Summary

I. A 5 year toxicoepidemiological surveillance of acute poisoning cases in the Government District headquarters Hospital in Udhagamandalam

Highlights:

- A total of 1860 poisoning cases were reported with 80 deaths (2008-2013).
- During the study period, incidence rate of poisoning was found to increase every year with an average rate of 14.46%.
- Average incidence rate of poisoning in Udhagamandalam population was 1.6 per 1,000 populations.
- The average case fatality and mortality rates were found to be 40.51 and 0.07 per 1000 respectively.
- Deliberate self-harm (n=1,755, 94.35%) was the most important cause for poisoning.
- The highest incidence was seen among young adults within the age group of 21-30 years (41.24%),
- Male predominance was observed (61.72%)
- Agrochemicals were the chief choice of poisoning and organophosphate found to be the major cause (24.78%) followed by unknown poisoning (16.29%) and paraquat poisoning (11.34%).

Social outcome:

- Patient level:
  Individualized patient counseling was given to those who intentionally consumed poison.

- Community level:
  Patient counseling leaflets were distributed to prevent accidental poisoning.
  Psychological guidance programs are recommended for the high risk people identified in the population.

Research Outcome:

- Based on the above study, a research paper entitled ‘Toxicoepidemiology of acute poisoning cases in secondary care hospital in rural south India: 5 year retrospective analysis’ was published in Journal of Post Graduate Medicine (J Postgrad Med 2015;61:159-62).

- A clinically relevant poisoning case observed during this study period was published as a case report entitled ‘Intentional chlorpyrifos poisoning in pregnant woman and subsequent fetal death’ in International Journal of health and allied sciences.

- A review article entitled ‘Epidemiology of poisoning cases in India’ is under manuscript preparation.
II. Survey of various agrochemicals available in Udhagamandalam region following preparation of poisoning management protocol

Highlights:

- A detailed documentation on various agrochemicals in Udhagamandalam area was prepared.
- The agrochemicals were categorized according to their chemical class.
  - Herbicides (n=16)
  - Fungicides (n=16)
  - Carbamates (n=1)
  - Insecticides (n=29)
- The agrochemicals were categorized according to toxicity and majority of the products (n=25) were moderately hazardous.
- The frequently moving products were listed out.

Social outcome

IDENTIFICATION AID

- A booklet was prepared covering concise report of all the agrochemical products available in this area.
- The possible physical description of the product helps for the easy identification of the product.
- The identification of the poisoning agent may help to decrease the number of unknown poisoning in this area.

POISON MANAGEMENT PROTOCOL

- The poison management protocol was updated based on currently available agrochemicals in this area.
- This was very well appreciated by the physicians attending poisoning cases in intensive care unit.
- The quick and better management of the agrochemical poisoning cases as well as reduction in the number of unknown poisoning are expected outcome.
III. Assessment of healthcare expenditure burden on management of various poisoning cases to the secondary care hospital

Highlights:

- 994 poisoning cases (2013 April to 2015 March).

- Total amount of money spent by the hospital administration in treatment of poisoning cases during the study period was found to be INR. 2,229,013 which accounts for 4.17% of the total expenditure of hospital in managing all diseases.

- Poisoning cases occupied 15.18% of the bed days in intensive care unit.

- Category wise cost distribution (mean cost per day per patient):
  
  - Drug cost = INR. 61.71
  - Lab investigation cost = INR. 86.02
  - Hospital stay expenditure = INR. 58.66
  - Health care providers remuneration = INR. 84.57
  - Food expense = INR. 28.94
  - Maintenance cost = INR. 109.27

- Transfer cost:

  The total expenditure in transfer of patients was found to be INR. 229,600. The mean cost of transfer per patient was found to be INR. 2050.

- Bed occupancy days for poisoning patients:
  
  - 4699 (1.53%) hospital beds were utilized for poisoning cases.
  - 15.18% (n=3214) beds from intensive care unit.

  Agent wise distribution:
  
  - Organophosphate poisoned patients = 1451 bed days
  - Paraquat poisoning patients = 779 bed days
  - Unknown poisoned patients = 744 bed days
  - Rodenticide poisoning patients = 400 bed days

- A significant association was observed between agents used for poisoning and treatment cost (p=0.0073).

- The age of the patients was found to be one of the determinants to influence the length of stay in the hospital (p=0.041).

Social Outcome

- Pharmacoeconomic analysis of individual patient treatment was done.

Research Outcome

- Based on the above study, a research paper entitled ‘Assessment of hospital costs of managing poisoning cases in a secondary care hospital, Udhagamandalam, Tamilnadu’ has been communicated for publication to International Journal of Public Health.
IV. Evidence (AchE) based management of organophosphate poisoning and its economic impact on health care expenditure

Highlights:

- The major clinical symptoms shown by organophosphate poisoned patients in this hospital were recorded.
- The severity of the poisoning cases was analyzed based on clinical manifestations by using the PSS and POP scales.
- The normal value of AchE in this population was established (1771.83 milli units/ml).
- The severity assessment was performed based on the acetyl cholinesterase levels.
- The correlations of the results were obtained between various scales and AchE measurement for severity measurements of organophosphate poisonings.
- The sequential prognosis at various time intervals of the empirical treatment was evaluated based on Acetyl cholinesterase levels.
- It was revealed that the organophosphate patients were exposed to overdose of drugs.
- Hypothetical pharmacoeconomic studies reported that the direct medical costs, direct nonmedical costs and indirect cost were expected to significant decrease if guideline treatment would have been adopted.
- The guideline treatment for organophosphate poisoning would be cost effective than the empirical treatment.
- If guideline treatment would have been adopted, the mean length of stay in the hospital was expected to decrease from 6.89 to 4.15 days.

Social Outcome:

- The normal value of AchE in this population was established.
- Optimization of organophosphate poisoning treatment could be successful by using acetyl cholinesterase estimation.
- The number of days of stay of an organophosphate poisoning patient at the hospital could be decreased.
- The clear distinction of the patient like latent and mild poisoning reduces the drug usage.
- The cost effective analysis shown that the proposed treatment plan is economically superior over the empirical treatment.
- Ensured the best quality and rational use of medicines.

Research Outcome:

- Based on the above study, a research paper entitled ‘Evidence based management of organophosphate poisoning and its pharmacoeconomic impact on health care expenditure’ has been communicated for publication to Medical Hypothesis.
- A review article entitled ‘Can galantamine act as an antidote for organophosphate poisoning?’ was communicated to Indian Journal of Pharmaceutical Sciences.
- A research paper entitled ‘Assessment of clinical features of organophosphate poisoning by using various scales at a secondary care hospital, Udhagamandalam’ is under manuscript preparation.
- A review article entitled ‘Acetyl Cholinesterase normal value in humans: The regional variation’ is under manuscript preparation.
CONCLUSIONS

Udhagamandalam being an agricultural zone is prone for poisoning with agrochemicals. The GHQH, Ooty, admits a significant number of poisoning cases every year. The epidemiological surveillance concluded that the increased number of poisoning cases is due to intentional and unintentional usage of agrochemicals. Similar conditions exist in other parts of India. The population at high risk, identified in this study should be provided with enough psychological guidance to reduce the occurrence of poisoning. Proper regulations should be brought into force to reduce the availability of harmful pesticides to public, such as banning the use of extremely toxic agents and substituting them with less toxic but equally effective agents. Also, the usage of biological methods of pest control, instead of these toxic agrochemicals, should be enforced. Regulations regarding the sale of agrochemicals by policy makers along with psychological guidance would go a long way in addressing the problem.

The availability of the agrochemicals in Udhagamandalam region was determined in the second phase. Based on the organoleptic properties of these products, a booklet, an identification tool was prepared. This simple method for the identification of poisons through the details given by the poisoning patients was developed which helped in quick identification of the poisons for appropriate treatment. This involvement of clinical pharmacist has helped the treating physicians in accessing the comprehensive information on various treatment options available for the treatment of poisoning cases. Similarly, poison management protocol was updated by including all the available products. Protocol provides the quick reference source for the treatment of various poisons. A significant improvement in the quality of care of poisoning patients along with reduction in the hospital stay by the patients was achieved. Half of the agrochemical products available in this area are of moderately hazardous in nature with low prize and increased frequency of purchase. In this context it is advisable that stringent rules and regulations have to be implemented against the easy accessibility of agrochemicals.

The poisoning management costs accounts for a substantial portion of the total treatment cost of the hospital and the increased occurrence rate of poisoning utilizes the limited facilities in intensive care unit. The evaluation of economic impact of these poisoning cases on health care system may be helpful in allocating the resources in an effective manner. A shift to use the lower hazardous agrochemicals would make substantial savings.

The determination of AchE levels can be used as a diagnosing tool as well as treatment prognosis monitoring parameter in organophosphate poisoning management. These measurements revealed that majority of the organophosphate poisoning cases in this secondary care hospital were less seriously affected. Due to the lack of such a provision in the study site, the patients were over exposed to the drugs in substantial quantity even after their clinical improvement. This may result reduction in quality of life of the patients. Similarly, the wastage of drugs causes economic loss for the hospital administration. This evidence based treatment for organophosphate poisoning may provide a better clinical and economic outcome. Thus, the cholinesterase measurement provision is essential in the study hospital.