

ROLE OF INFORMATION MANAGEMENT SYSTEM AND AUTOMATED RECORD IN ANAESTHESIA

Dr. Vandana Parmar

SUMMARY

Information is the skeleton around which organizations are designed. How anaesthesiology can meet the challenges of a changing environment is debated. It is unsettling that in the "Information Age", information concerning our most essential activity continues to be documented in an analog format using paper and pen. Like USA in India and all over the world the upcoming departments of anaesthesiology have to invest in and use Anaesthesia Information Management System (AIMS). This online record keeping system is safeguard for both patients and doctors. In the era of consumer protection act (CPA), right to information act (RIA), and considering medico legal aspects, records of detail information keep the doctors in safe hands; when question of medical negligence arises.

Keywords : Anaesthesia information management system (AIMS), Automated anaesthesia record (AAR), Medical negligence, Consumer protection act (CPA).

As virtually every other field of modern society uses computers, computer technology have made inroads into anaesthetic practice also. Every new physiological monitor and most of the newer generations of ventilators rely on this technology. The enormous processing power of the modern personal computer is used in word processing, administrative, and statistical purpose. Thus the anaesthesiologist of the future will need to be computer literate.¹

Medicine in general and anaesthesiology more specifically are in a period of great change. Some even suggest that the world as a whole is changing towards society where knowledge is the primary resource.² Intraoperative management is the "Primary" or "Core" activity of the our specialty.

Basically an Anaesthesia Information Management System (AIMS) captures anaesthesia related information in a digital format.^{3,4} An essential component is the Automated Anaesthesia Record (AAR) keeper, that collects information about intraoperative activities. An AAR alone, however does not qualify as an AIMS as it does not allow the information to be used for the management purposes.

A properly prepared record, accurately documenting the progress of anaesthesia, is of value not only to the

anesthesiologists in detecting untoward trends during the case but also is important to staff involved in post operative care of the patients. It is also essential source of the information for those who may be responsible for providing subsequent anaesthetics to the patient.

Anaesthetic records are also valuable source of information for education and research, and are required for medico legal purposes in most countries. In court of law the medical record is considered the primary source of facts, and juries tend to believe what is written over what is said— "If it isn't documented, it wasn't done."

Consumer Protection Act (CPA) was enacted as a law by Indian Parliament in 1986 and under section 2(1) (0) - service, medical practice was included as a service rendered by contracted party against payment and hence liable for under CPA.⁵ For the anaesthesia profession, the CPA has special significance. Most of the patients are aware of the problems associated with anaesthesia and for adequacy of care they rely on surgeon and others.

The difficulties specific to anaesthesia and ASA risk grading are not clearly explained to the patient for fear of annoying the surgeon, with the result that any complications following surgery are attributed to anaesthesia specialty. This is compounded by fact that a great deal of ignorance exists not only among the lay public but also among the medical professionals regarding the actual role of the anaesthesiologists. That's why meticulous recording of all events, drugs, and vital signs should be made.⁵

A full and accurate record may make the vital difference between the defensible and the indefensible in a claim for damages in which professional negligence is alleged. Even with the best will in the world it is virtually impossible to record all the events like vital signs, drug

D.A., M.D., Asso. Prof.
Department of Anaesthesiology,
PDDU Government Medical College,
Civil Hospital Campus, Rajkot - 360001. Gujarat

Correspond to :

Dr. Vandana S. Parmar
4 A, Sharda Nagar, University Road,
RAJKOT - 360 005 Gujarat
E-mail : vijaypithadia@lycos.com
(Accepted for publication on 22-2-2006)

administration etc., as they occur, especially during induction, recovery or during critical incidents; at that time anaesthesiologist concerned is with patient care; rather than record keeping, so data is recorded retrospectively. And also very difficult to record data manually in time while performing other tasks.⁶

So AAR system developed to cope with growing complexity of pharmacological interventions and physiological monitoring. The AAR is computer based device that requires data from physiological monitors, ventilators etc. These acquired data will be stored for printing of anesthetic record as well as allowing subsequent retrieval for clinical, administrative or record purpose.

Digital output from these devices is almost universally in serial form using a RS-232 protocol. Unfortunately there are many with in these so called serial communication standard are not updated. In the future it is to be hoped that all manufacturers will agree on an international standard for data transfer between medical equipment. A potential standard is that proposed by the American Institute of Electrical and Electronic Engineers (IEEE), the IEEE P1703 Medical Information Bus.

Differences in manual documentation on paper and computerized record keeping have already been investigated,^{7,8} and influence of the type documentation on the quality of data has been confirmed. To determine whether data recorded by an AIMS is significantly different from that recorded manually another study has been done; observer bias, missed reading, and errors of memory which affects manual anaesthesia record, may cause significant inaccuracy, and all of these can be avoided by using AAR generated by AIMS.⁹

Another aspect that must be considered is the security of the data base containing the AAR. And it becomes more important if it is maintained on a central computer serving a local area network. It is vitally important that adequate safeguards are built into the system to prevent unauthorized access, and to preserve patient confidentiality.

There is an obvious need for maintaining the confidentiality of medical information and with the increasing needs of computers, and information technology in health care, steps must be taken to prevent a breach in the security by hackers. As the anaesthesia records will be used by other health care providers, and administrators including nurses, physician, technicians, billing personnel, pharmacy, peer-review, and other anaesthesia providers, so it may be necessary that different format is available for different users.

AIMS gathers information on virtually every patients with whom departments of anaesthesia interacts, and all perioperative data in a digital format.^{3,4} An AAR alone, however qualify as an AIMS as it does not allow one to use anaesthesia information for management purpose. The AIMS database may interface with other database in the hospital or those of a larger health care system.

The components of the AIMS are:¹⁰

Hardware: Information enters AIMS through input devices, and automatically collects the data such as haemodynamics, capnography, ventilator settings, and anaesthesia gas analyzers. If the computer connected with central location by networking devices; file server further serve as a storage vehicle, and magnetic tapes are frequently utilized. From the file server the data are reproduced for printing anaesthesia record sheet or structured report.

Software : Software designed for the input and handling of anaesthesia information is very specific to our specialty and way of working methods. Software should able to access anaesthesia related data and reject artifacts. The sorting of data in a time ordered or in other logical sequences, formatting of data for storage replication and analysis are the essential features of software.

Future prospects of AIMS :

- A) Individual patient
- B) Anaesthesia practice
- C) Management function

A) Individual patient

(1) Better care through better records

The essential purpose is to document individual patient responses to anaesthesia and surgery. These are for patient benefit and allow other practitioners to care the patients in more informed manner; as easy and rapid retrieval of this digital database record is possible.

(2) Better ergonomics for anaesthesiologist

In operation room anaesthesiologists face a complex environment. Record keeping often disturb and distract from more immediate patient care. Time required for anaesthesia record is 10 to 15 % of total anaesthesia time.¹¹ Some found that AAR keeping significantly reduces record keeping time.⁸ With AAR the anaesthesiologist may shift to higher, cognitive supervisory tasks.¹²

B) Anesthesia practice

(1) Quality assurance function

The analysis of intraoperative incidents with more and frequent data with high accuracy is possible with AAR and AIMS, also allows rapid scanning of large database.

(2) Outcomes assessment

Digital information from large number of patients, intraoperative events is possible with AIMS. If single institute may not have sufficient numbers for valid analysis; digital database can be shared between other institutions and power of analysis can be increased. The effect of individual variations in anaesthesia practice can be analyzed.

(3) Education

Intraoperative events are readily retrieved from a digital database. Continuous data which are stored can easily be used for educational purposes. The meticulous analysis of a sequence of events may provide insight, which may not be possible with manual records.

(4) Medico legal protection

The AAR provides unbiased and contemporaneous documentation of intraoperative events. As a general principle, accurate information will most often work to the advantage of a defendant. It may help refute claims of negligence, and allow one to positively demonstrate that intraoperative responses were appropriate for given events.

C) Management functions**(1) Tabulation of services**

The exact tabulation of daily anaesthesia practice in particularly large department is challenging. With help of AIMS at anaesthesia work station; compiling of such data easy. Reports can summarize the daily anaesthesia activity with duration.

(2) Cost

In most anaesthesia departments, drugs supply represents major budgetary expenditures. AIMS allow systemic analysis of drugs, supplies related to patient case, surgical category, type of anaesthesia, physician operating room etc., and helps in practice guide lines to encourage cost-effective drug utilization.

(3) Resource utilization

The time of perioperative events like, admission to operating room, induction, surgical incision, etc., are precisely documented by AIMS. And it can be easily analyzed by surgeon and anaesthesiologists.

(4) Compliance with accreditation agencies

The ability to produce a legible anaesthesia records of every patient who receives anaesthesia services, to agencies (i.e. insurance agency) who requires comprehensive records is enhanced. For training in anaesthesia it is advisable for each resident to perform specific numbers of various cases to fulfill training requirements. These

requirements are best verified when all anaesthesia records available in digital database.

Selection of AIMS should be user specific with following criteria:

(1) Anticipated scope of AIMS

The department of anaesthesiology which considers to develop and update with AIMS, must define the activities that are intended to be recorded. The documentation of, only preoperative, intraoperative, and postoperative events or extend the limits of AIMS to PACU, ICU, ICCU, Labor and delivery units, pain clinics, trauma care centre and other off site anaesthesia locations like MRI, Cath-lab etc., has to be decided in the initial phases.

(2) Interaction of AIMS and AAR

Most modern monitoring and anaesthesia equipments can output electronic data but this compatibility is not with older types of machines. As the AIMS network structure is being considered, facilities to install computer equipment, and provision for electronic transmission of data need to be evaluated.

(3) Interfacing other system with AIMS

With AIMS it is easily possible to include ADT (Admission, Discharge, Transfer) system, an operating room management system, laboratory data retrieval system, drug supply, patient billing, and accounting system. These all systems can be linked through a hospital information network. Developing custom-built language may have significant cost implications.

Conclusion

The manner in which anaesthesia is practiced and the social, economical, and legal environment in which anaesthesiologists work have changed dramatically in recent years. The changes of these recent years are not only in scientific advances and technological developments but also in the social context with in which anaesthesiologists work. In health care industry due to public awareness, CPA and more medico legal involvement, a gradual move towards automated database in anaesthesia is just inevitable. An attentive, conscience, meticulously vigilant anaesthesiologist with the help of detailed record keeping and good knowledge of current trends in the practice is less likely to be judged negligent in case of his patients care.

The AIMS and AAR update all the perioperative details of cases, also helps in practice of evidence based medicine which make efficient, compassionate, and cost effective caring of the patient.

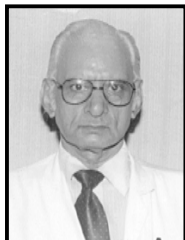
Anaesthesiologists who embrace this new technology place themselves at a significant competitive advantage.

The initial price of all installation of AAR and AIMS is high; but the potential reward is enormous. We get the rewards in cost benefit effectiveness when establishing this system; as less employment of staff required in hospital data management and record keeping, more accurate data available with AAR and AIMS also helps in avoiding insurance payment of false claimed cases. AAR and AIMS also helps in academic and research work with easy access of data. These all helps in reducing yearly monitory budget of hospital in more scientific way.

References

1. *Bavill JG, Engbes FHM*. Computers in Anesthesia, A Practice of anaesthesia: Wylie and Churchill Davidson, 6th edition 1995: 545.
2. *Ducker PF*. Managing a time of great change, Truman Talley Books, New York 1995.
3. *Smith N. Ty, Gravenstien JS*. Manual and automated anesthesia information management system in Monitoring in anesthesia, 3rd edition 1993: 473.
4. *Edsall DW*. Computerization of anesthesia information management- User's perspective. J Clin Monitoring 1991; 7: 351.
5. *Kaul HL*. Consumer Protection Act and anesthesiologist. J Anesthesiology Clinical Pharmacology 1996; 12(4): 232-34.
6. *Gravenstien JS, de Vries A, Beneken JEW*. Sampling intervals for clinical monitoring of variables during anesthesia. J Clin Monitoring 1989; 5: 17-21.
7. *Cook RI, McDonald J S, Nunzita E*. Difference between hand written and automatic blood pressure records. Anesthesiology 1989; 71: 385-90.
8. *Edswell DW, Deshane P, Gilles c, Dick D, Salem B, Farrow J*. Computerized patients' anesthesia record: less time and better quality than manually produced anesthesia records. J Clin Anesth 1993; 5: 275-83.
9. *Thrush DN*. Are automated anesthesia records better? J Clin Anesthesia 1992; 4: 386-89.
10. *Denial M. Thys*. The role of information system in anesthesia. Refresher course in anesthesiology The American Society of Anesthesiologists, Inc. 1998.
11. *Allard J, Dzwonczyk R, Yablok D et al*. Effect of automatic record keeping on vigilance and record keeping time. Br J Anesth 1995; 74: 619.
12. *Gaba DM, Howard SK, Small SD*. Situation awareness in anesthesiology. Human Factors 1995; 37: 20-31.

OBITUARY

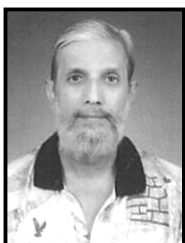


Prof. Dr. NARENDRA PAL SINGH

(15th July 1931 – 4th March 2006)

Prof. Dr. Narendra Pal Singh, after having medical graduation from Agra, received his anaesthesia qualifications from Mumbai and Patna. He served as Lecturer in Anaesth. at AIMS New Delhi 1960 to 1965 and subsequently served as Prof. HOD Anaesthesia at Maulana Azad Medical College, New Delhi (1966 –70), JIPMER Pondicherry (1970-74), Govt. Medical College, Goa (1974-77) Lady Hardinge Medical College, New Delhi (1977-89).

He served as President of Indian Society of Anaesthesiologists (1972), National Association of Critical Care Medicine (1979) and National Association of Emergency and Disaster Medicine (1980). He edited the journal 'Asian Archives of Anaesthesiology and Resuscitation' since 1971 till his last breath without interruption. He has authored several books in Anaesthesiology and Pain management. He was recipient of the prestigious BC Roy National Award in 1984. He organized centralized Accident Trauma Services New Delhi under Govt. of Delhi with about 50 ambulance running round the clock. He served as National Co-ordinator of Resuscitation Council of India of ISA since 2001. His active participation in the Annual General Body meetings during National Conferences every year will be missed by each and every member of ISA. His contribution to the over all development of our Anaesthesia fraternity can never be forgotten.



Dr. SUNIL D. SHITOOT

(4th Dec.1952 – 3rd March 2006)

Dr. Sunil Shitoot graduated in 1976 from M.G.M. Medical College, Indoor (M.P) and completed M.D Anaesth, in 1980 from AIIMS, New Delhi. He joined as consultant at S.D.M. Hospital cum MRI Jaipur in 1982 and remained associated till his sad demise.

Dr Shitoot had special interest in neuro and cardiac anaesthesia. He was life member of Indian Society of Anaesthesiologist and was actively associated with the activities of the ISA. He was executive member of city branch and also of Indian Association of Cardiovascular and Thoracic Anaesthesiologists. His active role as joint secretary in organizing National Conference of Indian Association Anaesthesiologist at Jaipur January 1994 and 8th IACTA conference at Jaipur 2005 will always be remembered. We, the member of Jaipur Society of Anaesthesiologist salute the brilliant scholar, excellent anaesthesiologist and above all a genuine human being that was Dr. Sunil Shitoot.

May their soul rest in peace.