

Ten PM Note of Organophosphate Poisoning: Successful Outcome of a Medical Audit with Complete Seven Steps

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ABSTRACT

Medical audit in general consists of seven steps like choosing topic, setting criterion and standard, collecting first data, comparing data with standard, introducing change, collecting second data and reflecting. Its three basic premise are improvement of patient care by using existing knowledge, team work with ongoing educational process and change management and promotion of blame-free culture maintaining confidentiality. Audit mostly relates to a particular practice and is therefore not generalisable. An audit of residents' late evening routine notes of organophosphate poisoning patients is reported here, as the change introduced appears relevant to the situation of developing countries. Organophosphate poisoning patients should be managed in intensive care unit with close monitoring, as inadvertent stoppage or slowing of atropine infusion may occur, particularly at night, leading to reappearance of poisoning manifestations, which may cause respiratory failure and death. If they are managed in wards, residents-on-duty can check the clinical and intravenous drip status in the late evening and communicate with nurses and relatives to be particularly vigilant. In the audit done, such regular ten pm notes of organophosphate poisoning about the clinical and drip status and communication by residents were increased from 15.5% in the first to 81.7% in the second data collection ($p < 0.01$) after the introduction of the change. The ten pm note is being continued for about two years now. Implementation of ten pm note of organophosphate poisoning patients admitted in medical wards is feasible and appears useful to improve the quality of health care delivery and learning of residents.

Key Words: *atropine, audit, audit steps, organophosphate mortality, organophosphate poisoning*

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INTRODUCTION

The value of audit is well established and popular in industrialized countries since more than two decades in improving patient care as part of an ongoing educational process, basically involving change management and quality assurance.¹⁻⁴ But practice of audit is not so common in the developing world. Audit is also often confused with collection of any data, perhaps as per the general meaning of audit. Audit in general language is defined as "An official examination of business and financial records or the quality or standard of something".⁵ But the principle foci of medical audit are change management and quality assurance. Audit in relation to the medical practice is defined as "A formalized objective approach to change management, designed to improve clinical performance through the application of explicit standards and reflective practice".^{1,3} Audit in the medical practice is a process involving the setting of standards, the observation of practice, and the comparison of performance with the set standards and the cycle is completed by making appropriate changes to practice and then re-measuring to see that improvements have been achieved.^{1,3}

Significant event audit (SEA) is a qualitative method of reviewing and learning from a single event that is thought to be 'significant' by a member of the healthcare team and it looks at single events thought to be significant in the care of patients or in the running of the medical practice.^{1,6,7} It is also known as critical event analysis. Both medical audit and significant event audit are professionally led, confidential and designed to improve care and takes a non-threatening, no-blame approach.^{1,8} Change management issues may include improvement to practice premises, improvements in services to patients, better management of the practice, working more effectively in teams, training and education focused on learning needs, and other aspects of the whole practice.¹

Seven steps of the audit

The audit involves a series of steps making audit cycle.^{1,9-11} The important seven steps of the audit are outlined as the audit cycle in Figure 1. Audit is a team effort. The doctor or any health care worker does not work in isolation but works with colleagues in the practice; most of our work is done as a team effort. While preparing and planning the audit, there should be teamwork and adequate discussion.^{1,10,11}

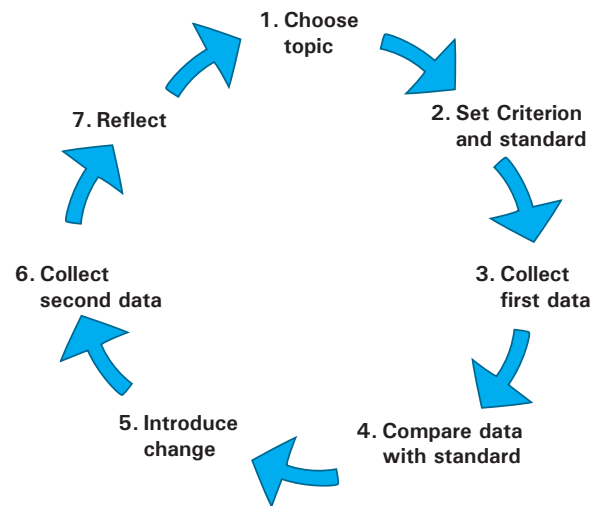


Figure 1. The seven steps of audit cycle

The audit topic should be of interest to the team and be appropriate and relevant to the practice. It should have potential for change. The quality of health care is regarded as being made up of three interrelated parts namely structure, process and outcome.¹⁻³ The audit can address all the three major aspects of practice. Structure relates to the premises, personnel, equipment and organization of a practice and process to the activities of the practice that result in the provision of medical care. Process audits tend to be most practical in terms of improving patient care. Original definition of outcome included all the changes in a patient's current and future health status attributable to an antecedent health intervention.² But the outcome audits now also include any result, like just lowering of blood pressure to the target level in the hypertension patients.¹ Small focused audits are likely to demonstrate the successful implementation of change.^{9,10}

A criterion is a statement of good practice and is clearly definable and precisely measurable element of care that is relevant to the audit subject. It must be so clearly defined that it can be said with confidence whether it is present or absent.^{1,3} The criterion should be relevant to audit subject and justifiable based on current international, regional or local literature. A good audit criterion can usually be recast in the form of a question.¹ The standard is the measured quantity within the criterion. The targets are set towards a standard with a suitable timescale. The standards should be derived from the best available evidence by clearly linking them to references in the scientific literature or to agreed written policies.¹ Some examples of common possible focused criteria with their recast questions encompassing different medical

fields and topics for audit are shown in Table 1. As per the specialties and standards, the examples given can be structured and made complete adding relevant points.

For collecting data, adequate population size should be taken, rather than a sample.¹ Changes should be introduced to achieve the set standard. Same population, but not the same sample, should be taken for both data collection. Data must be collected systematically and transparently. The results of the collected data should be compared with the standards.¹ Comparisons must be made like with like. Although advanced statistical methods are not necessarily required, there must be a clear demonstration that any improvements are genuine and not the result of chance.¹ Audit is an ongoing process. While reflecting, the analysis of the results, review of the whole experience and learning and plans for further improvement in the relevant or other topics are considered, and thus the cycle of audit continues.

Change management and blame-free culture

The audit cycle acts as a stimulus to change. Change management issues may include improvement to practice premises, improvements in services to patients, better management of the practice, working more effectively in teams, training and education focused on learning needs, and other aspects of the whole practice. All concerned members of the team, within the practice or unit, should be involved in the process of change management; otherwise the change may be resisted or may not be sustained.¹

Neither audit nor significant event audit is intended to find out any 'mistakes' of individuals or unit or hospital or to assign blame. Rather both promote blame free culture. Both show where improvements may be needed and where lessons for the future can be learnt. Accordingly confidentiality regarding patient, doctor and practice need to be maintained.^{1,4} It may not be appropriate to make available all audits and all data in the audits outside the immediate clinical team. Audit mostly relates to a particular practice or unit and is therefore not generalisable. While submitting audit, it is recommended to remove all identification of the practice or patients especially in copies of practice protocols. Any variation in practice, as seen in the audit, needs to be scrutinized within a supportive and educational context.¹

Different from simple data collection or research

The collection of morbidity and mortality data may sound superficially like the initial stage of a medical audit programme but it is a separate quality exercise, expected as a part of clinical governance.¹ Medical audit is designed to improve care as part of an ongoing educational process.

Similarly, audit could produce some unexpected information of interest to the observer, but is not intended to herald new and important scientific knowledge – should it appear to do so, then a full research project is indicated and the exercise is no longer an audit.¹ Audit aims to review current practice by using existing knowledge (i.e. application of knowledge) and to improve patient care. Thus, morbidity and mortality or any other data collection or research is not medical audit. The three basic premise of the audit are listed in Table 2.

The seven steps audit of clinical notes of OP poisoning

An audit of postgraduate residents' late evening routine clinical notes of organophosphate poisoning patients about their clinical and intravenous drip status and communication to the nurses and relatives is reported here as an example covering each step of the audit cycle.¹² It will help to understand the process and steps of the audit cycle. But the audit is also reported because the problem of organophosphate poisoning is common and the learning is useful and relevant to the medical practice in developing countries benefitting large number of young patients. The existing practice appears similar and the proposed change applicable and valuable to the situation of developing countries. The headings in the audit report of the clinical notes of organophosphate poisoning discussed below include the seven important steps of the audit cycle.

1. Choice of audit

Poisoning is one of the commonest causes of admission of young adults in the medical wards in Nepal and organophosphate is one of the commonest poisons consumed.¹³⁻¹⁹ Organophosphate poisoning is an important area to be given attention. It is quite common, as organophosphate compounds are easily available in household and market. It involves young people economically active with dependents in the family. Most events of such poisoning are reactive to an acute life crisis and patients are not unequivocally trying to kill themselves and if the patients survive the acute effects, they mostly do not repeat such attempt.²⁰ Self-poisoning is commonly a 'cry for help'. That is why the terms like 'self-harm', 'deliberate self-harm', and 'self-poisoning' are used, rather than the misleading one like 'attempted suicide' or 'parasuicide', as the word 'suicide' gives negative or wrong impression about the event. Poisoning is, thus, potentially completely curable with patients, mostly young, going back to their normal life. This is quite gratifying when we consider the other common causes of admission in the medical wards like COPD, stroke, congestive heart failure, cirrhosis, chronic renal

failure and cancers, which continuously require follow-up and expert medical support. Organophosphate compounds are quite toxic. The mortality rates of the organophosphate poisoning reported in the country are usually around 6 % to 14%.^{16,18,19,21}

Atropine is the cornerstone of the management of organophosphate poisoning. The atropine infusion drip is routinely given in the ward by simple intravenous sets, not by any infusion set with alarms. Inadvertent stoppage or slowing of atropine infusion particularly at night may occur in the ward leading to increase in poisoning manifestations, which may even cause respiratory failure and death.^{21,22} The death due to organophosphate poisoning usually results from respiratory failure due to a combination of depression of the CNS respiratory center, neuromuscular weakness, excessive respiratory secretions, and bronchoconstriction,²³ and occasionally occurs due to cardiovascular collapse^{23,24}. Such events tend to occur 'silently' without the patients being able to call others or make noise. The possibility of inadvertent stoppage or slowing of atropine infusion is relatively more at night, when vigilance by the staffs and relatives of the patients may decrease.

The routine continuous assessment in the late evening of all patients admitted in the hospital is difficult, that is why the need of admitting the patients with organophosphate poisoning in intensive care unit is increasingly felt.^{21,22} Without closely monitoring and managing the organophosphate poisoning patients in intensive care units, the results of any trials about the role of different drugs like pralidoxime may not be reliable.²¹ But, owing to the limited availability of facilities and resources and the relative large numbers of organophosphate poisoning patients, it may not be feasible to admit all organophosphate poisoning patients in intensive care units in the situation of developing countries. During the working hours, the respective unit residents closely take care of their patients, but later a few residents on duty are mostly busy managing admissions and calls in the whole hospital. The numbers of nurses are also relatively less during off-hours of late evening and early morning. The relatives of the patients stay in the ward and take care, but vigilance may decrease at night.

Considering the situation of relatively young patients with potentially lethal poisoning, the senior residents on duty could, make an especial point to see each patient of organophosphate poisoning late in the evening and check the patients' conditions and intravenous drip and remind nursing staff and patients' relative to be vigilant about the drip. So there are two related issues here; one is to assess the clinical status and intravenous atropine infusion drip situation of the organophosphate poisoning patients and the other is to communicate with nurses and relatives of the patients to be vigilant about the

functioning of the intravenous drip at the night. Both of these points need to be documented in the form of case notes written by senior residents on duty.

2. Setting of the criteria and standard

The plan was made to audit the frequency of notes written in organophosphate poisoning cases by residents on duty late in the evening and also to look for comment on the intravenous drip status and for advice given to the nurses and relatives of the patients. If the notes were not adequate, it was planned to implement writing of routine late evening notes by senior residents on duty with emphasis on communication regarding intravenous drip status. I named that "10 pm Note of Organophosphate Poisoning" as a sort of slogan to help to make it acceptable, popular and easier to remember by residents. On average, most patients with organophosphate poisoning receive atropine infusion drip for about a week. As there would be total only about 1 to 4 patients of organophosphate poisoning on atropine infusion each day in medical wards in the hospital, it was considered feasible to implement the late evening assessment of organophosphate poisoning patients.

The criterion for the audit was that all patients in the hospital with organophosphate poisoning on intravenous atropine infusion drip should have their condition assessed, along with communication with nursing staffs and relatives of the patients particularly to be vigilant of the intravenous atropine infusion drip, by the residents on duty as a routine at least once late in the evening as evidenced by their notes in the patients' chart. On recasting it into a question, it was "Have all patients in the hospital with organophosphate poisoning on intravenous atropine infusion had their condition assessed, along with communication with nursing staffs and relatives of the patients particularly to be vigilant of functioning of the intravenous atropine infusion drip, by the residents on duty as a routine at least once late in the evening as evidenced by their notes in the patients' chart?" If the notes were not adequate, the plan was to introduce the routine assessment of the patients with the required communication regarding vigilance of infusion drip with its documentation as late evening notes by senior residents on duty. The target was to demonstrate the significant increase in the frequency of such notes written towards fulfillment of the criterion in the data to be collected two months after the implementation of the criterion, as compared to the data collected before. This audit addressed the process aspect of the practice.

3. First data collection

The plan was discussed with the consultants, registrars and residents of the general medicine units. The data of

the daily evening case notes written by residents on duty late in the evening of last two months of all the patients of organophosphate poisoning, who were on intravenous atropine drip were collected. There were total 168 daily case notes for analysis during the two months period.

4. Comparison of the data with standards

On analysis of the results, it was found that there were clinical notes written in all the charts of the organophosphate patients in the regular day time working hours by the residents of the concerned unit. But after the working hours, as expected, there were not regular notes written by the residents on duty in the late evening hours in 142 (84.5%) of daily case notes of organophosphate poisoning. Residents on duty are obviously likely not to see all admitted patients unless they are called to attend. The notes in the evening time after the working hours were written in 26 (15.5%) mostly when called by the nursing staffs for any complaints or problems of the patients, not as a routine, or in some cases when the residents of the same unit having sick patients of organophosphate poisoning patients were on duty. Even in these 15.5% of the notes written, there was no mention regarding the intravenous atropine drip status and its communication to nurses and relatives of the patients.

5. Introduction of change

I called a meeting with all the residents, explained all the details and discussed the issues. The residents explained that when they were informed about any particular sick patients, they did assess the patients; otherwise they assessed the patients only if called by the nurses on duty. We discussed the importance and relevance of the issue and we proposed to have the system of writing "10 pm note of organophosphate poisoning" of all organophosphate poisoning patients in the hospital by the senior residents on duty. All the residents agreed to inform, with relevant details, the senior residents on duty about the admitted organophosphate poisoning patients on intravenous atropine infusion in each one's unit by writing the notes on the daily handover register of sick patients. As the patients and senior residents on duty are from different units, writing such notes on the daily handover register would make it easy to run the system smoothly and routinely. The conditions of such patients would then be assessed by the senior residents on duty, who would also check the intravenous atropine drip infusion rate and remind nursing staff and the patients' relative to remain vigilant about the functioning of intravenous atropine infusion drip and write the necessary notes on the case notes of the patients. Considering the

importance and feasibility of the issue, it was unanimously agreed to implement the "10 pm note of organophosphate poisoning" writing immediately.

6. Second data collection

The data of the late evening notes of all the organophosphate poisoning patients on intravenous atropine infusion drip of subsequent two months after our finalizations of decision of implementation were again analyzed. The second data collection was also done for the two months period to match it with similar period of the first data collection. There were total 126 daily case notes for analysis during this two months period. The total number was less than that of the first data collection. The period of the first data collection was around the autumn festival season, when the frequency of poisoning is relatively more, perhaps due to increased financial demand stress, as compared to that during post-festival season.¹⁶

7. Reflection

Regular clinical notes, including communication to nurses and relatives of the patient, written around 10 pm were present in 103 (81.7%) of daily case notes of organophosphate poisoning (Figure 2). The increase in the routine evening clinical notes written by senior residents is by 66.2%, as compared to the previous report of 15.5%. This was found to be statistically significant ($p < 0.01$) by Chi-square test. In all the 81.7% of the notes written, there was mention of intravenous atropine drip status of the patients and their communication to nurses and relatives of the patients for vigilance regarding intravenous drip infusion. The fulfillment of criterion indicates the achievement of good practice. I again discussed with the residents why the routine evening notes were not written in the rest 18.3% of the case notes of the patients. In some, though the residents examined the patients and discussed with them, their relatives and nurses, they forgot to write the notes. In others, as the patients were nearly settled, the unit residents forgot to write in the handover register.

There was significant improvement in the result with writing of 'routine notes in the late evening' in 81.7% along with writing about the intravenous atropine infusion and its communication to the nurses and relatives of the patients. The ten pm note is being continued for about two years now. It is obviously a good practice for the care of patients with potentially life threatening situation. This will not only improve the care of the patients but also teach and train the residents.

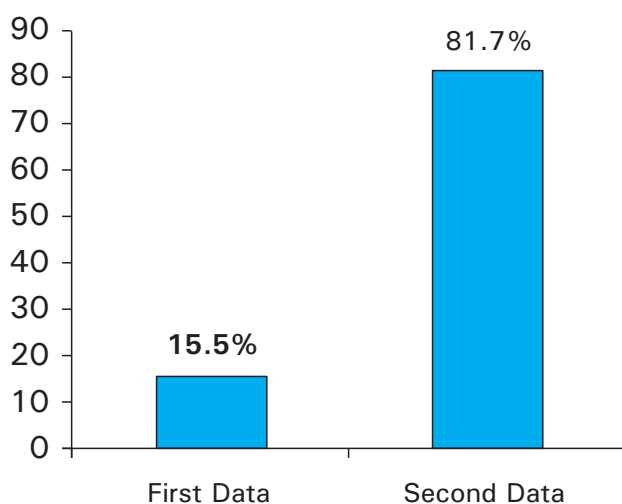


Figure 2. Frequency of 10 pm clinical notes written by residents in the charts of patients with organophosphate poisoning in the two data before and after ($p < 0.01$) introduction of the change.

CONCLUSIONS

While conducting audit, everyone involved had a practice of change management and looking at things with an eye to consider potential for change and in a way to solve the problem, rather than finding blame. Considering the increasing importance of performance and change

management, quality assurance, team work and communication in health setup, the training in medical audit, at least in the limited form possible, seems useful and necessary in the situation of developing countries like here, where there are many constraints in the delivery of the health care. The audit helps to improve the quality of health care delivery and needs to be promoted in developing countries as well.

The topic specific learning of the particular audit is writing of "10 pm note of organophosphate poisoning." Writing of such clinical note is feasible is demonstrated by the audit. Organophosphate poisoning is quite common in developing countries affecting young economically active people with dependents and it is potentially completely curable. The patients with organophosphate poisoning should as far as possible be admitted in intensive care or other unit with close monitoring. Otherwise writing "10 pm note of organophosphate poisoning" needs to be considered in all such situations in developing countries. Thus, implementation of ten pm note of organophosphate poisoning patients admitted in medical wards is feasible and appears useful to improve the quality of health care delivery and learning of residents.

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Table 1. Examples of the common possible criteria and their recast questions in medical fields for audit with the gaps to be filled in as per the specialties and standards

1. "All patients within our unit should have theirtest checked annually".
"Have ourpatients in our unit had theirtest checked in the last year?"
Examples: urine albumin, eye examination in diabetes or hypertension
2. "All patients withshould have theirless thanin our unit"
"Have all patients withtheirless thanin our unit?"
Examples: Blood pressure, LDL cholesterol, body mass index in patients with hypertension, diabetes, cardiac disease, chronic renal disease etc
3. "All patients within our institute should have time duration from attendance in emergency to therapy less than....."
"Is the time duration from attendance in emergency to therapy of all patients with less than..... in our institute?"
Example: door-to needle time in patients with myocardial infarction, any other emergency
4. "In our unit, the mortality rate of the patients withshould be less than"
"Is the mortality rate of the patients withless thanin our unit?"
5. "In our unit, the rate of(particular) complication in(in a particular condition or procedure) should be less than"
"Is the rate of(particular) complication in(in a particular condition or procedure) less thanin our unit?"

6. "All patients within our unit should have been immunized against....."
"Have all patients within our unit had been immunized against?"
7. "All patients withshould have received education aboutannually."
"Have all patients withhad received health education aboutin the last year?"
Example: diet, exercise, smoking cessation, in diabetes, COPD, IHD
8. "In our unit, all patients withshould having brisk walking at least half an hour five days a week."
"Are all patients within our unit having brisk walking at least half an hour five days a week?."
Other possible activities like having regular fruits, not smoking etc
9. "The rate of breast feeding by mothers discharged from our unit should be more than/at least"
"Is the rate of breast feeding by mothers discharged from our unit more than/at least?"
10. "The follow-up rate of the patients withshould be more than....."
"Is the follow-up rate of the patients withmore than?"
11. "The attempts for the successful(any procedure) should be less thanin our unit."
"Are the attempts for the successful(any procedure) less thanin our unit?"
Examples: artery or peripheral or central vein cannulation, lumbar puncture, aspiration, FNAC, intubation
12. "Before doing any procedure, all residents or interns should read about it."
"Have our residents or interns read about the procedure before doing it?"
13. "There should be adequate number of sterile.....instrument in our ward/ unit /OPD."
"Are there adequate number of sterile.....instrument in our ward/ unit /OPD?"
Examples: Gloves, proctoscope, speculum, BP instruments
14. "Allstaffs/students should have received immunization against"
"Have all.....staffs/students had received immunization against?"
15. "Allstaffs should have received education about?"
"Have allstaffs had received education about?"
16. "All patients with COPD/asthma in our unit should be using metered dose inhaler (MDI) correctly."
"Are all patients with COPD/asthma in our unit using metered dose inhaler (MDI) correctly?"
17. "Allin our unit should know the correct method of using....."
"Are allin our unit know the correct method of using.....?"
Example: inhaler, glove, multidose vial, IV cannula etc for residents, doctors, nursing students, nurses etc
18. "The (all or particular instrument/s).....used for all patients in our unit should be sterile."
"Is/are (all or particular instrument/s).....used for all patients in our unit sterile?"
19. "All instruments used in our unit should be decontaminated before manually cleaning them."
"Are all instruments used in our unit decontaminated before manually cleaning them?"
20. "All used syringes and needles in our unit should be promptly and properly disposed."
"Are all used syringes and needles in our unit promptly and properly disposed?"

Table 2. The three basic premise of the audit

- Improvement of patient care by using existing knowledge and evidence based standards of care
- Team work with ongoing educational process and change management
- Promotion of blame-free culture maintaining confidentiality

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