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Referral of patients to Plastic Surgeons following self-harm : Opportunities for suicide prevention?

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Introduction

Self-harm has been defined as repetitive, low-lethality actions that alter or damage body tissue without suicidal intent.^{1,2} The commonest methods of self-harm include cutting (75%), self-hitting (30%) and burning (28%).³ Over 33 descriptors and acronyms exist for this pattern of behaviour¹ including deliberate self-harm (DSH), self-injurious behaviour (SIB), self-mutilation, self-inflicted violence (SIV) and parasuicide. A majority (59-72%) of patients who self-harm deny having suicidal thoughts when self-harming, leading to the use of yet another term; non-suicidal self-injury (NISSI).⁴

Self-injury has been proposed as an action to avert suicide and relieve distress in response to psychological experiences such as tension, anger, anxiety and loss of control.⁵ At a biological level, the endogenous opioid system has been implicated

because of the analgesia that individuals experience during the act of self-injury along with the subsequent high many experience following it.⁶

However self-harm can be associated with suicidality and suicidal intent can also change over time. This has led to conflicting schools of thought whereby some researchers classify all self-harm on a continuum of suicidal behaviour.^{3,7} Others believe self-harm and attempted suicide are counter-intentional and should therefore be viewed as distinct entities.^{1,2} This distinction has clinical implications as patient care by medical and mental health professionals may differ depending on how the behaviour is described (e.g., as suicidal or self-injurious).

Hospital doctors are frequently confronted with patients following self-injury from lacerations or burns and need to understand the inherent risk, outlined in **Tables 1 and 2**, these patients pose for repeat self-injury and/or suicide. Self-harm presentations to hospital are important opportunities for suicide prevention. Surgeons have the means to offer an effective intervention in the post-operative phase and prior to discharge in collaboration with mental health services.⁸⁻¹⁰ Many issues arise when caring for these patients with respect to the safety of day case admission, transfer from referring hospitals and discharge planning. Considering the broad spectrum of self-inflicted injuries referral to plastic and hand surgery services, there is a paucity of literature describing the appropriate future management of these patients' mental health.

Aims

The aim of this study was to analyse the incidence and spectrum of injuries secondary to self-harm referred to the plastic surgery service in a tertiary referral centre. We also aim to identify ways to improve safety of referral, admission and discharge of patients following self-harm in conjunction with mental health services and to propose an intervention aiming to reduce future events.

Methods

A retrospective single center case series was carried out of all patients presenting or referred to Galway University Hospitals (GUH) following self-harm over a 7-year period from January 2010 to December 2016. Ethical approval was obtained at the outset of this study. Hospital in-patient enquiry data were cross-referenced with data provided by the National Self-Harm Registry Ireland (NSHRI) for the study period. NSHRI is the world's first national registry of intentional self-harm presentation to hospital emergency departments, funded by the Health Service Executive's National Office for Suicide Prevention.¹¹ A comprehensive chart review was carried out. Data were analysed using standard statistical software package (SPSS).

Results

During the study period, 61 individual presentations of self-harm occurred in 49 patients admitted under the care of plastic surgery. The ratio of male to female patients was similar with 26 male (53%) and 23 female presentations (47%). Mean age was 40 +/- 16 years with a range of 21 to 95 years. Concomitant alcohol or illicit

substance abuse was recorded in 17 of 61 self-harm presentations (28%). Thirteen of the 49 patients (27%) had repeat presentation for self-harm during the study period.

Four patients (8%) died by suicide during the study period. One patient completed suicide (self-drowning) after absconding during admission following repair of wrist lacerations. This patient left the hospital grounds during his surgical admission whilst under one-to-one supervision. He had been diagnosed with psychotic depression following psychiatric evaluation and was awaiting transfer from the plastic surgery services to the psychiatric ward under the Mental Health Act 2001. Another patient completed suicide one year after repair of wrist lacerations following repeated self-harm presentations. Two patients died as a result of their self-injury (both self-immolation with >80% total body surface area burns), one of whom had no prior psychiatric history.

The mean length of stay was 2.3 days +/- 3.9 with a wide range of 0 – 26 days as outlined in **Table 3**. Seventeen of 61 patient admissions (28%) were followed by same-day discharge. This reflects the accepted practice of same-day discharge for patients undergoing regional anaesthesia for upper limb surgery at our institution.

The mechanism of self-injury was predominantly upper limb injury (54 presentations; 88% of total cohort of self-harm presentations recorded), followed by self-immolation (3 presentations; 5%), leg laceration (3 presentations; 5%), facial laceration (1 presentation; 2%). One patient had concomitant self-poisoning (paracetamol overdose). The breakdown of upper limb injuries included laceration in 46 cases (85%), thermal or chemical burn in 6 cases (11%), biting in 1 (2%) and injection injury in 1 (2%). Intra-operative findings are detailed in **Table 4**. Aside from simple skin laceration, the mean number of injured structures deep to skin was 2 (Range 1-10). A higher proportion of males sustained damage to greater than 6 structures, suggesting a more significant injury severity (See **Table 5**). A greater number of female presentations involved skin only upper limb lacerations (i.e.: no deep structural injury) compared to male presentations. All index presentations involving damage greater than 6 structures were aged 30-45 years old.

Referrals were received by the plastic surgery department from regional hospitals outside GUH in 34 out of 61 cases (56%) versus 27 cases (44%) presenting directly to GUH. Of these outside referrals, most were referred from emergency departments and 4 patients were referred directly from off-site psychiatric units. The majority of outside referral patients were transferred by ambulance to GUH (n=23, 68%) whereas 11 patients (32%) self-transferred to GUH. Patients referred from within GUH were transferred by ambulance in 10 cases (37%) and self-transferred in 15 cases (55%) with 2 additional patients attending directly following GP referral and from the GUH inpatient psychiatric ward.

The time of presentation to hospital is detailed in **Table 6**. The majority of patients arrived outside of normal surgical working hours (n=34, 56%), before 7.30am and after 5pm. Only 17 cases (27%) presented during the normal working hours of the psychiatry department. The impact of timing of presentation on patient management will be further elucidated in the discussion section of this article.

The mental health history of presenting patients is summarised in **Table 7**. Depression was the most common diagnosis while alcohol and substance abuse were reported in 17 cases (28%).

Mental health risk assessment was performed and documented in 47% (16 out of 34) of all presentations with self-injury referred from a regional hospital. Fifteen patients (44%) transferred to GUH for plastic surgery input arrived with no documentation of having had mental health assessment carried out at their referring hospital. The remaining 3 patients (9%) reported mental health risk assessment was carried out at the referring hospital, but no documentation about the outcome of this assessment was provided in their medical transfer notes. Of note, each of the regional hospitals referring patients to GUH have on-site psychiatry services.

Mental health risk assessment was performed and documented in 59% (36 out of 61) of all patient presentations of self-injury to plastic surgery at GUH, including both outside referrals and direct presentations to GUH. In a total of 9 patient presentations (15%), mental health assessment was not performed in any hospital (neither in GUH nor in the outside referring hospital). Of these 9 patients, there were 2 mortalities from self-immolation, one refused to undergo mental health assessment, one absconded from hospital before they could be assessed and 5 were not referred to psychiatry services for reasons which were unexplained by detailed chart review.

Of the patients who did undergo mental health risk assessment in either hospital (52 out of 61 or 85% of all presentations), specific documentation of the need for close or one-to-one observation was made in 11 cases (20%) and was not mentioned in 43 (80%). This disparity in documentation existed despite comprehensive documentation of mental health assessment carried out by appropriately trained psychiatric physicians or psychiatric liaison nurse specialists. The retrospective nature of this study limits data collection to written documentation in medical notes and cannot account for verbal dissemination of such information between psychiatry and plastic surgery teams. However, written documentation of the requirement for one-to-one observation is generally required in our institution in order to obtain the ancillary staff required (nursing, health care assistant or security staff) to carry out this role.

Mental health follow-up plan was documented in 40 of 61 presentations (66%) on discharge of patients following self-injury. This was generally documented by the admitting plastic surgery team, after discussion with psychiatry services. Nine patients were admitted under care of psychiatry postoperatively. One patient was planned for involuntary re-admission to GUH psychiatry department before he self-discharged and completed suicide. Two patients refused admission and were not found to be detainable for treatment under the Mental Health Act 2001.

Discussion

Data from NSHRI recorded 11,485 presentations to hospital due to self-harm nationally, involving 8,909 individuals or 206 per 100,000 population¹¹. Two clinical programmes have been established in Ireland in 2005¹⁴ and 2016¹³ aiming to address the care and treatment required by people who present to emergency departments following self-harm. These programmes outline several recommendations including the development of national guidelines for standardised timely assessment of needs

and risk of patients who self-harm by appropriately trained mental health staff.^{13,14} This study highlights ongoing diversity with regard to assessment procedures and management of patients who present to hospitals after self-injury with 15-53% of patients undergoing no mental health assessment.

People who die by suicide may present to the emergency department with self-harm, often shortly before suicide (median 38 days).⁸ Up to 24% of patients presenting with self-harm are discharged directly from emergency departments without undergoing a psychiatric assessment, despite their increased risk of suicide.^{11,12} Diversity with regard to assessment procedures and management in hospitals, as well as feedback from families bereaved by suicide, have led to calls for the development and resourcing of an effective response for people who present to health services having engaged in self-harm.¹³⁻¹⁵

The present study recorded a high mortality rate from suicide (8%) compared with previously reported rates, summarised in Table 2, despite a relatively short follow-up period. This is likely related to the inclusion of self-immolation as self-harm in this study which carries a high mortality as a lethal mechanism and may be better classified as suicide as opposed to self-harm. The present cohort of patients referred for plastic surgery input following self-cutting also likely had more severe or deeper structural injuries than those managed non-operatively. Depth of wound injury could reflect a greater risk for suicidal intent than those with minor repeated self-cutting or skin only wounds which may not present for medical or plastic surgery intervention and thus could not be captured by this study.

In cases where mental health risk assessment was performed for patients following self-injury (47-85% of presentations), despite detailed documentation in medical notes by psychiatry services, pertinent information specifically relating to patient risk and perceived need for close observation was often absent. This information is paramount to inform admitting surgical teams how best to manage these patients in terms of the need for one-to-one observation, request for ground floor only admission where indicated and safe transfer of patients who may be requested to travel from another facility without plastic surgery services. Requests made for one-to-one observation in our institution requires documentation of the specific need for either nursing/health care assistant or security staff observation of a patient, or both where indicated.

Given the high proportion of people who presented with minor, skin only lacerations many patients in this cohort were treated surgically and discharged on the same day (Table 3). Decision to discharge such a patient may be appropriate on surgical or medical grounds but may not be safe practice depending on individual psychiatric circumstances. This presents potential risk in cases where there is lack of clear documentation regarding patient risk for suicide and psychiatric follow-up plan. The retrospective nature of this study is a limitation which does not allow for collection of data relating to potential verbal communication of information about patient risk between psychiatric and plastic surgery staff during each patient encounter, although this is likely to have taken place in many cases.

Repeat self-harm and suicide are key clinical outcomes in the management of patients presenting with self-harm. Repetition of self-harm was seen in 27% of our cohort during the study period and represents a significant burden on emergency services as well as psychiatry and plastic surgery services alike. This is consistent with previous studies with estimates ranging from 13.7% (CI 12.3– 15.3) using hospital admission data, to 21.9% (CI 14.3–32.2) in studies using patient reported data¹⁷. This suggests a higher occult rate of self-harm which does not result in hospital admission. The hazards of repeat self-harm are higher for those whose initial self-harm was treated in an inpatient setting (HR: 1.65, 95% CI: 1.49–1.83) compared with an emergency department (HR: 0.62, 95% CI: 0.55–0.69) or outpatient (1.00, reference) setting.¹⁸ This most likely reflects the greater severity of injuries which require surgical intervention, and associated higher degrees of violence and intent associated with these acts. Although just 28% of our cohort were discharged on the same day of surgery, this would be the aim for all suitable patients with upper limb injuries in our unit, when not limited by bed shortages or emergency theatre access. Self-cutting is the method most strongly associated with high-risk of repeated self-harm.¹¹ This was true of our study population with all repeat episodes consisting of self-laceration, in addition to two patients who also repeatedly inflicted burns in combination with laceration.

A large proportion of patients presented to the emergency department outside of normal working hours (73% outside of psychiatry working hours and 56% outside of Plastic surgery working hours). Thus, if the injury sustained does not require a surgical admission, these patients can still be offered an effective intervention to reduce their risk of future self-harm or suicide. Only 17 cases (27%) presented during normal psychiatry department working hours (9am-5pm). Outside of these hours there is one psychiatric registrar who is on call off site. The discrepancy in working hours between psychiatry and plastic surgery has the potential to cause management issues and theatre delays for self-harm patients presenting to GUH for Plastic Surgery review between 7.30 and 9am (9 cases or 15% of our cohort) when psychiatric input may not be readily available and is reliant on the availability of the psychiatric registrar. Over the course of the period studied, there were significant changes to the provision of mental health services during working hours, with the expansion of the liaison psychiatry team from one clinical nurse specialist and psychiatric registrar, to the addition of a consultant in liaison psychiatry and a clinical nurse specialist in self-harm.

Effective interventions for self-harm have been well described, provided by appropriately trained healthcare providers. Cognitive-behavioural-based psychotherapy (comprising cognitive-behavioural and problem-solving therapy) has been shown by Cochrane review to reduce repeating self-harm at 6 months and at 12 months follow-up.¹⁶ This therapy is also associated with significant improvements in depression, hopelessness and suicidal ideation. Brief psychotherapeutic interventions delivered in emergency departments have been shown to improve outcomes in terms of treatment adherence, and lower rates of subsequent self-harm related hospitalisations and completed suicide.¹⁵ Stand-alone interventions to mitigate suicide risk suitable for emergency department settings known as Safety Planning Interventions (SPI) have been found to improve outcomes in this group of patients.¹⁰ The basic components of SPI include recognising warning signs of an impending suicidal crisis; employing internal coping strategies; utilising social contacts and

social settings as a means of distraction from suicidal thoughts; utilising family members or friends to help resolve the crisis; contacting mental health professionals or agencies; and restricting access to lethal means.

Alcohol and substance misuse were associated with presentations of self-harm in 28% of our cohort. This is in keeping with the literature which reports alcohol consumption is implicated in more than 37% of cases of self-harm in Ireland.¹⁷ Half of those who die by suicide have had a history of alcohol abuse in the final year of their lives.¹⁹ Alcohol and drug misuse further complicated management of patients following self-harm in terms of patient co-operation and may cause delays in both surgical and psychiatric intervention in this population. Comorbidity of mental health illness and substance misuse are well known to increase the risk factors for self-harm and suicide.²⁰ Provision of alcohol and drug counselling in the acute hospital setting has been associated with improved outcomes as do brief interventions such as motivational interviewing.²¹

The results of the present study show diversity in assessment and management of patients following self-harm that could impact patient safety. The following elements could be standardised and improved:

- 1) Risk assessment at presentation to hospital, prior to and after inter-hospital transfer.
- 2) Prevention of repeat episodes or suicide via one-to one-observation when necessary.
- 3) Optimisation of physical and psychiatric management if admitted to hospital.

In consultation with psychiatry and emergency departments, a standardised referral proforma (Table 8) has been drafted by the authors to optimise referral of patients to plastic surgery and other surgery specialties following self-injury. This simple proforma proposes three minimum datasets to guide safer admission pathways for patients after self-injury and to improve documentation of the following parameters:

- 1) Patient suitability to self-present to plastic surgery trauma clinics the morning after self-injury.
- 2) Requirement for close or one-to-one observation by nursing staff, health care assistant staff or security staff.
- 3) Documentation of a thorough psychiatric assessment and treatment plan (to include necessity for psychiatric admission, outpatient clinic, addiction referral, psychotherapy).

Conclusion

This study demonstrates considerable variation in referral and care pathways of self-harm patients across a hospital group as well as the role of plastic surgeons in treating a wide spectrum of injury mechanisms. Guidelines for assessment and management of patients presenting with self-harm and suicidal behaviours to hospital should be developed and implemented as a matter of urgency. Plastic surgeons, in consultation with emergency and psychiatry services, have a unique opportunity to help standardise and improve management of patients referred following self-harm.

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Table 1: Relationship between self-harm and suicide

- Almost half of people who self-harm, have reported at least one suicide attempt (Klonsky).
- Self-harm can lead to suicide due to failure as a coping mechanism or by desensitising patients in crisis who may view suicide attempts as less frightening (Whitlock), (Stewart).
- Approximately half of all people who die by suicide have previously self-harmed (Foster).
- 15–20% of patients in the UK who complete suicide have visited a hospital for self-harm in the year prior to their death (Gairin).
- 1 in 25 to 1 in 50 patients presenting to hospital for self-harm complete suicide in the subsequent 5 years (Carroll) (Hawton).

Table 2: Summary of studies quantifying risk of suicide and repeat self-harm

Author	Study type	Country of origin	Conclusion
Victor	Systematic Review and Meta-analysis	Canada	Non-suicidal self-harm is the strongest predictor of suicide attempt after suicidal ideation.
Owens	Systematic Review	United Kingdom	Rate of completed suicide is 0.5% to 2% in first year after self-harm and greater than 5% 9 years after self-harm.
Carroll	Systematic Review and Meta-analysis	United Kingdom	Risk of suicide in the first year after self-harm is 1.6%, 3.9% after 5 years and 4.2% at 10 years. Incidence is almost doubled in males compared to females (2.7% vs. 1.2%). Estimated 1 year rate of non-fatal repeat self-harm was 16.3%, ranging from 13.7% using hospital admission data to 21.9% using patient reported data.
Hawton	Mortality follow-up study	United Kingdom, Scotland and Northern Ireland	Suicide risk in the first year after self-harm is 0.7% or 66 times the annual risk of suicide in the general population. 5 years risk estimate was 1.7%, 2.4% at 10 years and at 3.0% at 15 years Males significantly higher risk with hazard ratio of 2.8.
Tidemalm	National cohort study	Sweden	3.0% of males and 1.4% of females died by suicide within 1 year after self-harm, and 8.0% for males or 4.3% for females after 19 years. Incidence rate ratios of suicide ranged between 13.8 to 41.0 for males and between 13.2 to 45.7 for females after self-harm compared to population controls.
Olfson	National cohort study	United States (US studies include self-harm presenting to all settings. UK, Scottish, Irish and Swedish studies only included patients treated in hospitals)	1-year suicide standardised mortality rate ratio was 26.7 compared with matched age, sex, or race and/or ethnicity in the US general population. Adolescents and young adults have 26.7 times higher relative risk of suicide than that of the demographically matched adults after self-harm.

Table 3. Length of stay following admission following self-harm

<i>Day of discharge</i>	Number of Presentations	Percentage of Presentations
<i>Same day discharge</i>	17	28 %
<i>Day 1</i>	13	21 %
<i>Day 2</i>	12	19 %
<i>Day 3</i>	11	18 %
<i>Day 4</i>	3	5 %
<i>Day 5</i>	2	3 %
<i>Day 10</i>	1	3 %
<i>Day 15</i>	1	1.5 %
<i>Day 26</i>	1	1.5 %
<i>Total</i>	61	100 %
<i>Mean</i>	2.3 +/- 3.9 days	

Table 4. Upper limb injury findings following self-harm

		Number	Percentage of total lacerations (n=54)
<i>Flexor Tendons</i>	Number of lacerations with flexor injury	26	48%
	Flexor digitorum superficialis	14	
	Palmaris longus	12	
	Flexor carpi ulnaris	11	
	Flexor digitorum profundus	3	
<i>Extensor Tendons</i>	Number of lacerations with extensor injury	4	7%
	Extensor digitorum comminus	2	
	Extensor digiti minimi	1	
	Extensor pollicis longus	1	
<i>Neurovascular injury</i>	Number of lacerations with neurovascular injury	23	43%
	Median nerve	11	
	Ulnar nerve	6	
	Ulnar artery	5	
	Radial nerve	1	
	Radial artery	1	

Table 5. Upper limb structures injured following self-laceration

<i>Number of structures injured</i>	Number of patients	% Total	Male	Female
<i>Skin only</i>	20	37%	9	11
<i>1 structure</i>	10	19%	6	4
<i>2 structures</i>	4	7%	3	1
<i>3 structures</i>	11	20%	5	6
<i>4 structures</i>	3	6%	2	1
<i>6 structures</i>	2	4%	1	1
<i>7 structures</i>	1	<2%	1	-
<i>8 structures</i>	1	<2%	1	-
<i>9 structures</i>	1	<2%	1	-
<i>10 structures</i>	1	<2%	1	-
<i>Total</i>	54	100%	30	24

Table 6. Timing of presentation to hospital following self-harm

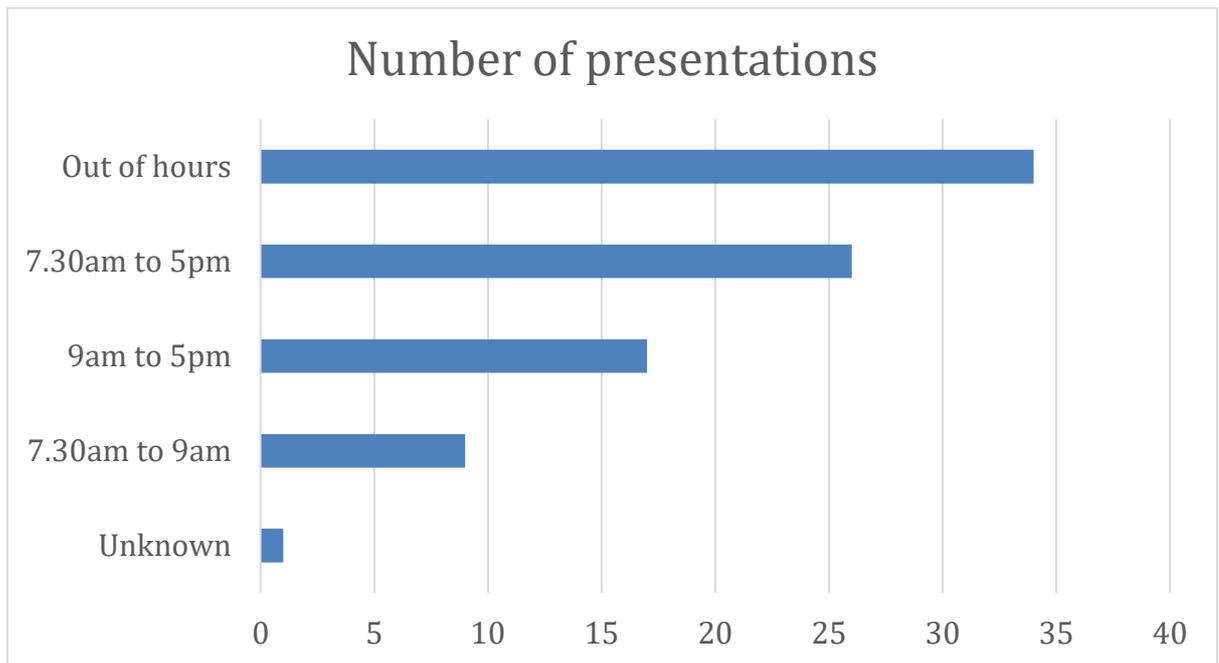


Table 7. Psychiatric diagnoses at presentation following self-harm

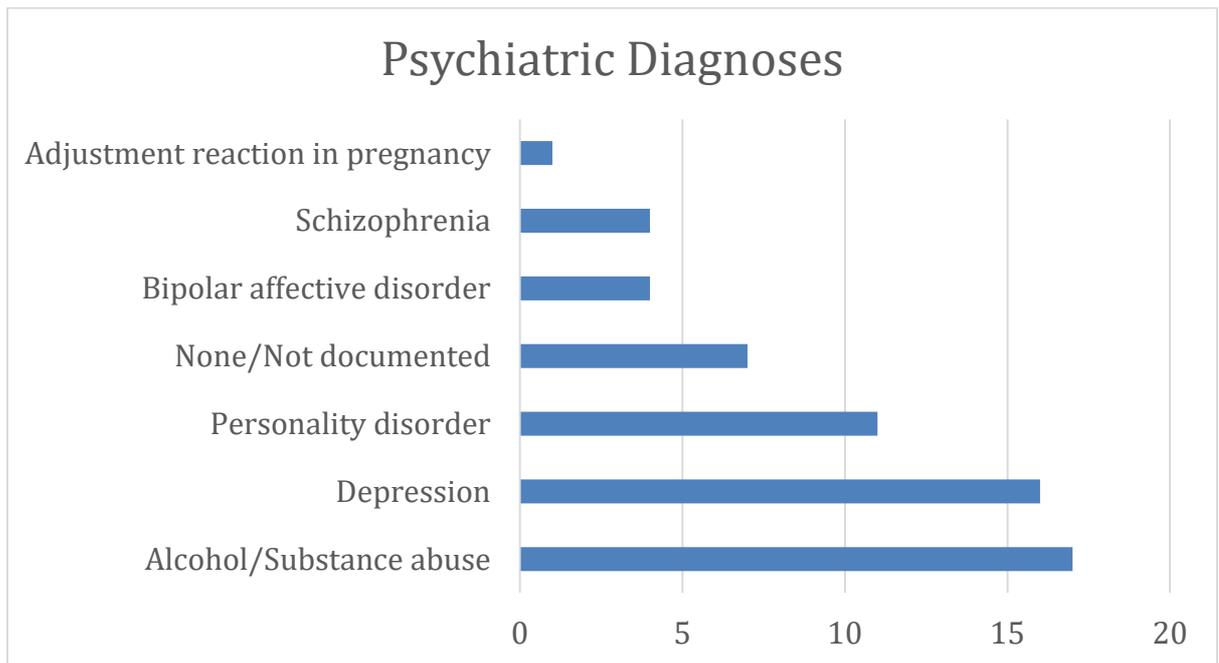


Table 8. Proforma for referral of patients to plastic surgery services following self-harm

- 1) Following mental health risk assessment, is this patient suitable to self-present to plastic surgery trauma clinics the morning after self-injury?

Yes (Please ask to re-attend as per Plastic Surgeon on call's instruction)

No (Please discuss with Plastic Surgeon on call and arrange appropriate inter-hospital transfer as per instruction with appropriate supervision as outlined in Qn 2.)

Other: Please specify:

- 2) Is there a requirement for close or one-to-one observation of this patient by nursing staff, health care assistant staff or security staff?

Yes (Please circle to specify one or more of the above options as appropriate)

No

Other (Please specify if any other observation required, e.g.: next-of-kin)

- 3) Please document/provide full copy of relevant psychiatric assessment and treatment plan (including perceived necessity for psychiatric admission, outpatient clinic, addiction referral, psychotherapy etc.)
-

Table 9. Suggestions for improvement in management of patients following self-harm

- Timely mental health assessment following presentation
- Assessment of requirement for one-to-one observation and specification of level of observation indicated (nursing/ health care assistant/security staff)
- Inter-hospital transfer if required once appropriate level of observation available
- Transfer of patient with complete copy of mental health assessment conducted in hospital of initial presentation (time allowing) for review by referral centre including risk assessment, treatment and local follow-up plan