BRIEF RESEARCH COMMUNICATION

Direct Costs of Healthcare among Patients with Deliberate Self-harm: A Pilot Study from a Tertiary Care Hospital in South India

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Abstract

Background: Deliberate self-harm (DSH) in developing nations has a significant impact on health and economic conditions of patients and families.

Materials and methods: This retrospective study aims to study the cost of hospitalization and the factors affecting the cost of medical care. Adult patients with a diagnosis of DSH were included.

Results: A total of 107 patients were included with the most common type of poison consumed being pesticides (35.5%) followed by a tablet overdose (31.8%). There was a male preponderance with a mean (SD) age of 30.04 (9.03) years. The median cost of admission was ₹13,690 (USD 195.57); DSH with pesticide increased the cost of care by 67% as compared to non-pesticides. Other factors which increased the cost were need for intensive care, ventilation, use of vasopressors, and development of ventilator-associated pneumonia (VAP).

Conclusions: Pesticide-based poisoning is the most frequent cause of DSH. Among different types of DSH, pesticide poisoning is associated with a higher direct cost of hospitalization.

Keywords: Deliberate self-harm, Direct cost, Pesticide poisoning, South India.

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Highlights

Deliberate self-harm leads to a significant impact on health and economic conditions of patients' families. Consumption of pesticides and tablets are the commonest form of DSH. Among different types of DSH, pesticide consumption is associated with a higher cost of hospitalization.

Introduction

According to the World Health Organization (WHO), approximately 800,000 people die of suicide in a year, of which 110,000–168,000 die from pesticide self-poisoning. 79% of global suicides occur in low-and-middle income countries.[1] In a developing country such as India, poisoning-associated mortality is the fourth most common cause of mortality and varies from 15 to 30%.[2] As the Indian economy is predominantly agrarian, poisoning leads to a substantial financial burden. Deliberate self-harm is more common in the productive age of 32 years which adds to the economic burden. Understanding the economic burden of poisoning can impact policy change.[3] In Sri Lanka, an average of USD31.83 was spent per patient with DSH and the cost was highest for pesticide poisoning (USD49.12)[4] whereas in Bangladesh, the cost of hospitalization was estimated to be USD 98.40 per patient.[5] However, data on the direct and indirect costs of treating patients with poisoning is scanty in India. This pilot study aims to look at the profile of poisoning in a tertiary care hospital in South India and to estimate the direct cost of treatment.

Materials and Methods

Patients and Setting

This retrospective study was conducted in a single medical unit of a 2,700 bedded, tertiary care, teaching hospital from South India over a period of 1 year (2018–2019). Patients admitted with a diagnosis of DSH were included in this study. After a thorough search of the case records, a total of 107 patients were included. Data pertaining to the clinical and laboratory features, poison consumed and outcomes were analyzed. Direct costs of treatment (professional fees, bed and nursing charges, investigations, and oxygen charges) were obtained from the hospital electronic database. This was compared in various poisoning groups.

Patient Management and Outcome Parameters

All patients were managed with supportive therapy (hemodynamic support, mechanical ventilation, and renal replacement therapy) as indicated and decided by the treating physician.

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The outcomes of interest were the types of poison consumed and the direct cost of care among different poisons.

Ethical Approval and Funding

This retrospective study protocol was approved by the Institutional Ethics Review Board (IRB No.: 12113), Christian Medical College, Vellore, India.

Statistical Analysis

Statistical analysis was performed using IBM SPSS 25.0 (Customer ID: 200699). The descriptive data were presented as mean (SD) or median [interquartile range (IQR)] as appropriate. Chi-square test was used to compare dichotomous variables and *t*-test was used for continuous variables as appropriate. Since the data on cost had a skewed distribution, the data were log-transformed and analyzed using a generalized linear model (GLM). When the outcome is skewed, natural log transformation or log to the base 10 is done to make it approximately normal. The natural log transformation of the outcome, $100(e^{\beta-1})$ is interpretable as the percentage increase in the average value of the outcome per unit increase in the predictor.

Results

A total of 107 patients were admitted over a period of 1 year with a diagnosis of DSH. The most common poison consumed was pesticide in 38 (35.5%) patients followed by tablet overdose in 34 (31.8%) as seen in Table 1. A male preponderance was noted (51.4%) with a mean ± SD age of 30.0 ± 9.0 years. The predominant mode of poison consumption was ingestion of the liquid form. Gastrointestinal symptoms (84.1%) were the most common clinical feature at presentation followed by the involvement of the central nervous system 71 (44.8%). Prior to presenting to our center, 81 (76%) patients received treatment in a primary or secondary level hospital of which 72 (67.3%) had received a gastric lavage and 17 (15.9%) received atropine. Twenty-two (20.6%) patients required an intensive care therapy while 19 (17.8%) required a ventilator support and 5 (4.7%) required vasopressors.

The result of the cost analysis is presented in Table 2. The median (IQR) cost of admission was ₹13,690 (8,970–28,890) [USD195.57 (128.14, 412.71)] as denoted in Table 1. The pesticide consumption significantly increased the direct cost of care by 67% (95% CI: 13–78,146 %) as compared to non-pesticide poisoning.

The need for the intensive care unit (ICU) admission increased the cost by 6.67 (95% CI: 4.87–9.07) times. In patients on ventilator, the direct cost significantly increased by 7.33 (95% CI: 7.27–10.21) times. Inotropes were also found to significantly increase the patient's costs by 5.54 (95% CI: 2.37 82–12.94) times more as compared to the patients not requiring inotropes (p <0.001). The direct cost in the VAP patients was found to be significantly increased by 11.65 (95% CI: 5.84–23.29) times more as compared to the patients with no VAP (p <0.001).

Table 1: Baseline characteristics of patients with deliberate self-harm (n = 107)

Variable	*n (%)*
Age, mean (SD), years	30.04 (9.03)
Gender	
Male	55 (51.4)
Female	52 (48.6)
Type of poisoning	
Pesticide	38 (35.5)
Tablet	34 (31.8)
Plant	10 (9.3)
Others	25 (23.4)
Treated prior to presentation	
Yes	81 (75.7)
No	26 (24.3)
Treatment offered prior to presentation	
Stomach wash	72 (67.3)
Atropine	17 (15.9)
Activated charcoal	4 (3.7)
Clinical presentation	
Vomiting	84 (78.5)
Altered mental status	47 (43.9)
Abdominal pain	21 (19.6)
Diarrhea	21 (19.6)
Breathlessness	7 (6.5)
Seizures	7 (6.5)
Treatment given	
Atropine	31 (29)
N-Acetyl cysteine (NAC)	19 (17.8)
Stomach wash	14 (13.1)
Bicarbonate	8 (7.5)
Charcoal	6 (5.6)
Outcome variables	
Need for intensive care	22 (20.6)
Need for invasive ventilation	19 (27.8)
Need for inotropes	5 (4.7)
VAP	6 (5.6)
Cost of care per day, Rupees, median (IQR)	13,690 (2485–799,900)

Discussion

Deliberate self-harm due to poisoning is an important cause of morbidity and mortality in India and other developing nations.[6–8] Studies have shown that in South Asian countries such as Sri Lanka and Bangladesh, a substantial proportion of income was spent on poisoning; however, Indian data with regard to the cost of care in DSH is not robust.[3,5] The most common cause of DSH is organophosphorus compounds in India, as noted in our study as well.[9] In addition to the clinical morbidity, poisoning causes a significant economic burden; the incidence is higher in young age-group (15–40 years) who are the breadwinners of their families[10,11] In our cohort, there was a 67% increase in the direct cost attributed to pesticide poisoning as compared to the non-pesticide DSH, similar to Nambiar et al., where organophosphorus was the most common poison consumed (34%) and incurred the highest cumulative expenditure (₹830,000) and the highest expenditure per admission (₹18,500).[12]

In our study, one in five patients required intensive care therapy. Besides a need for an intensive care, the intensive care-related supports such as inotropes and development of VAP infection were also associated with a higher healthcare costs. Hence, nationally implemented policies curtailing free access to highly hazardous pesticides that are associated with increased need for intensive care and mechanical ventilation will decrease the economic burden due

Table 2: Analysis of factors associated with increased cost of care in patients with deliberate self-harm ($n = 107$)

	Actual amount (Indian Rupees)	*Log transformed*	
Variables	*Median (IQR)*	*OR (95% CI)*	*p*
Pesticide Non-pesticide	19,435 (10,657–65,085) 13,020 (8530–20,710)	1.67 (1.13–2.46)	0.01
ICU Non-ICU	71,845 (40,996–107,421) 11,680 (8415–17,387)	6.65 (4.87–9.07)	<0.001
Ventilation No ventilation	83,165 (53,280–113,635) 12,212 (8496–18,103)	7.33 (5.27–10.21)	<0.001
Inotropes No inotropes	87,845 (27,500–452,625) 13,107 (8861–25,203)	5.54 (2.37–12.94)	<0.001
VAP No VAP	144,517 (69,901–612,130) 13,020 (8842–23,902)	11.65 (5.84–23.29)	<0.001

CI, confidence interval; ICU, intensive care unit; IQR, interquartile range; OR, odds ratio; VAP, ventilator-associated pneumonia

to the direct costs in resource limited nation such as ours, with high proportion of DSH due to pesticides.[13]

The limitations of our study were our inability to assess the indirect costs and loss of wages due to hospitalization and the economic impact of the costs on the family of the patients since this is a retrospective study.

Conclusions

Deliberate self-harm leads to a significant economic burden to patients and their families. Pesticide-based poisoning is the most important cause for DSH and also incurs a higher direct cost compared to non-pesticide poisoning.

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