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"From Crisis to Care" - Nursing Perspective in Managing Suicidal Rodenticide Ingestion

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Abstract: ***The "Hub and Spoke" model is an innovative healthcare delivery pathway designed to provide urgent plasma exchange (PLEX) treatment for patients with rodenticide ingestion–induced acute liver failure (ALF), particularly from yellow phosphorus poisoning. This multipronged approach also includes providing social support, restricting the availability of poison, and effective preventive management, which is needed to control this societal menace. Our study highlights the social reasons and suggests potential targets for intervention. This article explores the precipitating reasons for intentional ingestion of rodenticide poisoning from the nursing perspective. It also emphasizes the nurse role in early critical care, supportive care and psychological intervention to improve patient outcomes and to prevent recurrence in vulnerable population***

Keywords: suicidal ingestion, rodenticide poisoning, multipronged approach, Plasma exchange, acute liver failure

1. Introduction

Acute liver failure (ALF) is a serious life - threatening condition in which massive necrosis of hepatocytes leads to coagulopathy and encephalopathy and may lead to multi - organ dysfunction and death. In Western countries, acetaminophen poisoning is the most common cause for ALF, whereas in developing countries, viral and toxin - mediated ALF are the predominant causes. (1) Acute liver failure due to ingestion of yellow phosphorus - containing rodenticides with suicidal intent is rapidly becoming the most common cause for ALF in southern and Western India (2, 3) Suicidal rodenticide consumption is a major problem in Asian countries due to their easy availability. Majority of rodenticides (though of different composition and toxicity levels) are hepatotoxic, resulting in Acute Liver Failure. In the year 2022 - 2024, a total of 13, 643 patients were admitted with Rodenticide poisoning, 1679 patients underwent PLEX therapy. This aggressive management helped in averting 64.4% deaths (4) . The Tamil Nadu Government has taken administrative initiatives under the title 'The "Hub and Spoke" model: a established pathway to treat patients with acute liver failure due to rodenticide ingestion'.

Key Features of the "Hub and Spoke" Model (5) (6) (7):
The "Hub and Spoke" model in Tamil Nadu, India, is an innovative healthcare delivery pathway designed to provide urgent plasma exchange (PLEX) treatment for patients with rodenticide ingestion–induced acute liver failure (ALF), particularly from yellow phosphorus poisoning. This model addresses the critical challenge of limited access to liver transplantation in resource - constrained settings by decentralizing care and optimizing use of existing infrastructure.

1) Structure and Referral Pathway:
Initial patient assessment and resuscitation occur at the nearest primary health center (PHC). Patients are then monitored at secondary - level hospitals. Those who develop rodenticide hepatotoxicity (RH) are referred to district government medical college (GMC) hospitals which are the "hubs"—where low - volume PLEX is initiated for eligible patients based on defined clinical criteria (e. g., Kochi criteria for liver transplantation listing). This creates a tiered referral network ("spokes" feeding into "hubs") ensuring timely access to PLEX across all 38 districts of Tamil Nadu.

2) Standardized Protocols and Training:
Protocols were developed for non - transplant management of rodenticide poisoning. Training programs and online sensitization workshops have been conducted periodically for doctors, nurses, and technicians at all levels of care to implement these protocols effectively. (4)

3) Resource Optimization:
Plasmapheresis machines acquired during the COVID - 19 pandemic have been repurposed to provide PLEX for RH patients, maximizing existing resources without significant additional investment.

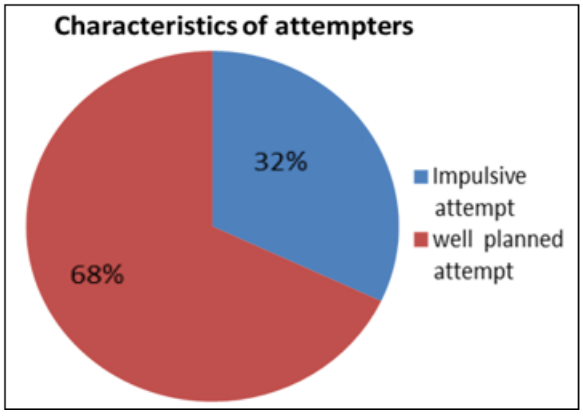
4) Government Support and Policy: (9)
The model is integrated into the Tamil Nadu Accident and Emergency Care Initiative (TAEI) under the National Health Mission (NHM), with poisonings identified as a priority area. Legislation to restrict rodenticide access complements clinical interventions.

5) Outcomes:
From 2022 to 2023, 1, 237 patients with rodenticide hepatotoxicity underwent PLEX under this program, with a reported 1 - month survival rate of approximately 68.7% among those meeting transplantation criteria treated with low - volume PLEX, highlighting PLEX as a practical alternative.

6) Cost and Accessibility:
PLEX is likely more cost - effective than liver transplantation and relies on plasma donors rather than scarce organ donors, making it scalable in low - resource settings.

This "Hub and Spoke" model demonstrates a successful framework for delivering urgent plasma exchange in a geographically and resource - diverse region. By decentralizing initial care and concentrating advanced therapies at district hubs, Tamil Nadu has improved survival rates for rodenticide - induced ALF. The approach offers a replicable blueprint for other states and countries facing similar challenges in managing toxic liver failure. ((6)

Precipitating reasons for suicidal rodenticide ingestion:
Being a significant contributor for the Hub and spoke model, a retrospective study was done to understand the reasons and to strengthen the practical application of multi pronged approach in rodenticide poison management. we analyzed all patients who were admitted with acute liver injury/failure secondary to rodenticide ingestion, for therapeutic PLEX in a tertiary care hospital in Tamilnadu was done. Samples were analysed from 2017 t0 2023. The causes of rodenticidal ingestion and detailed psychiatry assessment were undertaken in all included patient. The initial causes identified were audited for the present study. The total sample size is 100 and 68% of them had made a well - planned deliberate attempt by ingesting yellow phosphorus poisoning



Among them 57% were men and 43% were females. The precipitating factors for the suicidal ingestion was analysed. Interpersonal conflict was 62%, (conflict between spouse (34%), children with parents (24%), conflict with in - laws (4%)), was the most common reason cited. Failure in romantic relationship (13%), loss of job/ financial instability (15%), burden of education (3%), domestic violence (4%), recent bereavement (3%), and chronic pain (3%) were the other reasons cited.

Role of nurse in PLEX
Nurses play a critical role in patient preparation, monitoring throughout the process, managing potential complication, ensuring patient safety, obtaining informed consent, assessing vital signs, closely monitoring for any adverse reactions throughout the treatment. The Nurse coordinates the care in collaboration with other care providers and act as the patient guide and advocate, propose change in care and participate in the clinical research.

Providing psychological support to the patient and providing information and education to the patient regarding PLEX.

Weekly follow up includes:
OPD appointment will be scheduled with hepatologist 7 days after the IP discharge. Routine blood investigation including LFT, CBC profile, Serum electrolyte, creatinine, PT, INR, ferritin, von willibrand factor will be done at each visit and the results will be followed up. If there is any signs of alerted sensorium (encephalopathy will be graded according to West Haven classification), serum ammonia level along with routine investigation will be done. Monitoring of the vital signs (blood pressure, pulses, respiratory status level of consciousness, input and output status, body weight, temperature) will be done at each visit. In patient admission will be made if there is unstable Hemodynamic status, worsening of liver function or if there is any source of infection.

Telephonic follow up with patient or close family members will be done once in 2 weeks till completion 3 months after the procedure. The clinical status of the patient, titration of insulin, compliance to medications (steroids), physical activity plan, signs of infection, bleeding or hematoma at sites of venepuncture site will be monitored. Documentation of the physiological state and psychological wellbeing of the patient will be made. Patient will be instructed to report immediately to our emergency service, if any of the above problems are identified and further treatment process with will be discussed with on call duty register.

Anthropometric and liver frailty index assessment to identify the frail status after the patient will be carried out. Based on the 24 hour diet recall method, the calorie and protein deficit will be calculated. Dietary modification and supplementation will be made according to it. Recommended calorie intake for liver disease: 30 - 35 kcal /per kg /per day, protein 1.5 g to 2 g /per kg / per day.

Normal activities are encouraged after first follow up OPD visit. If patient feels tired and weak, adequate rest along with restriction of tedious activities will be advised. Instructions to maintain general hygiene and to avoid contact with people who have infection. Avoid travel to crowded places for atleast 2 weeks after discharge.

Adequate explanation regarding the need of regular medications, dose and duration, potential side effects and complications, refilling and importance of maintaining drug note. Patient will be advised to avoid self - medication and use of hepatotoxic drugs.

2. Interdepartmental Referral:

Psychiatric Evaluation:
Given the high incidence of intentional ingestion, the patient's mental health was assessed e appropriate psychiatric support was provided. Patients are referred to psychiatry department to strengthen the psychological well - being at each visit. Various ways to relieve the stress such as yoga, sleep hygiene, walking will be taught. Managing rodenticide poisoning requires collaboration across multiple medical specialties to address the diverse toxicological effects of these substances. A structured approach involving emergency medicine, internal medicine, neurology, psychiatry, nephrology, and public health ensures that patients receive timely and

appropriate care. Furthermore, preventive strategies and mental health support play a crucial role in reducing poisoning incidents and improving overall public health outcomes.

Suicidal Risk Assessment:

Many cases of rodenticide poisoning are intentional self - harm. Early psychiatric consultation for risk assessment and mental health intervention.

Psychological counseling for survivors. Long - term psychiatric follow - up to prevent recurrent poisoning attempts.

Awareness Campaigns

Educating the public about the dangers of rodenticides. Advocating for restricted sales of highly toxic rodenticides (e. g., yellow phosphorus).

3. Conclusion

Managing rodenticide poisoning requires collaboration across multiple medical specialties to address the diverse toxicological effects of these substances. A structured approach involving emergency medicine, internal medicine, neurology, psychiatry, nephrology, and public health ensures that patients receive timely and appropriate care. Furthermore, preventive strategies and mental health support play a crucial role in reducing poisoning incidents and improving overall public health outcomes. A blended learning approach combining lectures, simulation, hands - on training, and case - based discussions can be used as method for teaching. Regular competency assessments and continuing education will help to maintain nursing proficiency in this life - saving procedure. Nurses play a crucial role in improving patient outcomes, raising public awareness, and advocating for safer rodenticide regulations.

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