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Research Article

Enhancing Adverse Effects Detection in Psychiatric Care: Development and Validation of a Trigger Tool - A Pilot Study

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ABSTRACT

Aim

To assess the impact of the effectiveness Psychiatry Trigger Tool (PSYTT) in patients suffering from mental health complications

Methodology

A PSYTT was developed in five stages including literature review, Expert panel screening, Delphi panel review, computing average mean and statistical reliability test, and the final list of triggers. A prospective observational pilot study was performed over two 6-week cycles in a tertiary care teaching hospital. Data was collected using a developed Google form with PSYTT including 59 triggers across five modules viz., Behavioral, clinical, medication, laboratory, and general module. Statistical analysis was performed using SPSS version 21.

Results

A total of 92 case records were reviewed using the developed tool for 3 months. The triggers were investigated for their presence, frequency, and ability to detect adverse effects. Only 63 case reports had 219 triggers, while 29 cases had no triggers at all. 14 of the 59 PSYTT triggers were identified more than five times in the reviewed cases. Adverse effects were found in 41% of the cases studied. It has been observed that triggers such as somnolence, constipation, extrapyramidal symptoms, tachycardia, and tremor were able to help to identify the adverse effects frequently.

Conclusion

A set of triggers was specifically designed, developed and validated for detecting ADRs in the psychiatry department. This newly developed PSYTT can assist in ADR detection allowing timely interventions and enhancing safety for patients visiting the psychiatry department. But further research is recommended to explore the applicability of PSYTT in other mental health settings worldwide.

Keywords: Adverse drug reaction, trigger tool, Psychiatry, triggers, adverse drug events

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CONFLICT OF INTEREST AND SOURCE OF FUNDING

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DATA AVAILABILITY STATEMENT

The datasets generated during and/or analyzed during the current study are not publicly available but are available from the corresponding author on reasonable request.

Introduction

Adverse drug reactions (ADRs) are a concern for the public's health, affecting patients by needing hospitalization or a prolonged hospital stay(Davies EC, 2009; Suh DC, 2000; Dormann H, 2004), leading to increased health care costs(Wu C, 2012), poor compliance to drug therapy (Nagpal, 2010; Del Pozzo-Magaña BR, 2015), and a negative impact on quality of life (Del Pozzo-Magaña BR, 2015). ADRs are potentially fatal and are one of the most prevalent causes of death in the general population(Lazarou J, 1998; Moore N, 1998; Classen DC and Metzger J, 2003). The median (with interquartile range[IQR]) prevalence of ADR-related hospitalization in developed and developing countries was 6.3 % (3.3–11.0) and 5.5 % (1.1–16.9), respectively. The median proportions of preventable ADRs in developed and developing countries were 71.7 % (62.3–80.0) and 59.6 % (51.5–79.6), respectively(Angamo MT, 2016). During the hospital stay in Uganda, 256 (48.9%) of the patients experienced at least one ADR. A total of 365 ADRs were identified during 4702 person-days of follow-up. The incidence of ADRs was 78 ADRs/ 1000 person-days (Yadesa TM, 2021). In Finland, a total of 53 ADEs were detected in the 834 medical records with the GTT, which corresponds to 13 ADEs/1000 patient-days and 6% of the patients (Valkonen V, 2023).

In India, the median incidence of ADRAd (ADR at admission) and ADRIn (ADR after admission) was 2.85 %(IOR: 1.25- 3.93%) and 6.34% (IQR: 3.36- 16.37%), respectively,

according to a systematic study. Studies performed in intensive care units, elderly age groups, with intensive monitoring, length of >1 year, and a multidisciplinary team had a high incidence rate, according to the subgroup report. The fatal ADR rate was 0.08% (95% CI: 0.00-0.15%). The elderly, female sex and polypharmacy were all important risk factors for ADRs. ADRs have a high prevalence in hospitalized patients (Patel TK and Patel PB, 2016).

Monitoring adverse events over time can help determine whether adjustments are enhancing the patient safety. The traditional method of detecting ADRs was through voluntary reporting and spontaneous reporting. However, hardly 10-20% were reported, leading to minimal harm to patients. A more effective method for identifying adverse events that cause harm to patients is required in order to choose and evaluate changes to lessen harm. Using triggers to identify adverse events is an effective way to assess overall harm from treatment in the healthcare sector. "A trigger is defined as an occurrence, prompt or flag found on review of the medical record that 'triggers' further investigation to determine the presence or absence of an adverse event"(Matlow AG, 2011). A trigger may include a laboratory trigger, a medical trigger, or a clinical trigger. Earlier studies report that the use of triggers promotes a more focused chart review and thus may help to identify ADRs (Matlow AG, 2011; Brenner S, 2012; Scobie S, 2006).

The IHI Global Trigger Tool for Measuring Adverse Events is intended for monitoring an overall extent of harm, rather than measuring harm in a specific area. Organizations such as the National Patient Safety Agency in the United Kingdom, which gather and analyze data on patient safety incidents in mental health settings, do it through incident reporting systems, a traditional methodology affected by significant underreporting (Scobie S, 2006; Schmidt LG, 1984). Unlike in standard healthcare settings, studies in mental health facilities frequently do not look at all aspects of patient safety issues. For example, several studies in psychiatry are solely concerned with Adverse Drug Events (ADEs) (Rothschild JM, 2007; Hawton K, 1978). Other studies, the majority of which rely on incident reports for data, focus on either

aggressive or self-injurious behaviors, and occasionally just on accidents in mental health settings (Hawton K, 1978; Barlow K, 2000; James K, 2012; Fairlie A and Brown R, 1994). Following the widespread implementation of the Global Trigger Tool (GTT), several successful initiatives to develop trigger tools for usage in a variety of healthcare settings have occurred (Matlow AG, 2011; Karpov A, 2016; Singh R, Griffin FA, 2009).

However, equivalent efforts have not been made in the field of mental health. This study outlines the development and validation of a specialized trigger tool, the psychiatry Trigger Tool, based on the principles of the Institute for Healthcare Improvement (IHI's) GTT and trigger tool methodology, with the goal of detecting and measuring both traditionally defined ADRs and other patient safety incidents relevant to mental health settings via a prospective pilot study.

Materials and methods

Development and Validation of Trigger Tool:

The development of trigger tool comprised of five steps: first, the triggers were identified from published studies and other available sources (Rajesh V, 2013), and then an initial list of triggers was compiled. The subsequent step involved the examination of initial triggers by an expert panel consisting of psychiatrists and clinical pharmacists. After the expert opinion, a Delphi panel, comprising of two psychiatrists and two clinical pharmacists, conducted a review of compiled triggers. The panel members, assessing each trigger item for relevance, validity, and suitability, evaluated the items in the list using a Likert scale of 1 to 5 to make their decisions. An item has been included or excluded from the list based on the collective opinion of the members. At the end of the review, the ratings of four team members were summarized along with their ratings and distributed to all team members. Items having a mean rating of 3.5 or above on a 5-point scale were considered for inclusion on the list. The trigger tool was finalized after the Delphi panel evaluation. The Figure 1 depicts the steps involved. The trigger tool was

further validated internally by a reliability test: Cronbach's Alpha coefficient test using SPSS software version 21.

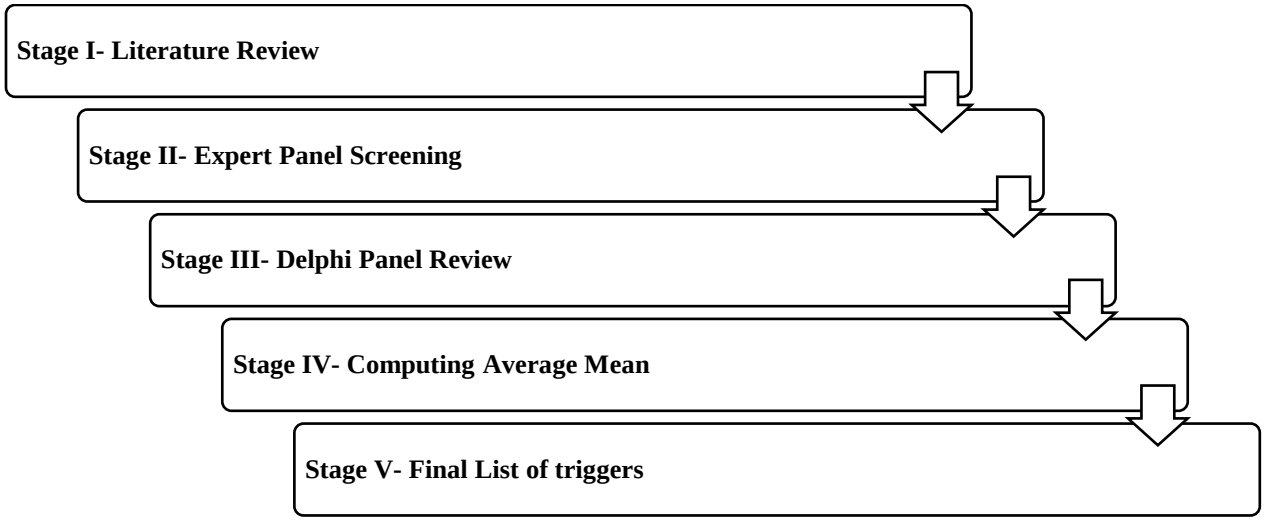

Figure. 1- Stages of development of PSYTT

Development of Adverse drug reaction trigger tool in digital form:

A comprehensive ADR trigger tool was developed digitally in the form of 'Google Form', for easy access and reporting. Data was acquired using this Google form, and it was built with similar information from suspected ADR reporting forms and a designed trigger tool. The Google form has been categorized into three sections. The first section contains patient information and facts about the suspected medicine, as well as a description of the reaction. The second section, known as the reporter form, contains information about the healthcare professionals responsible for reporting. The third section, designated as the trigger tool, encompasses behavioral, clinical, medical, laboratory, and general triggers categorized according to adverse events as per The National Coordinating Council for Medication Error Reporting and Prevention (NCC-MERP).

Study:

A prospective observational pilot study was carried for 3 months from 15 May 2022 to 15 August 2022 in patients admitted to JSS Medical College and Hospital, a 1200-bed tertiary care teaching hospital at Mysuru, Karnataka (India). The study protocol (JSSMC/IEC /13042022/ 15NCT /2021-22) was approved by the Institutional Ethics Committee of JSS Medical College and Hospital before the commencement of the study. The purpose of the study was explained to the guardians, and written informed consent was obtained with the guardian's signature. The developed Psychiatry trigger tools (PSYTT) were implemented in in-patient settings, and comprehensive data of patients with discharge summaries was compiled. A two-stage assessment of patient records was carried out. In the first stage, the healthcare professional independently checked each patient record using PSYTT to record the presence or absence of triggers and/or ADRs. The presence of triggers and/or ADRs was validated by the physician in the second stage by cross-checking with information from the patient's record. The healthcare professional recorded the final findings in the ADR reporting Google form, which was digitally signed by the reporter.

The case records with triggers were evaluated further to identify adverse effects. After determining the presence of adverse events, the level of harm was classified utilizing the NCCMERP Index. According to this index, the harm categories were E (temporary harm necessitating intervention), F (temporary harm necessitating initial or lengthy hospitalization), G (permanent patient injury), H (intervention for maintained life), and I (death).

Results:

A preliminary list of 69 triggers was developed based on the literature research and the global trigger tool method. The expert panel evaluated and approved these triggers for further

assessment by the Delphi panel. Following the Delphi panel's final evaluation, 10 triggers were removed Table 1 lists the deleted triggers with validation scores.

Table 1: List of triggers omitted during the Delphi panel review process

S No	Deleted triggers	The average mean obtained out of 5
1.	Transfer to a higher level of care	3.25
2.	Reports of absconding or missing from hospital	3
3.	Imaging studies (ex: x-ray, CT scan)	2.75
4.	WBC<3.0 or neutrophils<1.5	3
5.	Raised serum prolactin (>500mIU/L)	3.25
6.	Ultrasonography	3
7.	Acetone +	2.75
8.	Plasma ammonia levels>	3.25
9.	Transfer to general hospital/ medical ward/ referral for medical consultation	3.25
10.	Acute dialysis	3

The final trigger list comprised of 59 items divided into five categories: a) behavioral module (B1 – B13), b) clinical module (C1 – C14), c) medication module (M1 – M17), d) laboratory module (L1 – L11), and e) general module (G1 – G4). Table 2 summarizes the validation outcomes for the final list of triggers. Table 3 shows the results of the internal validation of the final trigger tool using Cronbach's Alpha coefficient reliability test.

Table 2: The final set of triggers in PSYTT

Behavioral Module			
S.No	**Trigger division**	**Behavioral Trigger**	**The average mean obtained out of 5**
1.	B1	Self-harm/ suicide attempts/ suicide	4.5
2.	B2	Disturbed/ aggressive/violent behavior or physical aggression by patient/ mania	4

3.	B3	Restraint or seclusion use	3.75
4.	B4	Extrapyramidal symptoms (false parkinsonism, nystagmus, akathisia, tardive dyskinesia, excess salivation)	4.5
5.	B5	Sexual habits (increased libido, decreased libido, irregular menstruation)	4
6.	B6	Somnolence	4.5
7.	B7	Anxiety/ Nervousness/ confusion	4.25
8.	B8	Tremor	4
9.	B9	Seizure	4.25
10.	B10	Euphoria	4
11.	B11	Disorientation	4
12.	B12	Xerostomia	4.25
13.	B13	Worsening of depressive symptoms	3.75
Clinical Module			
1.	C1	Constipation	4.25
2.	C2	Ineffective thermoregulation	4
3.	C3	Loss of appetite/ indigestion, diarrhea	4.25
4.	C4	Abnormal hemorrhage	4.25
5.	C5	Hypercholesterolemia, weight gain	4.5
6.	C6	Cardiac dysrhythmia, MI, cardiomyopathy, bradyarrhythmia	4.75
7.	C7	Hypothyroidism	4.75
8.	C8	Hypotension/ orthostatic hypotension	4.25
9.	C9	Tachycardia	4
10.	C10	Nephrotoxicity	4.5
11.	C11	Respiratory depression/ arrest	4.25
12.	C12	Memory impairment/ irritability	4.25
13.	C13	Diminished sweating/ photosensitivity	4
14.	C14	Abnormal digestive peristalsis, intestinal GI hypomotility,	4

		paralytic ileus	
Medication Module			
1.	M1	Abrupt medication stop/ reduction in dose	4
2.	M2	Anticholinergics (ex: atropine)	4
3.	M3	Antimicrobials	3.5
4.	M4	Use of rectal suppository/ enema/ oral bisacodyl	4
5.	M5	Antihistamines	4
6.	M6	Analgesic/ anti-inflammatory	3.5
7.	M7	Antihyperlipidemic drugs	3.5
8.	M8	Thyroxine	3.5
9.	M9	Antidiabetic medications	3.75
10.	M10	Rapid tranquilization	3.5
11.	M11	Antihypertensive/ propanalol	4
12.	M12	Syndopa/ levodopa/THP	3.5
13.	M13	Anticonvulsant therapy	4
14.	M14	Antidiarrhoeal	4
15.	M15	Naloxone	3.5
16.	M16	Fludrocortisone/ midodrine/ flumazenil	4
17.	M17	Anti-emetic	4
Laboratory Module			
1.	L1	Serum creatinine> two-fold, BUN> , GFR>	3.75
2.	L2	Prolonged QT interval (ECG)	3.75
3.	L3	Plasma sodium levels<	4
4.	L4	Glucose level >	3.5
5.	L5	INR>5 /coagulation test	3.5
6.	L6	SGPT/SGOT/Bilirubin >	4
7.	L7	Waist circumference	3.5

8.	L8	BP/ orthostatic vital signs	3.5
9.	L9	TSH> , T4<	3.75
10.	L10	TGL>	3.5
11.	L11	CRP+	3.75
General Module			
1.	G1	Initiation or increase in frequency of monitoring of physical Parameters	4.25
2.	G2	Readmission within 30 days of discharge	3.5
3.	G3	Pressure ulcers	3.75
4.	G4	Healthcare-Associated Infections	3.5

Table 3: Reliability Statistics

Reliability Statistics

Cronbach's Alpha	N of Items
.990	59

Assessment of case records using PSYTT

The presence of triggers was investigated in 92 cases. Figure 2 illustrates that only 63 case records had 219 triggers, whereas 29 cases did not have any triggers.

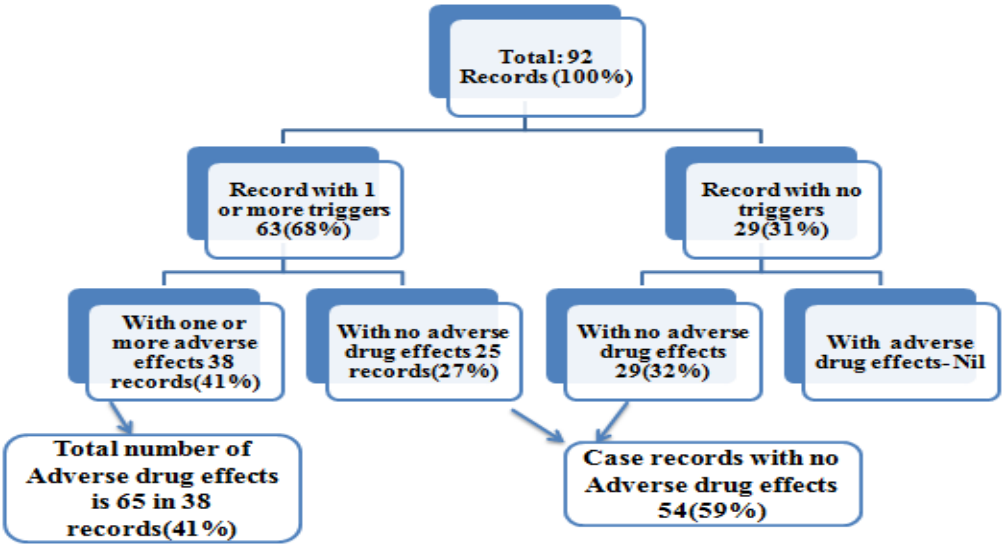

Figure. 2- Results of the review of patient records using the PSYTT.

Behavioral module

Four items out of the 13 triggers in the behavioral module were identified in the patients under examination more than five times. Somnolence (B6) was detected 19 times, followed by Anxiety/Nervousness/Confusion (B7) 16 times, Tremors (B8) 13 times, Extrapyramidal symptoms (B4) 10 times and, Self-harm/ suicide attempts/ suicide (B1) 4 times. The triggers in behavioral module with codes: B2, B3, B10, B11, B13 were not observed in any of the patients.

Clinical Module

Four items out of the 14 triggers in the clinical module were identified to have occurred more than five times in the patients under examination. Memory impairment/ irritability (C12) was detected 21 times, followed by constipation (C1) 15 times, loss of appetite/indigestion/diarrhea (C3) 13 times, and tachycardia (C9) 9 times. The triggers in clinical module with codes: C2, C4, C5, C6, C8, C10, C11, C13, and C14 were not observed in any of the patients.

Medication module

Seven out of the 17 triggers in the medication module were identified in the patients under examination more than five times. Abrupt medication stop/reduction in dose (M1) was detected 31 times, followed by use of rectal suppository/enema/oral bisacodyl (M4) 11 times, analgesic/anti-inflammatory (M6) 9 times, Syndopa/levodopa/THP (M12) 7 times, and antihypertensive/propranolol (M11) 5 times. The triggers in medication module with codes: M2, M7, M10, M15, M16, and M17, were not observed in any patients.

Laboratory module

Prolonged QT interval (ECG) (L2) was noticed 5 times out of the 11 triggers in the laboratory module, whereas SGPT/SGOT/Bilirubin (L6) and BP/orthostatic vital signs (L8) were identified 3 times each. The triggers in laboratory module with codes: L1, L3, L4, L5, L7, L10 and L11 were not observed in any patients.

General module

In the general module, out of the 4 triggers, initiation or increase in frequency of monitoring of physical parameters (G1) was observed 6 times, and readmission within 30 days of discharge (G2) was observed 1 time. The triggers in general module with codes: G3 and G4 were not observed in any patients. The Table- 4 shows the frequency of triggers in 92 cases.

Table 4: Frequency of triggers in the reviewed cases

S.No	Trigger division	Behavioral Trigger	Frequency of triggers in 92 cases (%)
1.	B1	Self-harm/ suicide attempts/ suicide	4(4.3)
2.	B2	Disturbed/ aggressive/violent behavior or physical aggression by patient/ mania	0
3.	B3	Restraint or seclusion use	0
4.	B4	Extrapyramidal symptoms (false parkinsonism, nystagmus, akathisia, tardive dyskinesia, excess salivation)	10(10.8)
5.	B5	Sexual habits (increased libido, decreased libido, irregular menstruation)	2(2.1)
6.	B6	Somnolence	19(20.6)
7.	B7	Anxiety/ Nervousness/ confusion	16(17.3)
8.	B8	Tremor	13(14.1)
9.	B9	Seizure	1(1)
10.	B10	Euphoria	0
11.	B11	Disorientation	0
12.	B12	Xerostomia	2(2.1)
13.	B13	Worsening of depressive symptoms	0
Clinical Trigger			
1.	C1	Constipation	15(16.3)
2.	C2	Ineffective thermoregulation	0
3.	C3	Loss of appetite/ indigestion, diarrhea	13(14.1)

4.	C4	Abnormal hemorrhage	0
5.	C5	Hypercholesterolemia, weight gain	0
6.	C6	Cardiac dysrhythmia, MI, cardiomyopathy, bradyarrhythmia	0
7.	C7	Hypothyroidism	2(2.1)
8.	C8	Hypotension/ orthostatic hypotension	0
9.	C9	Tachycardia	9(9.7)
10.	C10	Nephrotoxicity	0
11.	C11	Respiratory depression/ arrest	0
12.	C12	Memory impairment/ irritability	21(22.8)
13.	C13	Diminished sweating/ photosensitivity	0
14.	C14	Abnormal digestive peristalsis, intestinal GI hypomotility, paralytic ileus	0
Medication Trigger			
1.	M1	Abrupt medication stop/ reduction in dose	31(33.6)
2.	M2	Anticholinergics (ex: atropine)	0
3.	M3	Antimicrobials	1(1)
4.	M4	Use of rectal suppository/ enema/ oral bisacodyl	11(11.9)
5.	M5	Antihistamines	3(3.2)
6.	M6	Analgesic/ anti-inflammatory	9(9.7)
7.	M7	Antihyperlipidemic drugs	0
8.	M8	Thyroxine	1(1)
9.	M9	Antidiabetic medications	3(3.2)
10.	M10	Rapid tranquilization	0
11.	M11	Antihypertensive/ propanalol	5(5.4)
12.	M12	Syndopa/ levodopa/THP	7(7.6)
13.	M13	Anticonvulsant therapy	4(4.3)
14.	M14	Antidiarrhoeal	1(1)

15.	M15	Naloxone	0
16.	M16	Fludrocortisone/ midodrine/ flumazenil	0
17.	M17	Anti-emetic	0
Laboratory Trigger			
1.	L1	Serum creatinine> two-fold, BUN> , GFR>	0
2.	L2	Prolonged QT interval (ECG)	5(5.4)
3.	L3	Plasma sodium levels<	0
4.	L4	Glucose level >	0
5.	L5	INR>5 /coagulation test	0
6.	L6	SGPT/SGOT/Bilirubin >	3(3.2)
7.	L7	Waist circumference	0
8.	L8	BP/ orthostatic vital signs	3(3.2)
9.	L9	TSH> , T4<	1(1)
10.	L10	TGL>	0
11.	L11	CRP+	0
General Trigger			
1.	G1	Initiation or increase in frequency of monitoring of physical Parameters	6(6.5)
2.	G2	Readmission within 30 days of discharge	1(1)
3.	G3	Pressure ulcers	0
4.	G4	Healthcare-Associated Infections	0

Statistical Analysis

The statistical analysis was performed using SPSS version 21. Pearson's correlation coefficient was used to assess the relationship between the number of triggers and the harm level, which was found to be 0.848441, which is highly significant; similarly, the correlation between the number

of triggers and the number of adverse effects was found to be 0.845413, which is also highly significant.

The NCCMERP Index was used to categorize adverse effects. There were only three types of harm: E, F, and H. E was the most common category (41%), F was second (12%), and H was the least common (0.015%), as shown in Figure 3. The frequency of suspected medication and the frequency of drug-related adverse effects are shown in Figures 4 and 5, respectively.

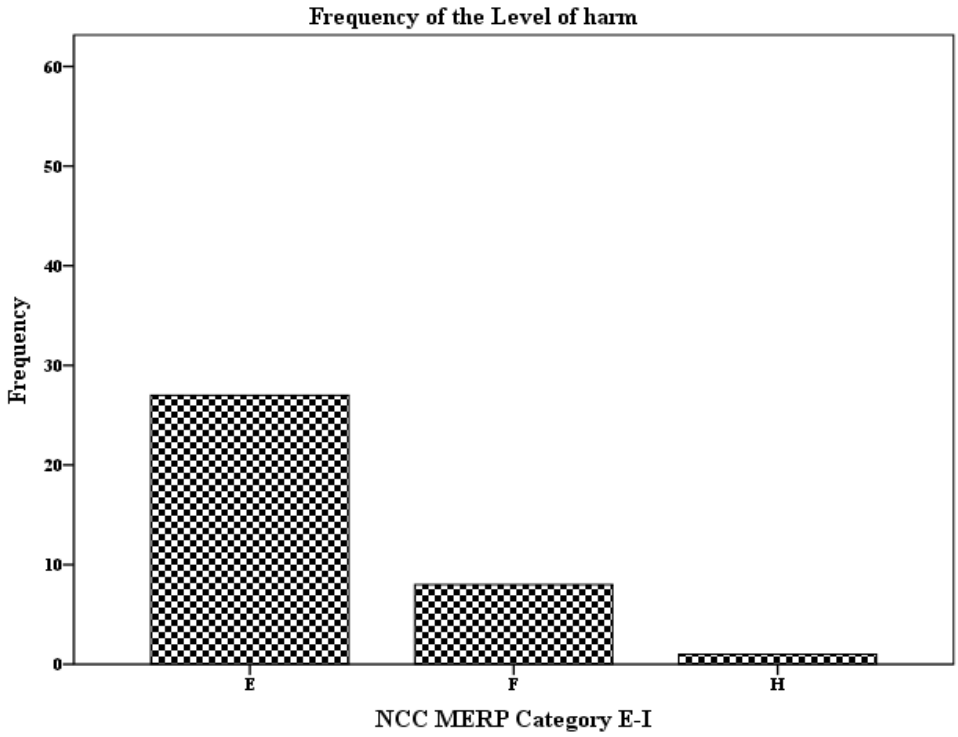

Figure. 3- Frequency of the level of harm

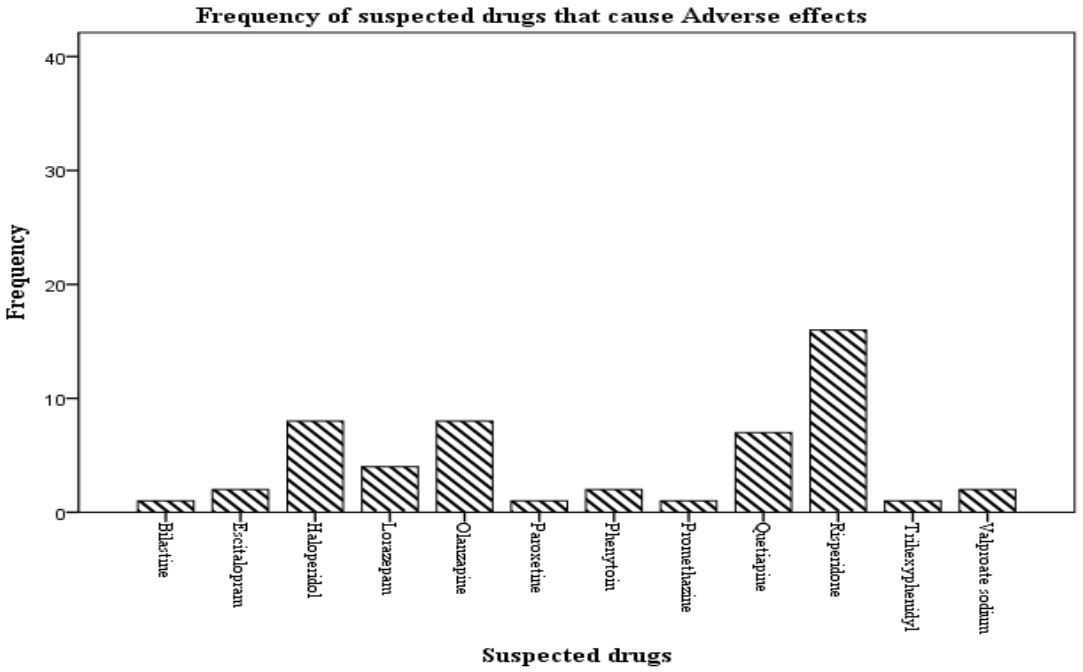

Figure. 4- Frequency of suspected medication that cause adverse effects

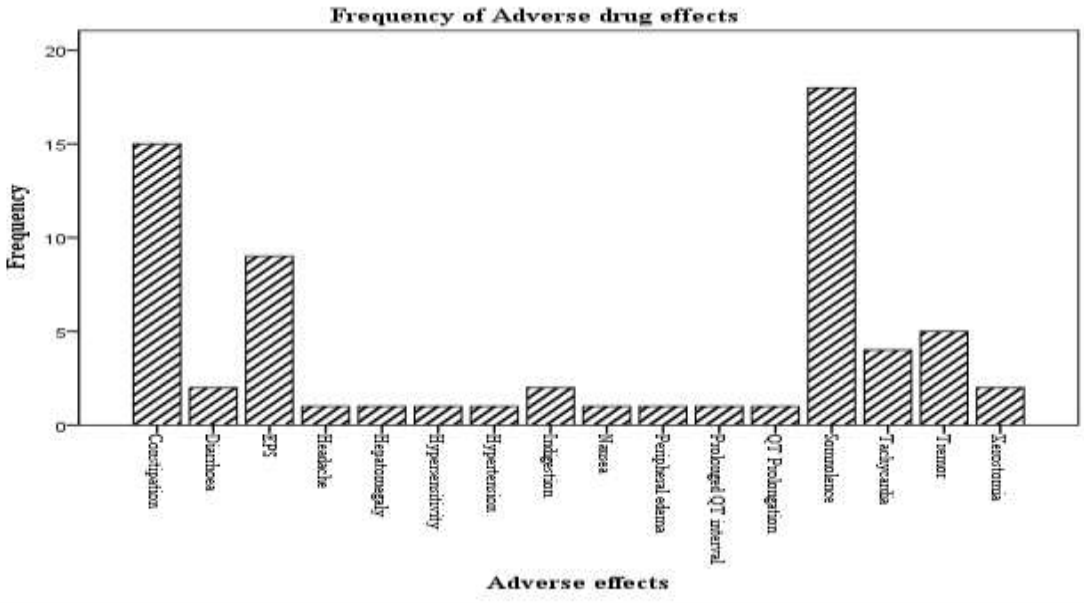

Figure. 5- Frequency of adverse effects

Discussion:

The present tools for evaluating AEs in standard healthcare settings may not be compatible with use in mental health settings. The IHI's monograph clearly states that inpatient psychiatric

patients should be excluded from GTT because the tool's triggers are not identified for this population (Griffin FA, 2009).

The present investigation tried to develop a trigger tool for psychiatry that was molded to Indian situations. Previous studies have shown the prevalence of adverse medication effects in psychiatry. For example, a cross-sectional retrospective study conducted at AIIMS Jodhpur from 2014 to 2020 found 334 ADRs. The majority of these ADRs were associated with antipsychotics (60.6%), followed by antidepressants (25.5%) and antiepileptic medications (5.8%). Clozapine (15.8%) was found to be the most usually implicated antipsychotic, whereas Escitalopram (6.1%) was related with the greatest number of side effects among antidepressants (Ambwani S, 2021).

Traditionally, the detection of ADRs has relied primarily on voluntary reporting with the use of causality assessment scales. However, in this traditional approach the medications were not rechallenged, therefore the identified number of ADRs represents only probable and unlikely situations. This limitation arises because most ADRs in the psychiatric department exhibit primarily as behavioral symptoms, with no precise laboratory markers to describe them, such as somnolence, extrapyramidal symptoms (EPS), constipation, and so on. Unfortunately, this traditional system has resulted in inadequate reporting and a lack of collaboration from healthcare practitioners, among other issues.

This trigger tool was developed using the Delphi technique, which is well-known for its reliability. This approach is thought to be more objective in exploring human judgments and contributes to less subjective decision-making. Following the Delphi panel evaluation, the final trigger tool included 59 triggers. Traditionally, the detection of adverse drug reactions (ADRs) has relied primarily on voluntary reporting with the use of causality assessment scales. However,

in this approach, the drugs were not subjected to rechallenge, which means that the identified number of ADRs only represents probable and unlikely cases. This limitation arises because most ADRs in the psychiatry department manifest mainly as behavioral symptoms, lacking specific laboratory parameters to define them, such as somnolence, extrapyramidal symptoms (EPS), constipation, and others. Unfortunately, this traditional method has resulted in poor reporting and a lack of cooperation from healthcare providers, among other factors.

Various groups around the world have developed trigger tools to assess adverse events in a wide range of medical settings. However, in the field of psychiatry, the number of tools available is limited and less sensitive, with many being used mainly in retrospective case studies. To our knowledge, this Psychiatry Trigger Tool (PSYTT) developed is the first of its type in India and may be applied to both prospective and retrospective studies. The trigger tool methodology offers an alternate approach to screening for adverse effects. This approach minimizes the burden on treating clinicians by having the reviewer review, verify, and report the events. Compared to voluntary reporting, this method has been shown to detect more adverse effects. In the current study, ADRs were detected in 41% of the reviewed cases, demonstrating the effectiveness of this method in the Indian setting. A total of 65 ADRs were identified in 38 patients using the Patient Safety in Psychiatry Trigger Tool (PSYTT). This method not only serves as a basis for measuring the incidence of ADRs within an organization, but it also determines the effectiveness of interventions targeted at lowering ADRs in psychiatric patients.

Conclusion:

A psychiatric trigger tool for assessing the impact of adverse effects in the psychiatric unit was developed, and pilot research was conducted. The designed trigger tool list successfully identified 63 cases of the 92 investigated case reports, indicating potential adverse effects and

hence, systematic measures to improve the quality of psychiatric care are necessary. The study extends the knowledge of adverse events in psychiatric care. The PSYTT is a practical and simple instrument for understanding and monitoring a range of patient safety occurrences in mental health settings. It is intended for inpatient mental health facilities and may require modifications for outpatient settings. Additional research is needed to see whether PSYTT is applicable across different mental health settings, worldwide. The use of trigger tools to identify adverse medication events can aid in better understanding the adverse drug events of patients treated in psychiatric units and improving pharmacovigilance measures in this area.

Author contributions

The authors of the manuscript met the criteria for Authorship as outlined by the International Committee of Medical Journal Editors (ICMJE). Sharumathi SM played a key role in collecting the data, acquiring knowledge, and analyzing data. Bhavatharini Sukumaran and Rinu Mary Xavier contributed to the literacy quest and drafting of the manuscript. Arun K.P. reviewed and assisted with the preparation of the manuscript. The final version of the manuscript was revised and supervised by Deepalakshmi M.

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