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INTRAOPERATIVE DATA RECORDING

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INTRODUCTION

Anaesthetic record keeping is standard practice at all South African public hospitals.

Anaesthetic data recording is the writing up of the different variables and a summary of the steps used to provide anaesthetic care in theatre.[1]

South African Society of Anaesthesiologists (SASA) strongly recommends that a practitioner completes a record of the anaesthetic technique and patient responses conforming to the standards of practice.[2]

The anaesthetic record documents all drugs given during anaesthesia. This also prevents repeat drug administration and facilitates handover and safeguards Anaesthetists regarding any future risk of abnormal or unexpected events.[3]

History of Anaesthetic records [4]

The first anaesthetic records were devised in 1894 by two medical students, Harvey Cushing and Amory Codman during anaesthetic practice for their surgical supervisor, Dr. F.B.Harrington. Cushing acknowledges the idea of creating charts to the point “the very casual administration of a dangerous drug”. His writings describe how the recording of vital signs (pulse, respiratory rate, and later, blood pressure) along with the amount of ether administered was key in developing the understanding of cause and effect. The role that the anaesthetic record played in patient safety and the development of the Anaesthesia as a practice was noted by several observers, including Harold Griffith.

The quantum of information collected continued to increase and the first electronic anaesthetic records were introduced in the 1980’s. The electronic record captures a large amount of physiologic data. It also allows manual insert of information by the doctor/clinician (through keyboard, mouse, touch-screen) and together, the automated data is organized as an electronic anaesthetic record which can be both stored in a database as well as printed out on paper as a chart.

The electronic anaesthetic record is one part of a more complex “anaesthesia information management system” (AIMS) where the anaesthetic record component is kept with numerous other hospital data bases, such as medical records, preoperative assessments, laboratory results and surgical scheduling. The AIMS can also be expanded to create research, quality assurance and professional services (billing) databases as well for audit purposes.

Automated vitals capture recording can also eliminate documentation errors and also enables the anaesthetist to focus on patient rather than the manual recording of vitals. It is estimated that between 15 and 20 % of a provider’s time is spent documenting and recording events.

Quality indicators and outcomes can be easily entered into electronic documentation and it also encourages anaesthetic event reporting.

Electronic input also eliminates the possibility of elimination of a missed step or missed documentation of the step.(medical aid reimbursement)[5]

Standard of Anaesthesia book keeping[6]

Each Anaesthetist may have a different opinion on the detail necessary to be recorded. However, there is no recourse to legal sanction until such time as a practitioner falls below the minimum standard requirement by the law and injury results to a patient.

The standard of care must be higher than that which could not be condoned by a responsible body of anaesthetist.

This is the Bolam test or principle, which, stated in the original words of Mr Justice McNair, is as follows:

> 'A doctor is not guilty of negligence if he has acted in accordance with a practice accepted as proper by a responsible body of medical men skilled in that particular art….putting it the other way round, a doctor is not negligent, if he is acting in accordance with such a practice, merely because there is a body of opinion which takes a contrary view'

It is to be stated that the Bolam test for the standard of care has been approved by the House of Lords and been even mentioned in several medical court proccedings on a number of occasions and the standard to be applied is that which applied at the relevant specific time.

> Essentially then it is for anaesthetists to set the standard below which another anaesthetist should not fall.

If the patient is paying privately for treatment a contract arises, the terms of which are usually implied.

There is nothing to stop a patient's own choice of the procedure and the Anaesthetist agreeing to a particular course or procedure which, if not followed, could lead to the patient (or his personal representatives) bringing legal action against the Anaesthetist for breach of contract or uninformed procedure.
An informed private patient could require his Anaesthetist, under an express written or oral contractual term, to use monitoring equipment or anaesthetic apparatus.

The patient could choose to specify the degree of detail with which he required the doctor to keep a record of the anaesthetic procedure. The Anaesthetist of a private patient is also responsible for any failings of his assistants, for the duty he accepts under the contract is his, unless the contrary is clearly stated.

Recommendations regarding anaesthetic records

An anaesthetic record provides information about the pre-operative and perioperative management of a patient and also helps for audit and research purposes. The HPCSA mandates that medical records should be kept for at least 6 years after they become dormant.

INTERNATIONAL STUDIES ON ANAESTHETIC RECORDS

Anaesthetic records have been noted to have many inaccuracies and have caused confusion during random checks when a patient reappears for operation and the doctor checks the previous anaesthetic charts.[7]

The importance of good anaesthetic record keeping has been emphasized upon several times in view to improve the standard of care. Several studies done abroad regarding anaesthetic data record keeping revealed that anaesthetic recording practice and documentation were substandard and poor.[8]

Out of 164 intraoperative anaesthesia records reviewed at Dilla Referral hospital in Ethiopia none had a completion rate of 100%.[9]

Though the required content of the anaesthetic record may be easily determined, the literature suggests that there is much improvement in data recording that can be done. Devitt noted poor documentation by Anesthesiologists using handwritten anaesthetic records and reported a high rate of incompleteness, with fewer than 37% of records being considered complete.[10]

Tessler compiled the opinions and views of Anaesthesiologists to determine information they felt to be most important to include on the anaesthetic record and found that many of the variables were left out. (Tessler et al,2005)

STUDIES DONE IN SOUTH AFRICA

An audit of anaesthetic records was performed by Prof FM James from University of Cape Town (Christiaan Barnard Memorial Hospital) to determine the rate of completion and adequacy of such records. Less than one third of all records was complete and legible according to them.[11]

Studies done from University of Bloemfontein(Swart & Kuhn) found that documented preoperative data was incomplete and they concluded that training and evaluation regarding completion of preoperative assessment of patients was required.[12]

Incomplete or illegible anaesthetic forms can pose certain difficulties. This usually occurs during handover where all data regarding the operation had not been revealed or fast scribbling to catch up the after events or during complex or complicated surgeries where multiple discrete variables have to be monitored and multiple tasks have to be done.[13]

QUALITY HEALTH CARE

Clinical record keeping plays an important part in good professional practice and the delivery of quality healthcare. Complete and accurate record keeping enhances the continuity of care and communication among different healthcare professionals. According to the 2009 World Health Organisation (WHO) guidelines for safe surgery, documents and documentation for effective communication and the exchange of information in the operating room are pivotal. Accurate, available documents and documentation are vital to protect and reinforce patient safety.

MEDICOLEGAL IMPORTANCE

Anaesthetic record is an essential part of the patient's medical record.

It includes the documentation of all aspects of perioperative anaesthesia management that are relevant to the procedure.
Anaesthetists are predisposed to different medico legal issues. Some of the major causes of litigation cases were based on poor recording, inappropriate delegation and poor communication with other staff, patients and relatives The anaesthesia record provides vital information that may help other staff who will be involved in the care of the patient and other subsequent anaesthetists. It may also be valuable for medico-legal defence and can be used for quality assurance and research purposes. All components of the anaesthetic record must be readily available throughout a patient's hospital stay, and for all subsequent attendances.
Tessler surveyed the opinions of Anaesthesiologists to determine the variables they felt to be most important to document on the anaesthetic record. His chart study found that many of the variables considered important were infrequently recorded.

Vital signs were considered to be most important however only the anaesthesiologist's name was found to be recorded on all records. The allergy status was the most recorded preoperative variables(84% charts)
For example, estimated blood loss, though rated as important information by the Anaesthesiologists, was recorded less than 24% of instances.[14]

Improved documentation and improved data collection were the two main factors for installing AIMS in University departments of Anaesthesia in the United States.

Factors in favour of AIMS	Barriers to adoption of AIMS
Improved documentation	No return of investment
Improved data collection for quality improvement	High cost of AIMS
Upgrade of patient care and safety	AIMS not essential for hospital
Improved data collection for research	Fear of decreased revenue
Compliance with authorities	Fear of medico-legal exposure
Convenience for anaesthesiologist	Systems are too complex or cumbersome

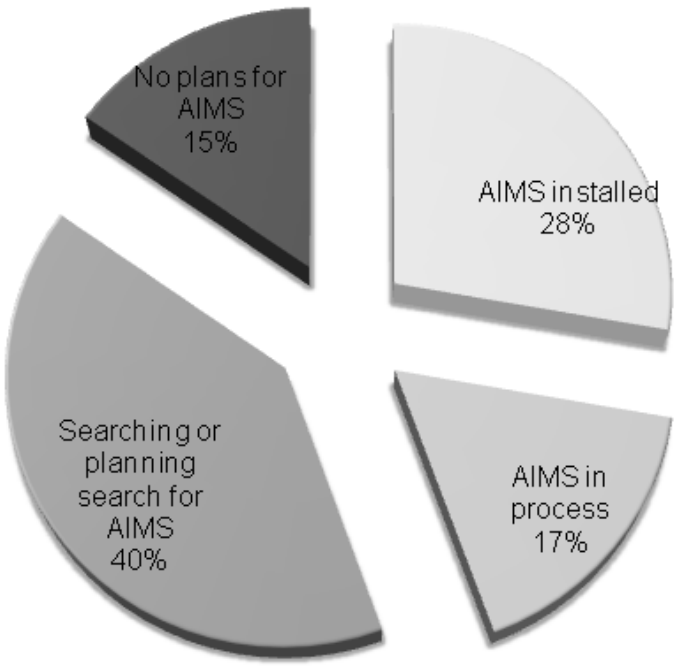
Table 1: Denoting advantages and disadvantages of implanting AIMS [15]

(Adapted J.M Ehrenfeld, Department of Anaesthesia, Critical care & Pain Medicine, Massachusetts General Hospital, Harvard Medical school, Boston)

AIMS (Anaesthesia information management system)

It is important to remember that many essential data capture variables are beyond the reach of automated capture. Management of the airway, invasive interventions, patient positioning, as well as the administration of drugs and fluids are but a few examples of data that require direct clinician input.

The input of these variables can be done in different ways depending on the design of the electronic record. Reliance on typed in input by the clinician is associated with incomplete data collection.
User interface has to be friendly and follow the procedure in consecutive steps[16]



Pie chart denoting hospitals which have adopted AIMS in USA
[17](Grunwald z.Adoption of Anaesthesia information management systems by academic departments in the United States. Anaesth Analg).

Table 2 showing advantages of electronic record over hand written records

Feature	Handwritten Record	Electronic Record
Legibility	Often poor	Good
Accuracy	Suboptimal- subject to clinician bias:	Excellent- must watch for missing data
Completeness	Suboptimal and difficult to control. Structured (template) format will improve legibility and completeness	Good. user interface can prompt or require essential data points; data is completed automatically
Medico-legal Factors	Can be an asset if complete, legible and accurate. Bias remains problematic.	Favourable due to completeness and accuracy No evidence that the AIMS increases medico-legal exposure
Ease of Use	Simple.	has the potential to be convenient and time-saving
Cost	Inexpensive	Expensive to install and maintain.
Complexity	Simple	Requires ongoing user training. Requires maintenance and technical support.
Value Adds	Limited	Convenient data base for research, quality assurance; billing, archiving.

Certain aspects of data recording are very important in an AIMS setup. Data entry should be user friendly and concise as far as possible to ensure good standard of data capture and of should not be ambiguous or time consuming. User prompts can also help the user to identify important sections to be filled in as mandatory fields. The use of bold characters and tick boxes could also ease visibility and also draw attention of the anaesthesiologist.
Data entered should be visible in a good format, coherent and should be easily understood.

FORMAT

The Anaesthesiologist, will not expected to have advanced computer training but basic skills. Chosen font should be simple and large enough to be read at ease. Shading and bold lines can be used to assist the reader to track visually across the page or screen and to distinguish clinically separate sections and also to demarcate vital information. Jargon should be avoided and use of abbreviations should be standardized according to one of the well known English language medical dictionaries (oxford). The SI format for date (YYYY/MM/DD) and time is recommended, but consistency within the institution is of paramount importance.[18]

DATA ENTRY

Anaesthetic records (handwritten and electronic) utilize a mix of structured and unstructured data entry. A structured format presents a list of items or options and allows the user to select one option from a pre set list of choices).
An unstructured format relies on typed in text entry, although the category may be prompted.
When used in a handwritten record, the structured format is legible and is associated with a higher degree of completeness compared to an unstructured format.
Template-based form relies less on recollection of sequence of events. Some detailed information are also not easily provided through a structured format. The main drawback of the use of structured formats in handwritten records is the increased use of document space as the template lists may have lot of options.

Space for unstructured input can be limited. When designing a handwritten record it is important to maintain completeness and conciseness.

The electronic record allows the integration of structured and unstructured formats, with high completion rates particularly where essential data points are made mandatory or does not allow you to proceed further till the previous data is entered. Selection options can be hidden by "drag out boxes" and accessed only as necessary, eliminating the visual clutter and "use of space" concerns.[19]

Table 3 denoting boxes/prompts and the rationale behind capturing relevant information (J.M Ehrenfeld, Department of Anaesthesia, Critical care & Pain Medicine, Massachusetts General Hospital, Harvard Medical school, Boston)

Content item	**Rationale**
Verification of "nil per os" status	A historical feature that must be Verified on the day of surgery
"Absence of peripheral nerve stretch verified"	A prompt to document the careful positioning and padding of extremities
Prompt for "Ultrasound Guidance" When used for central venous access	The use of this tool decreases risk and should be documented.
Accurate description of ventilatory modes over time, including documentation of tidal volume when pressure controlled ventilation is used	Ventilatory modes may be changed during the course of the anesthetic, a reality for which the anesthetic record must allow. In the case of a handwritten record, Documentation may promote clinician awareness of this important physiological variable.
Airway pressure	Important physiologic variable
Fluid management summary box	Important clinical information which may be difficult to interpret from grid portion of record
Intra-operative laboratory results box	Promotes review of laboratory results and presents results and trends visually to the anaesthesiologist.
Regional technique details box: includes prompts for needle type and sizes, precautions, drug types and doses;	Promotes completeness and serves as an easy reference for other health care professionals caring for the patient postoperatively

Failure to record unexpected events and incidences like difficult intubation or adverse drug reactions might lead to no preparations or precautions undertaken for any subsequent anaesthetic procedures and can unfortunately result into damages, complications, injury or death occurring.[20]

An automated record serves not only to protect the Anaesthetist from baseless allegations but also to condemn him when he has failed to understand risks, acknowledge complications and quickly provide responsible remedial act upon the developing picture of an anaesthetic untoward event.[21]

Tampering of data, erasure of vital information and cover up situations have often been acknowledged and regarded as a serious criminal offence. However, it has often been agreed that a patient should have priority of attention over record keeping.[22]

Retrospective notes have been accepted to provide important information regarding the different steps and actions undertaken for safe anaesthesia delivery and patient care preoperatively, intraoperatively and the post operative management of patients.[22]

Purposes of Anaesthetic records

1. Facilitating clinical care

Despite the lack of a 'universal' anaesthetic chart, the presence of standards and recommendations mandate that similar information is recorded for all cases.

These guidelines ensure data capture and record supporting safe clinical care. A detailed record of preoperative assessment, (including the process of consent and discussion of risk), intraoperative management and patient response (both normal and abnormal) to the procedural management are noted. Other features have developed to avoid adverse outcome (e.g. tick box for throat pack removed) or demonstrate compliance with national standards (e.g. tick box for equipment check) or even to draw attention as a precautionary measure.[23]

2. Augmenting handover processes

Whilst not ideal, handover between anaesthetists in the middle of a case does occur, and where this occurs the anaesthetic record should support any verbal handover, allowing the incoming anaesthetist to continue the case at minimal risk to the patient and to carefully understand procedural sequence of events and planning.[24]

Instructions for postoperative care should be clearly documented.

3. Future care

Anaesthetic records are used to caution anaesthetists providing care in the future of any abnormal or unexpected events during anaesthesia (difficult intubation/allergies). This would eventually also help to stratify the risk management and also cater for special precautions or planning to provide for the most efficient and safer approach towards the anaesthetic procedure.[24]

4. Audit

An anaesthetic record provides a wealth of information about the pre- and perioperative management of a patient. [25]

5. Reviewing clinical care

An anaesthetist may perform a large number of cases in a year. Problems involving delayed or late complications during individual cases may not be evident at the time of surgery or in the early postoperative period (e.g. peripheral nerve injury).

Cases requiring review and court proceedings may take several years to be handled and increasing levels of litigation, demands adequate reliable documentation to demonstrate an acceptable standard of care and no deviation or breach from the duty of care.[26]

Anaesthetists maintain comprehensive records in accordance with recommended guidelines and as the law demands. Detailed and accurate clinical records support a solid defence and a vital proof when the standard of care is challenged. Inadequate or illegible documentation reflects poorly on the level of clinical care delivered.[27]

Factors directly affecting intra operative data recording

Poor equipment / Inappropriate instruments/ failure are one of the important causes of poor intraoperative recording.
Even if the machine has been thoroughly checked, equipment malfunction like a kink in the capnograph or pitot disconnection can lead to gaps in recording or loss of intraoperative monitoring it is also essential to set alarms so that immediate remedial action can be taken.

Increased work load, multi tasking and stressful conditions to cope with high turn over of cases can lead to poor data recording due to quick scribbling

Critical monitoring and intra operative cardiac monitoring as well as procedures involving inserting A lines/NGT can lead to certain delay or gaps during the data recording. Data input is based on recollection as the anaesthetist is usually the one doing same task of monitoring vitals and performing the procedure (inserting lines), however the screen and alarms should clearly draw attention of the anaesthesiologist in case of change in variables so that remedial action could be taken almost immediately.

Manual record has been often regarded as substandard by many studies. [28]
The availability of information-pre induction data regarding urine output, premedication, Gcs score does give an clear cut indication of most important variables to follow up during the operation
It is very important for the anaesthesiologists to identify the high risk factors for the operation and also the precautions or parameters that need to be carefully monitored and supervised during the operation

Several distractions like phone calls, moving from the anaesthetic station to adjust surgeons light, loud music could lead to poor data recording in theatre as the anaesthetist would try to catch up with details at a later stage
These distractions are known to draw the anaesthetist’s attention and can impede appropriate data recording.

Retention and disposal of records

Record keeping and chart review facility is regulated upon specific rules by the HPCSA. It is very important for all medical institutions to follow the prescribed guidelines regarding retention of medical records and their disposal.
Medical records and anaesthetic records could be required by researchers, for criminal investigations as well as for medicolegal enquiries.

In terms of section 14 of the Protection of Personal Information Act 4 of 2013 records of personal information must not be retained any longer than necessary for achieving the purpose for which the information was collected and processed.

The HPCSA offers the following guidance on the retention of medical records:

Records should be kept for at least 6 years after they become dormant while records of minors should be kept until their 21st birthday.
The records of patients who are mentally impaired should be kept until the patient's death while records pertaining to illness or accident arising from a person's occupation should be kept for 20 years after treatment has ended.

Retention periods should be extended if there are plausible reasons for doing so, such as when a patient has been exposed to conditions that might manifest in a slow developing disease, such as asbestosis where case studies and records can be of crucial importance. In these circumstances, the HPCSA recommends keeping the records for at least 25 years.

A records management system involves archiving or destroying dormant records in order to make space available for new records
Records held electronically are regulated by the Electronic Communications and Transactions Act, which specifies that personal information must be deleted or destroyed when it becomes obsolete.
The records should be examined first to ensure that they can be disposed and an authority (designated member of staff) to authorize disposal. The records must be stored or destroyed in a safe, secure manner.
A register of all healthcare records that have been destroyed should be maintained.
[29](HPCSA-Guidelines on the Keeping of Patient Records (2008))

Ownership and transfer of records

Healthcare records belong to the establishment that created them and store them. Patients have rights concerning the information contained in their records, but they do not own the documents or the electronic files.
The exception is where a patient has paid for records or images.

Transferring records
If a patient transfers to another doctor, a copy of the patient's records to the new doctor, while retaining the original records is kept

Learning outcomes

- As far as possible notes should be clear and concise with author's name and signature clearly written. The date and time written clearly in black pen.

- The operative procedure should be mentioned, side & specific location, type of anaesthesia /emergency or elective procedure

- Details of patient's preparation including positioning , additional procedures and prophylaxis

It is also of prime importance to have regular feedback/ random monitoring to improve standard of documentation.

CONCLUSION

Intra operative data recording is an important aspect of our day to day practice. The anaesthetic record is a valuable source of information which can be used at a later date.
This medicolegal document should properly documented and signed. Special care should also be taken to denote special precautions and difficult situations on the anaesthetic record so that any future untoward events can be avoided.

A computerised system would be advantageous however the limited health budget allocation along with the training of staff to use the sytem could limit the start up of a fully computerised system.
However, it is also true that various hospitals are now running on semi-computerised system and the system set up has been running smoothly so far. Regular audits /random monitoring would also help to evaluate the efficiency and accuracy of intra operative data recording.

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