA in practice.

Basic Concept of Clinical Audit

Clinical Audit (CA) is regarded as an effective tool for achieving the goal of improving quality of life and reducing mortality and morbidity rates [10]. Clinical audit is a tool that measures the quality of care

and services against agreed standards and making improvements where necessary [11]. In an audit, clear criteria are set for particular elements of the structure, process and outcome of care, and these elements are assessed in a certain practice or setting against the set criteria [12, 13].

CA has been defined as a quality improvement process that seeks to improve patient care and outcomes through systematic review of care against explicit criteria and the review of change. Clinical audit approach is utilized to find out how well clinical care is being maintained and to ascertain if there are opportunities for improvement, where the practices fall short of the criteria. A CA, however, is not the same as, for example, an organizational or financial audit [14]. The clinical audit which was known as medical audits in the past took place predominantly in the USA and in the UK from the 1970s onwards [11]. Clinical audits are extensively used in the USA under the term chart audit. In France, the clinical audit is compulsory for doctors [15], practised extensively across Europe, and established a practice in Commonwealth countries particularly Australia, and then spread around the world to a greater or lesser degree[11, 16].

Several reports [17, 18] have stated that clinicians feel benefited from audits through enrichments in communication amongst professional groups, boosted professional satisfaction and knowledge, and increased staff enthusiasm. Moreover, CAs have brought many advantages in improvements in patient care quality, improved patient satisfaction, and involving the patients in decision making [19, 20].

Stages of Developing Successful Clinical Audit (CA):

For a successful clinical audit, a cycle of five stages have been demonstrated (Fig. 1).

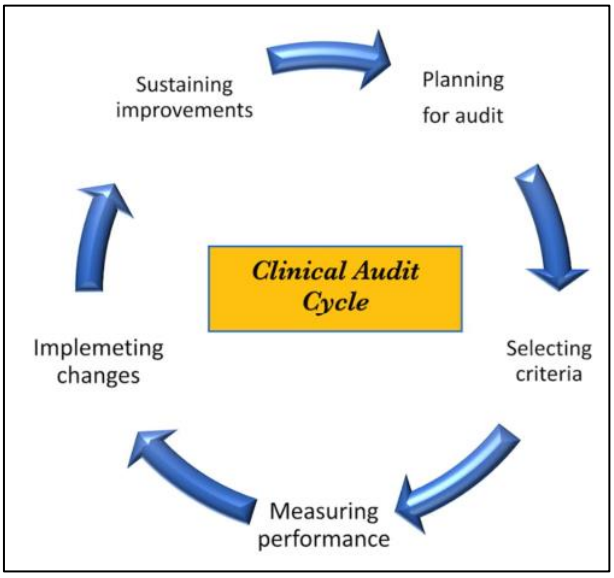

Fig. 1: Clinical audit cycle with stages

Stage One: Planning for Audit

It can be argued that to get it right and to do well in any CA project it is needed to carry out the preparation and planning stage in an effective manner. Successful planning and preparation are crucial to the success of an audit project outcome that is capable of identifying areas of excellence or areas for improvement. However, the amount of time that is needed for planning and preparation varies based on the individual circumstances of each audit. Practically, this stage can be broken down into three elements:

- Stakeholder engagement.
- Choosing audit topic.
- Planning the delivery of audit fieldwork.

Stakeholder Engagement

Large-scale engagement is the most effective way to ensure extensive change in the organization [21]. It is a complex process, which encompasses the need for connection with the emotional, cognitive, and behavioral styles of all stakeholders [22]. These days, engaging with stakeholders within an organization is not a choice, and it should be systematic, logical, and practical. Therefore, judgement must be built about how this engagement will be approached [23, 24]. Stakeholder engagement means that organizations are capable of reassuring stakeholders that they can tackle any concerns that may have developed, and sometimes such engagement is critical for problem-solving. Consequently, the expense required for developing and saving stakeholders' knowledge in terms of money, time, and effort is justifiable [1] . It was mentioned [24] that stakeholders should be engaged from outset of the CA cycle until its completion. They should be consulted on the scope, design, and presentation of the results and other processes during CA. They ought to be actively involved in developing the review criteria and establishing action plans for change [11]. According to

Deegan and Parkin [25], there are two different levels of stakeholder engagement; the first is a manner of "information giving and consultation" for fostering the knowledge of stakeholders around a project, and the second involves a higher level of engagement contribution that lowers the resistance of stakeholders to the project. For example, commitment to the CA procedure ought to be obtained from those with the power to endorse changes arising from audit recommendations, specifically if they have potential resource effects in other service areas [26]. Therefore, all relevant stakeholders, including clinical or support staff, users and managers should be given the opportunity to contribute to the CA and each of them must know his/her role in the CA program . Establishing clear, effective, two-way communication channels with them, including those who are not yet able to participate, is a must in order to amplify the influence of the audit on improving patient care [27].

Choosing Audit Topic

This step is very important and must be given cautious consideration. As well as national priorities, topics will be determined by both the clinical priorities and requirements of the organization's senior management team [8]. Every health care organization, however large or small, will have its own priorities for audits, and these will usually be discussed and selected by a committee, group, or team with a remit for managing a CA program. Topics may be given priority because of a demand for public accountability or because of a specific event. Therefore, when designing an audit program, a balance is needed between the local audit and audits that are driven by national initiatives [28]. This reveals that the organization is mindful and responsive to the needs of its local population, utilising information such as public health statistics to focus priorities on the areas of greatest need. It also shows that the organization is aware of the national quality agenda and how this affects its own local population; thus, a scoring system can be utilized to prioritize themes in order of importance [29]. Crucially, topic choice should always involve looking at one's own practice. If this is neglected it will not only lead to the audit being seen as a divisive, threatening process, but also it is doubtful that it will cause any change or improve patient care, because those who have gathered and presented the audit data will have no power or support to implement any changes. CA should be about raising morale and job motivation, higher quality individual performance and team coherence, not about ruining these values [11, 21].

Planning the Delivery of Audit Fieldwork

Throughout the planning stage of an audit, it is vital to consider the mechanisms for project management. Audit methodology, including the aims and objectives, criteria and target levels of performance, data requirements, data collection tool, and agreed terms, should all be acknowledged and documented [27].

Once the CA topic has been approved, the reasons for the project have to be explicit. A project without obvious purposes can not attain anything: a clear sense of purpose must be established beforehand so that proper methods for the audit can be considered. Moreover, everyone in team audits ought to ensure that each one of them is working to a common purpose and so a suitable audit process can be selected [30]. A discussion of the problem that highlighted the need for the audit in the first place is valuable to confirm clarity of purpose. Moreover, the aims and the title of the audit must be specific to avoid any ambiguity or misinterpretation [11]. Regarding instituting the audit project team, in order to be successful, a CA project needs to incorporate the right people with the right skills from the beginning [11]. It is also critical that the team includes members from all the relevant groups involved in care delivery, and not just those with clinical experience. All CA team members should have a basic understanding of the CA process, and commitment to the plans and objectives of the project with flawless awareness and perception of what is expected of the project team [11, 31]. Therefore, identifying the skills needed and managing the key people should be prioritized. Definite skills have been stated [11] that are required for all audit projects. These include the following:

- Project organization, project leadership, and project management.
- Clinical, managerial and other service input and leadership.
- Expertise in CA methodology.
- Data collection and analysis skills.
- Change management skills.
- Facilitation skills.

However, in order to have a successful CA project, barriers and obstacles to the CA should be expressed from the outset and profound discussion with the relevant stakeholders is mandatory to put into place some effective measures, otherwise the success of the project will be jeopardized. At the planning stage, it is crucial to draw up and follow an audit timescale, determine the scope of the project and the inclusion and exclusion criteria for the target population to avoid any time, energy or resource wasting [28].

Stage Two: Standard and Criteria Selection

Developing Valid Criteria

After setting up the specific title and the aims, developing appropriate audit criteria is the next step. It is all too easy to include numerous criteria in the belief that this will offer greater potential for change and improvement. However, over-ambitious projects tend to lose momentum over time because they expect too much of those involved, and are complex to interpret. It

is also difficult to identify where changes should be made [28]. On the other hand, audits that are more selective in their chosen criteria provide a better focus on specific aspects of care. They also tend to lend themselves to greater potential for change, because they are realistic in their expectations of those involved and they pinpoint where change is needed. Compliance with an audit is more likely to occur where there are attempts at selectively [31].

The terms 'standard' and 'criterion' frequently cause confusion since these terms have been used differently by numerous authors and professional groups across health care. For some, a standard is the performance level or target for predictable compliance (typically expressed as a percentage). For others, a standard is a statement of best practice. Therefore, the audit team must be agreed on the definitions of the terms from the beginning, otherwise misinterpretation and possible weaknesses in the phrasing of those aspect of care that are going to be measured in the audit are likely to occur [28].

The Quality & Patient Safety Directorate [29] states that for criteria to be valid and to lead to improvements in service user care, they should be consistent with SMART guidance:

- Specific (explicit statements, not open to interpretation).
- Measurable.
- Achievable (of a level of acceptable performance agreed with stakeholders).
- Relevant (related to important aspects of care).
- Theoretically sound or timely (evidence-based).

Criteria Types

Donabedian [32] states that it is useful to consider audit criteria in terms of structure (what you need), process (what you do) and outcome (what you expect to happen as a result).

Structure Criteria

Refer to the resources that are needed and the physical attributes that are required. They might involve the provision of equipment and physical space, organizational arrangements, number of staff and skills mix. Though structure criteria do not always directly relate to the care given to patients, they usually provide a sign of how well resourced a team or department is so as to operate effectively and support the care given. An example of a structure criterion, taken from the code of the UK's regulatory body of nursing, the Nursing and Midwifery Council (NMC), is given below: "attribute any entries you make in any paper or electronic records to yourself, making sure they are clearly written, dated and timed, and do not include unnecessary abbreviations, jargon or speculation" [33].

Process Criteria

CAs nearly always measure process criteria more than the other measures, because they focus directly on the actions and decisions taken by practitioners, together with users. These actions could embrace assessment, investigations, communication, education, prescribing, surgical and other therapeutic interventions, evaluation, and documentation. However, the significance of process criteria is determined by the degree to which they impact outcomes. The process that is being audited must have been evidenced to be valuable in the impact that it will have on the health care outcomes that the patient experiences as a result. An example of that taken from the Hypertension Audit is as follows: "The records show that the patient has been given advice about dietary salt restriction at least annually" [34].

Outcome Criteria

Outcome criteria are usually concerned with the physical or behavioral responses to an intervention such as reporting health status or the level of knowledge and satisfaction. These refer to aspects of care that are closely associated with eventual outcomes, but are more simply measured. An example of such a criterion for the diabetes audit is: "Patient's systolic blood pressure is less than 130mmHg and diastolic blood pressure is less than 80mmHg" [34].

Some audits, especially the national ones, focus particularly on outcomes and do not contain formal criteria, but instead collect information regarding the outcomes of care. This is technically acceptable when outcomes occur shortly after the delivery of care and are easily measurable. If the outcomes are also of major importance to service users, for example, postoperative complications, the direct assessment of outcomes is not only applicable but also predictable. Nevertheless, audits using outcome measures alone sometimes provide inadequate information for devising an action plan that aims to improve practice.

In this context, it is worth mentioning the difference between CA outcomes and health care outcomes. As the prime drive of the audit is to improve compliance with recommended standards and criteria in the delivery of health care through re-audit cycles and the report process, this defines the outcome of CAs. On the other hand, health care outcomes are traditionally defined as an improvement in mortality or morbidity rates. Long-term CA outcomes may result in significant CA impact, which is defined here as the subsequent results and overall effects that arise from changes to clinical practice and systems identified by CA. These results can include financial savings, efficiencies and possible health gains for patients [35].

Sources of CA Criteria

Research suggests that audit criteria are not always based on research evidence [36]. Where possible, audit criteria should be retrieved from the best evidence available, as this will offer objective and obvious statements about what should be done for patients in definite topic areas. For the majority of CA topics today, it is likely that this guidance will be readily available and often in routine use. For example, in the UK, the NICE development of good-quality guidelines depends on careful review of the relevant research evidence, therefore the criteria suggested in such guidelines are likely to be valid. Other organizations produce specific guidelines for their practice such as the British Thoracic Society (BTS) (for asthma), or the Scottish Intercollegiate Guidelines Network (SIGN), which covers a range of topics. In the case of a lack of national or local guidelines, a literature search of certain journals or good-quality systematic reviews can be done to detect the best and the most up-to-data evidence, which can be used to create audit criteria. Shaw and Baker [37] suggested that criteria should be prioritized into 'should do' or 'must do' based on the robustness of the research evidence and its outcome impact.

These days, there are increasing opportunities for working collaboratively with service users when writing appropriate and relevant audit criteria in order to establish the users' experience of the service and the main features of care from their perspective. This collaboration makes the CA holistic and it might be done in several ways: the critical incident technique [38]; focus groups [39]; consumer audits [40]; direct observation of care [41]; direct conversations [28]; and satisfaction surveys [27]. Once the preferences of users have been acknowledged, they must be integrated into the criteria.

Selecting and Developing Appropriate Performance Levels

Performance is usually expressed in the form of percentages to represent the proportion of patients or occasions that must fulfil each criterion. It is typically established that a performance level or target should be assigned to each audit criterion [28]. Certainly, failure to do this can lead to lost opportunities for improvement, even though practice seems to be good. However, the precise level at which performance levels should be set is not always obvious. Therefore, open discussion with the audit team members and relevant stakeholders is desirable in order to approve the most appropriate performance at the outset of the audits [31, 42]. The team is motivated by having explicit targets to aim for. Such targets also help the team to focus on gauging where the current performance level lies. However, the performance level must be reviewed in the re-audit cycles. For example, if after collecting the data, analysing the results and implementing the changes, the re-audit shows that some performance levels still have not been reached, it may be appropriate to review this. In such a situation it is helpful for the audit team to be able to compare their performance with that of others who may have undertaken a similar audit [11, 28, 29]. In the ideal world, performance levels would always be set at 100%, but in health care practice, this is not always a realistic goal. The point at which performance levels are set for each criterion will depend on three key factors, such as, Clinical importance, Practicability, and Acceptability as described by Crombie [42] as follows:

- ***Clinical Importance:*** If the criterion is critical to the safety of patients or life-threatening, performance level must be set at 100%, otherwise the targets should be realistic and achievable.
- ***Practicability:*** The resources and the environment may limit the performance level to some degree. For example, the time and energy spent on achieving 100% on some aspects of care and service provision will certainly be at the expense of other aspects, unless it is of critical importance that 100% be achieved.
- ***Acceptability:*** Both those who deliver the care and those who receive it should feel that the performance level is sensible and achievable. An unrealistically high target will not foster motivation, enthusiasm or support among hardworking health professionals who feel that the expectations of the audit are too high. Equally, a target that is set too low may be received with scepticism on the part of those who are given responsibility for that aspect of care, and the motivation to achieve more may be low.

Stage Three: Measuring Performance

This stage includes three key steps, such as, Data collection, Data analysis, and Presentation of results.

Data Collection

The overall objective of CA is to enhance the quality of care and outcomes by assessing current practice against best practice. Once the standards against which the audit will be conducted are known, the subsequent step in the audit process is the gathering of relevant information regarding current practice so as to ease comparison.

It is necessary that data collected in the course of any CA is accurate and relevant to the audit being executed [29]. Before data collection is initiated, a structured approach ought to be taken to identify any relevant data and to make sure that the data collection process is effective, efficient and accurate. Therefore, some questions need to be answered before starting data collection (shown in Fig. 2). In order to define whether or not performance levels have been reached, we need quantitative data (numerical data) to be counted. However, a data collection strategy may include a qualitative element which often provides notions for

improvement in health care that can be investigated further. All data collected must be pertinent to the aims and objectives of the audit. In the same way, each data item should be appropriate and necessary for the purpose of measuring practice against the relevant audit criteria [10, 42]. Therefore, the collection of unnecessary data which provides little or no benefit is more time consuming and the impact of the audit may be diminished because the focus is lost [29, 43]. Therefore, wherever possible, data collection should remain focused and linked directly to the audit standards.

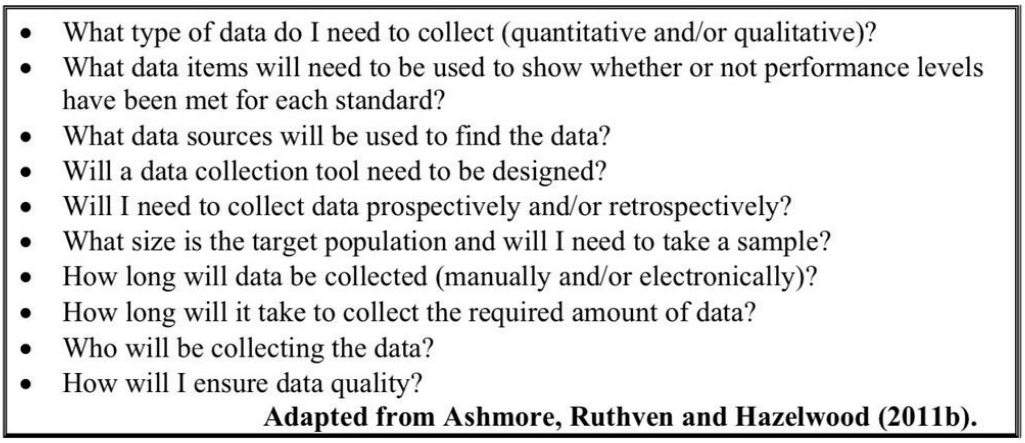

Fig. 2: Questions regarding data collection process

The audit team should specify and approve the source of data. The choice of which source to use will depend on various factors, including accessibility, accuracy and completeness. However, such records may be deficient. Thus, data collection from numerous sources may overcome this problem [43].

Data for audits are generally collected retrospectively for example, in the previous six months. The main advantages of this method are firstly that the data are gathered relatively quickly and secondly it reflects real practice during the time period of the audit. However, common disadvantages are that there is a possibility of the data being incomplete, inaccurate or out of date [43]. Therefore, concurrent data (prospective) can be an alternative. Prospective data looks forward, so a specific data capture tool has to be designed to gather data as the care is given. It provides feedback on current performance and can act as positive reinforcement to enhance or maintain practice. However, there is a potential for bias since some health care professionals may change their behavior to that which they know they should be performing when they realize that they are being monitored or audited [27].

As part of the collection of data, the audit team should be able to define the target population clearly and precisely so that the correct figure and sample size are obtained. This requires the identification of all inclusion as well as all exclusion cases [31, 43]. For example, those auditing the postoperative complications after Root Canal Treatment (RCT) in patients for a defined time period, roughly 3 or 6 months, need to determine the patient flow and their characteristics as they link with the audit inclusion and exclusion criteria. Then they can calculate the sample size since it is not practical or feasible to include every service user in the selected audit. If the sample is too small, there is a risk that the conclusions drawn will be based on unreliable information that does not present the true representation of care. If the sample is too large, audit motivation and the time saving benefits are lost. It is important to consult a statistician to help with calculating the sample size since there are various methods that can be used to determine it. Once the sample size has been established, it is necessary to decide how the records will be selected from the target population. Usually it would be necessary to search records from a defined time period (e.g. within the last year or at least 3 months), since users do not form a stationary population, and the users that structure the population may change during the audit [43].

Data Analysis

The basic goal of data analysis is to convert a collection of data into valuable information in order to detect the level of compliance with the agreed standard. As with collection data, analysis should be tightly connected to the audit drivers and purpose so that the results emphasise what is planned for, and if anything needs to be modified in order to achieve that audit's aims [44, 45]. The data should be organized into a format that lends itself to accurate analysis and correct interpretation [43]. The type of analysis that should be used must be acknowledged at an initial step, because it influences both the type and amount of data collected. The analysis can vary from a simple calculation of percentages, through to fairly sophisticated statistical methods. For example, if samples have been taken, the most appropriate calculation to perform is confidence

intervals [46].Typically, however, simple techniques are desirable, and indeed, if the outcomes are to inspire change, the analysis must be straightforward enough for everybody in the care process to understand it [47]. If necessary, anything that looks odd or that stands out as different can be verified by referring back to the completed data collection forms or patient records.

Presentation of Results

Just as the analysis should be as easy as possible, the findings should also be presented simply and clearly to support understanding and induce open discussion among all relevant stakeholders. The important question to consider when preparing the results for presentation is who the target audience will be. Most probably, a broad mix of stakeholders will be interested in the results, which therefore need to be presented clearly and effectively to communicate the key points to the audience and thus facilitate discussion. The aim is to maximize the influence of the audit to encourage and support action planning. Ashmore *et al.*, [43] stated that various presentation methods may be utilized to certify that the results are delivered in a timely manner to all stakeholders. These methods include:

- Visual presentations, for example, posters, which are a useful way of reaching as many stakeholders as possible. Data can also be presented visually using tables, charts and graphs in both written and verbal presentations (for example, through using presentation software like Microsoft PowerPoint).
- Written reports for submission to the relevant clinical lead, directorate or governance committee.
- Verbal presentations at relevant meetings.

Stage Four: Implementing Changes

An audit that merely measures but does not stimulate change to deal with issues that have already been identified, is not a good audit. All good audit projects must comprise a program of change activity and post-identification of the audit findings, to confirm that essential changes happen [48]. An audit can be threating because of its potential to reveal deficiencies in health care services. Therefore, clinicians can have strong and opposing reactions to them. Some may welcome them enthusiastically, while others may feel threatened and avoid involvement. Clinicians may fear that the results will portray previous patient care as inadequate, and thus undermine their professional reputation[42]. Yet maintaining and enhancing this reputation is central to work motivation. Therefore, for a change to be successful, the people involved must realize why a change is compulsory and feel empowered to collaborate in the decisions about how the change should be applied [49]. Early reassurance may encourage participation and prevent later withdrawal. This will be promoted if the participants feel valued and realize that they will not be judged or criticized [42]. Before introducing any form of change, whether it is within a solo clinical team or involves the whole organization, it is necessary to recognise any challenges or potential barriers, so that they can be planned for and, wherever possible, avoided.

According to Lewin's theory [50], "successful change has been characterized as unfreezing old behaviors, introducing new ones, and re-freezing them". Change is all about people, either as part of an organization or as individuals. Therefore, change may be difficult to achieve because of people's reluctance to leave what is perceived to be a "comfort zone"[51].

The CA team ought to interpret and review the audit findings in order to make the areas that require action clear and definite, so as to improve the quality of clinical care and its outcomes. Once an audit has revealed that there are serious issues with the practice of an individual, these should be conveyed directly as soon as possible to the audit funder, who should inform the service manager for urgent action [29]. Transformation is often the most challenging element of the audit. When the audit team have developed the recommendations, decisions should be built on how changes can be presented and monitored. Results should be utilized in combination with feedback and local agreement to change clinical practice and to improve standards. Since there might not be a plan against every standard, priorities for action must be known and these should be clearly documented; for example, through risk assessment to identify the areas of highest risk. All audits ought to result in a quality improvement plan (QIP) in order to accomplish the required improvements in practice [45].

Quality improvement plans can be devised to tackle those areas requiring perfection. It is essential that improvement duties or actions emphasised in the QIP relate to local and national priorities or targets and the provider of the service has the necessary resources. QIPs should similarly be unified into the current management system of the service provider to monitor implementation [29]. Quality improvement plans should be time restricted with obvious milestones and objectives, as well as robust recommendations. The members of staff who should implement the necessary tasks and actions should be clearly allocated from the authority for the change to be effective [29]. Sometimes, QIPs and related actions or duties are beyond the scope of individuals. In such cases, the support and backup of the service is crucial to the success of the audit. Therefore, the audit committee should be in charge of escalating those high and very high risks up the line for probable inclusion in higher level risk registers, for example, hospital, regional or national risk registers [29].

Stage Five: Sustaining Improvements

Although enhancing practice performance is the prime goal of audits, sustaining that improvement is also crucial. Certainly, any systematic approach to changing professional practice should include plans to:

- Monitor and evaluating changes.
- Maintaining and reinforcing improvements (NHS Centre For Reviews and Dissemination, 1999) [52].

Monitoring and Evaluating Changes

To assess and maintain the improvements made during CA, after changes have been introduced, collecting data for a second time is central [53]. The classic audit cycle frequently involves collecting relatively large amounts of data over a long period after changes are initiated. Although this approach, if properly applied, offers good information about performance, it can make the process of change slow. Rapid-cycle data collection may also be a good alternative to the old method, in which only extremely critical data are collected from small samples. PDSA cycles (plan, do, study, act) (Institute for Healthcare Improvement, 2013) [54] are an example of such a rapid cycle, when testing change ideas on a small scale, generally on a small number of clinicians and service user samples, before introducing the change to other clinics or user groups. For some audits, two data collections will not be sufficient to provide assurance that improvements to the level required have been achieved. This will be either because performance levels were not reached upon re-audit for some or all of the standards, or because they were reached but it was agreed that they should be increased further in the light of new information [53]. Therefore, a small number of key performance indicators may be generated for each quality improvement program to monitor the implementation of the action plan. Once the audit team is satisfied with the performance levels that have been attained, ongoing monitoring arrangements will be set in place, for example, yearly or 6 month-checks are preferred to ensure that the improvement is maintained. To facilitate this, a traffic light system (red, amber and green) can be used to monitor implementation status. This system can also be used in the long term to measure the impact of change on practice [29]. Moreover, adverse incidents, errors and significant event audits can also be used for sustained checking, alongside the comments retrieved from the service users, which might be included as information sources about performance [27, 55].

Maintaining and Reinforcing Improvement

Keeping and supporting improvement over time is not an easy-going process. In UK projects in which improvements have been sustained, some common features have been identified [56], including: Supporting or encouraging elements built in by the management to backing the continual cycle of quality improvement, Amalgamation of an audit into the quality improvement systems of the organization, and Strong and durable leadership.

Ashmore *et al.*, [53] outlined a number of practical ways in which improvements can be maintained and reinforced successfully over time, summarized below:

1. **Meeting Agenda:** Including completed audit follow-up as a standing agenda item provides an opportunity for clinical staff and other stakeholders to raise any issues that may come to light after the completion of an audit.
2. **CA Showcase:** Running an event once or twice a year for teams to showcase and share their audit work can be an effective way to publicise audits and promote their benefits.
3. **Leading by Example:** Clinical and administrative managers and leaders must remind and motivate the staff regularly to adhere to the new processes that were agreed as a result of the audit work.
4. **Induction of New Staff:** New employees should be inducted into the new processes. There is a risk that old systems and processes may be followed if updated protocols are not visible.
5. **Making Changes Visible:** Following on from the previous point, it is critical that changes to policies, protocols and records are visible.
6. **User Friendly System and Processes:** A further point to ensure is that the changes are implemented in a usable way that fits in with normal practice and everyday procedures and processes.
7. **Trial and Error:** In healthy and supportive environments, staff should be able to report any errors, or suggest any adjustment or alterations to the change so that quality does not suffer.
8. **Supportive and Dynamic Culture:** Organizations that stimulate a culture of including change and new ideas, and which support the staff in these endeavors, are best placed to obtain the maximum benefit from audits.

Clinical Audit in Saudi Arabian Dental Practice:

Though clinical audit in Saudi Arabian dental practice is not frequently reported, several documentations in this field are noticed in previous years and beyond. Literature review reveals that clinical audit in several specialities in dentistry, such as, endodontics, dental infection control, intraoral radiography, and orthognathic surgery had been performed so far which is encouraging in implementation of dental audit practice in Saudi Arabia.

It was reported [57] that a retrospective audit was carried out to evaluate the technical quality of root canal obturations performed by the undergraduate

students of Qassim University, Saudi Arabia between 2018 and 2020 using standardised criteria based on obturation length, density and taper. In this audit the technical quality of majority of the cases were found to be acceptable. However, among the evaluated parameters of obturation quality, length control was found to be as the most frequent deficiency that suggests to take necessary measures to improve the quality of obturation length.

Another report [58] reveals that a two-stage endodontic audit was carried out at a dental specialty center in Saudi Arabia where the initial audit was conducted in November 2017 examining a total of 12-months data from the previous records using four criteria, such as, standard of X-ray images engaged during endodontic treatment, radiographically evaluated standard of root canal filling, clinical audits and unfavorable events. This study has explored the gaps in the services delivered in endodontic treatment through clinical audit concluding that the similar audit is needed in endodontic departments to determine the change in the practice over a period of time and its impact on the clinical endodontic outcomes.

It was documented [59] that aiming to assess the adherence to infection control guidelines by the dental students of Umm Al-Qura University, Saudi Arabia, a clinical audit was performed by collecting data from the past 4 years' checklists evaluated by infection control team to recognize the most common violations in infection control, and thus to improve infection control practice in the clinics in the future. In this study, checklists item, total category, and overall adherence percentages were calculated based on recorded observations. Using generalized estimating equations with the identity logit and an autoregressive correlation matrix the difference in adherence and violations in infection control practice was assessed that resulted in the fact that overall adherence to all checklist categories for infection control practice was high except for 10–45% got out of the cubicle with used gloves and 15–60% not probably wore mask outside the cubicle. Further, it was observed in the study that overall violations among females were significantly lower than males, while the violation was lower among 4th grade students compared to 6th graders. This study concludes that to make corrective actions among students violating infection control policies, the continuous monitoring through clinical audits together with educational programs and counseling is of great importance.

Report [60] shows that a quality assurance audit on digital intraoral periapical radiographs was undertaken at the undergraduate dental clinics at Qassim University College of Dentistry, Saudi Arabia. In this study, clinical audit was conducted by two evaluators based on 506 intraoral periapical radiographs taken by dental students graded according to the standards set by Health Protection Agency. The documentation of errors, such as, coning off, foreshortening/elongation, contact overlap, poor contrast, and image blurring was done in addition to the grading of radiographs. As evaluated by the quality assurance audit, the radiographs were found below the standard set by the Health Protection Agency. Hence, improvement measures in the radiology department was recommended, and re-audit was planned after one year.

It was shown in another report [61] that a retrospective study on a surgical audit of all the orthognathic surgery cases were carried out at King Khalid University Hospital, Saudi Arabia during the period between 1/1/1410 and 1/1/1414. In this study, data was collected using audit proforma from both the patients' records and operation room's record. The audit reveals that orthognathic surgery in this hospital was followed by slightly lesser percentages of trauma and transalveolar surgery that led the investigators to investigate this category of surgical cases in more depth.

However, in most of the publications on dental audit in Saudi Arabian perspective it was noticed that the procedural details of clinical audit, particularly the audit cycle with stages has not been elaborated, rather the cross sectional study towards a comparison between the retrospective and post-procedural audit was illustrated by the identification of deficiency or improvement of the clinical process along with suggested recommendations if applicable.

CONCLUSION

It is a matter of concern that many health care professionals including dental practitioners in Saudi Arabia are not aware of clinical audit in their practice. It is crucial for the dental practitioners to have an insight on the basic concept and application of clinical audit as well as its method of implementation in order to develop quality of care in evidence-based dental practice.

REFERENCES

1. Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implementation Science: IS*, *4*(1), 50.
2. Çiçek, E., Özsezer-Demiryürek, E., Özerol-Keskin, N. B., & Murat, N. (2016). Comparison of treatment choices among endodontists, postgraduate students, undergraduate students and general dentists for endodontically treated teeth. *International Dental Journal*, 66(4), 201–207.
3. Savani, G. M., Sabbah, W., Sedgley, C. M., & Whitten, B. (2014). Current trends in endodontic treatment by general dental practitioners: report of

a United States national survey. *Journal of Endodontics*, 40(5), 618–624.
4. Taha, N. A., Albashaireh, Z. S., & Alfied, R. G. (2019). Endodontic decision making for asymptomatic root-filled teeth with apical periodontitis - A radiographic survey. *Australian Endodontic Journal: The Journal of the Australian Society of Endodontology Inc*, 45(1), 40–45.
5. Dickinson, A., Peacock, K., Fair, N., Thomas, M., Nicol, R., Mikkelsen, J., ... & Johnstone, L. (2009). The implementation and evaluation of an oral healthcare best practice guideline in a paediatric hospital. *International Journal of Evidence-Based Healthcare*, *7*(1), 34-42.
6. Schwendicke, F., Doméjean, S., Ricketts, D., & Peters, M. (2015). Managing caries: the need to close the gap between the evidence base and current practice. *British Dental Journal*, 219(9), 433–438.
7. Ramugade, M., & Sagale, A. (2018). A review of medicolegal considerations of endodontic practice for general dental practitioners. *Journal of International Society of Preventive & Community Dentistry*, 8(4), 283.
8. Ashley, M. P., Pemberton, M. N., Saksena, A., Shaw, A., & Dickson, S. (2014). Improving patient safety in a UK dental hospital: long-term use of clinical audit. *British Dental Journal*, 217(7), 369–373.
9. Pozo-Rodríguez, F., Castro-Acosta, A. A., & Álvarez-Martínez, C. J. (2015). Clinical audit: Why, where and how? *Archivos de Bronconeumologia*, 51(10), 479–480.
10. Frostick, S. P., Radford, P. J., & Wallace, W. A. (1993). Medical audit : rationale and practicalities. *Cambridge University Press.*
11. Burgess, R. (2011). New principles of best practice in clinical audit. Radcliffe Medical Press.
12. Lokuarachchi, S. (2006). Clinical Audit-What is it and how to do it? *Galle Medical Journal*, 11(1), 41–43.
13. Naveen, A., Vemanna, S., Shankar, N., & Praveena, V. (2011). Basics in research methodology - The clinical audit. *Journal of Clinical and Diagnostic Research*, 5(3), 679–682.
14. Academy of medical Royal colleges. (2014). Appraisal for revalidation: a guide to the process. Retrieved 2018; Oct 31.
15. Chevreul, K., Berg Brigham, K., Durand-Zaleski, I., & Hernandez-Quevedo, C. (2015). France: Health system review. *Health Systems in Transition*, 17(3), 1–218, xvii.
16. Graham, W. J. (2009). Criterion-based clinical audit in obstetrics: bridging the quality gap? *Best Practice and Research in Clinical Obstetrics and Gynaecology*, 23(3), 375–88.
17. Johnston, G., Crombie, I. K., Davies, H. T., Alder, E. M., & Millard, A. (2000). Reviewing audit: barriers and facilitating factors for effective clinical audit. *Quality in Health Care: QHC*, 9(1), 23–36.
18. Willmot, M., & Foster, J. (1995). Evaluating Audit: A Review of Audit Activity in the Nursing and Therapy Professions: Findings of a National Survey. *BMJ Publishing Group*.
19. National Audit Office. (1994). Auditing clinical care in Scotland. London.
20. Penney, G. C., & Templeton, A. (1995). Impact of a national audit project on gynaecologists in Scotland. *Quality in Health Care: QHC*, 4(1), 37–39.
21. Davies, H., Powell, A., & Rushmer, R. (2007). Healthcare professionals' views on clinician engagement in quality improvement. A Literature Review. London: The Health Foundation.
22. West, M., & Dawson, J. (2012). Employee engagement and NHS performance. *The King's Fund.*
23. Jeffrey, N. (2009). Stakeholder Engagement: A Road Map to Meaningful Engagement: # 2 in the Doughty Centre 'How to do Corporate Responsibility' Series.
24. Freeman, R. E., (2010). Strategic management: A stakeholder approach. Boston: Pitman.
25. Deegan, B., & Parkin, J. (2011). Planning cycling networks: human factors and design processes. *Proceedings of the Institution of Civil Engineers - Engineering Sustainability*, 164(1), 85–93.
26. Walsh, K., Deakin, N., Smith, P., Spurgeon, P., & Thomas, N. (1997). Contracting for change: Contracts in health, social care, and other local government services. *Oxford University Press.*
27. National Institute for Clinical Excellence. (2002). Principles for Best Practice in Clinical Audit. Radcliffe Medical Press Ltd.
28. Ashmore, S., Ruthven, T., & Hazelwood, L. (2011). Stage 1: Preparation, planning and organization of clinical audit (R. Burgess, Ed.). Radcliffe Medical Press.
29. Quality & Patient Safety Directorate. (2013). A Practical Guide to Clinical Audit.
30. Buttery, Y., Walshe, K., Rumsey, M., Amess, M., Bennett, J., & Coles, J. (1995). Provider audit in England: A review of twenty-nine programs.
31. Copeland, G. (2005). A practical handbook for clinical audit. Clinical Governance Support Team NHS.
32. Donabedian, A. (1966). Evaluating the quality of medical care. *The Milbank Memorial Fund Quarterly*, 44(3), Suppl, 166-206.
33. The Code Professional standards of practice and behavior for nurses, midwives and nursing associates. (2015).
34. Clinical Audit - Examples on Diabetes and Hypertension Audit Making Use of the Reference Frameworks. (2015). Primary Care Office.
35. Loughlan, C. (2011). Appendix 2: Clinical audit (R. Burgess, Ed.). Radcliffe Medical Press.,
36. Hearnshaw, H., Harker, R., Cheater, F., Baker, R., & Grimshaw, G. (2002). A study of the methods used to select review criteria for clinical audit.

Health Technology Assessment (Winchester, England), 6(1), 1–78.
37. Shaw, E., & Baker, R. (2001). Audit protocol: benzodiazepine prescribing in primary care. *The Journal of Clinical Governance*, 9(1), 45–50.
38. Powell, J., Lovelock, R., Bray, J., & Philp, I. (1994). Involving consumers in assessing service quality: benefits of using a qualitative approach. *Quality in Health Care: QHC*, 3(4), 199–202.
39. Ford, C., Kelson, M., & Rigge, M. (1998). Stroke rehabilitation : patient and carer views, a report from the Intercollegiate Working Party for Stroke.
40. Fitzpatrick, R., & Boulton, M. (1994). Qualitative methods for assessing health care. *Quality in Health Care: QHC*, 3(2), 107–113.
41. Balogh, R., Simpson, A., & Bond, S. (1995). Involving clients in clinical audits of mental health services. *International Journal for Quality in Health Care*, 7(4), 343–353.
42. Crombie, I. K. (1993). The Audit Handbook: Improving Health Care through Clinical Audit. *John Wiley & Sons.*
43. Ashmore, S., Ruthven, T., & Hazelwood, L. (2020). Stage 2: Measuring performance. In New Principles of Best Practice in Clinical Audit (pp. 59–79). CRC Press.
44. Ashmore, S., & Ruthven, T. (2008). Clinical audit: a guide: All nurses are expected to take part in clinical audits. Stephen Ashmore and Tracy Ruthven explain how it should be done. *Nursing Management (Harrow)*, 15(1), 18–22.
45. Schofield, J., & Jenkins, J. (2012). How to Implement Local Changes from National Clinical Audit a guide for audit professionals in healthcare organizations.
46. Altman, D., Machin, D., Bryant, T., & Gardner, M. (2013). Statistics with Confidence Confidence Intervals and Statistical Guidelines. *John Wiley & Sons.*
47. Plsek, P. E. (1999). Quality improvement methods in clinical medicine. *Pediatrics*, 103(Supplement_E1), 203–214.
48. Ashmore, S., Ruthven, T., & Hazelwood, L. (2020). Stage 3: Implementing change. In New Principles of Best Practice in Clinical Audit (pp. 81–92). CRC Press.
49. Godfrey, K. (2011). Appendix 3: Four principles of change management (R. Burgess, Ed.). Radcliffe Medical Press.
50. Lewin, K. (1952). Field Theory in Social Change. London: Tavistock.
51. Sloane, P. (2017). The leader's guide to lateral thinking skills : unlock the creativity and innovation in you and your team.
52. NHS Centre for Reviews and Dissemination. (1999). Effective Health Care: getting evidence into practice, The University of York. 5(1), 16.
53. Ashmore, S., Ruthven, T., & Hazelwood, L. (2020). Stage 4: Sustaining improvement. In New Principles of Best Practice in Clinical Audit (pp. 93–106). CRC Press.
54. PDSA cycle. (2013). Institute for Healthcare Improvement.
55. Bodansky, D., Oskrochi, Y., Lewis, J. G., Fischer, M., & Narayan, B. (2017). Change the habit to change the practice: Do audits really ever change anything? Injury.
56. Dunning, M., Abi-Aad, G., Gilbert, D., Hutton, H., & Brown, C. (1999). Evidence and Everyday Practice. Creating Systems for Delivering Health Care. London: King's Fund.
57. Javed, M. Q., AlAttas, M. H., Bhatti, U. A., & Dutta, S. D. (2022). Retrospective audit for quality assessment of root fillings performed by undergraduate dental students in clinics. *Journal of Taibah University Medical Sciences*, 17(2), 297–303.
58. Korabari, M. I., Khijmatgar, S., Noorani, T. Y., Assiry, A., & Alharbi, T. (2020). Is there a justification of conducting clinical audit in the endodontic outcomes? *J Conserv Dent*, 23, 518–521.
59. Bukhari, O. M., Ahmed, A. A., & Afifi, I. K. (2020). Adherence of Umm Al-Qura University Dental Students to Infection Control Guidelines: A Four Year - Auditing Report. *Open Access Maced. J Med Sci*, 8, 19–26.
60. Javed, M. Q., Kolarkodi, S. H., Riaz, A., & Nawabi, S. (2020). Quality assurance audit of digital intraoral periapical radiographs at the undergraduate Dental Clinics. *Journal of the College of Physicians and Surgeons--Pakistan: JCPSP*, 30(12), 1339–1342.
61. Ahmed, K. A. (1995). First 4-years orthognathic surgery audit of a Saudi teaching hospital. *Egyptian Dental Journal*, 41(2), 1077–1084.