Estimating the trends in attempted suicide using Administrative data and patient chart review: a pilot study

Diane Daneau

Department of psychiatry

McGill University, Montréal

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ABSTRACT

Suicide is a major public health problem and attempted suicide is a known risk factor of suicide death. There is an accepted figure that between 10 to 20 attempts occur for every death by suicide. However, reliable data on attempted suicide seeking medical assistance are scarce and unrepresentative notwithstanding advances in medical charting. Many have tried to contravene this by novel ways of taking the census of attempted suicide with interesting results but few were applicable to very large population. Our study goals are firstly to estimate the level of underestimation of attempted suicide treated in hospital settings; secondly to find, by the adjunction of the Canadian Emergency Department Triage and Acuity Scale (CTAS) used by nurses in emergency triage, to usually used administrative databases a new affordable and dependable way to identify more accurately the number of attempted suicide treated in hospitals. Thirdly, this study seeks to prove that lethality is the main indicator of attempted suicide coding without regards to intention.

This study used administrative data that covered physical and psychological diagnosis that could have been or induced by a suicide attempt. The second step added nursing triage notes that suggested that the main complaint of the patient was related to suicidal behavior. Then, attention was brought to cases bearing exclusive suicide attempt diagnosis and if their first unit of hospitalization was intensive care unit to verify if lethality was meaningful in the recording of their diagnosis.

This study found that 95% of the attempted suicides seeking medical assistance were not coded as such and their physical or psychological diagnosis was the main diagnosis appearing in the administrative database. CTAS was efficient in locating attempts of low to moderate lethality in emergency department but was not efficient for high lethality case as these would bypass nursing triage and receive immediate medical care. For monitoring purpose, usual administrative databases and CTAS should be associated with another means that could identify suicide attempts with high lethality to give a more realistic estimate of this phenomenon. This study also found that lethality is a major factor in the labelling of attempted suicide but there seems to be other elements interfering other then intentions as only a quarter of very lethal cases were coded as attempted suicides.

RÉSUMÉ

Le suicide est un problème de santé publique reconnu et les tentatives de suicide sont parmi les facteurs de risque les plus importants de mort par suicide. Il existe une valeur acceptée qu'il y aurait entre 10 et 20 tentatives de suicide par suicide complété. Malgré les avancés dans les codifications aux dossiers, il existe peu de données fiables sur les tentatives de suicide traitées en centre hospitalier et plusieurs contestent ces données. Plusieurs efforts ont été tentés pour contrer cette lacune avec des résultats intéressants mais peu sont applicables sur de grandes populations. Notre étude poursuit trois objectifs : premièrement de chiffrer la sous-estimation des tentatives de suicide traitées en milieu hospitalier; deuxièmement, elle propose l'utilisation des évaluations de triage infirmier (ETG) en département d'urgence comme une méthode efficace et abordable pour le recensement des tentatives de suicide ayant recours aux services d'urgence qui pourrait être avantageusement conjuguée aux banques de données administratives déjà existantes; troisièmement, démontrer l'influence de la létalité sur la codification d'une tentative de suicide.

Cette étude utilise les diagnostics physiques et psychologiques qui auraient pu être associés à une tentative de suicide apparaissant dans les banques de données administratives. Par la suite, ont été ajouté les notes de triage des infirmières affirmant que la visite du patient était reliée à une tentative de suicide. Par la suite, une attention particulière fut portée aux cas codés comme étant des tentatives suicidaires conjuguée à une hospitalisation aux soins intensifs pour déterminer si la létalité d'une tentative représente un facteur déterminant dans sa codification.

Cette étude a trouvé que la sous-estimation des tentatives de suicide traitées en milieux hospitalier frôle les 95 %. Les ETG procurent des informations fiables à propos des tentatives de suicide de létalité légère à modérée mais sont peu adaptés pour les tentatives à létalité élevée celles-ci ne nécessitant pas l'intervention du triage infirmier. Donc, les ETG devraient être combinées avec une autre méthode pour identifier les tentatives à létalité élevée pour permettre une meilleure surveillance du phénomène. Cependant, la létalité ne semble pas être le seul élément qui entre en compte étant donné que seulement le quart des cas considérés à létalité élevée ont reçus un code de lésions intentionnelles.

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Introduction

Attempted suicide is a serious risk factor for suicide death. Having been hospitalized for an attempt increases significantly the odds of suicidal death (DeJong, Overholser, & Stockmeier, 2010; Gunnell, Bennewith, Peters, House, & Hawton, 2005; Hawton & Van Heeringen, 2009; Houle, Codaire, & Poulin, 2009; OMS, 2014; Owens, Horrocks, & House, 2002; Suicide prevention ressource center, 2011). Attempted suicide creates a heavy toll on emergency department because of its common presentation that can represent up to 0.5% of all cases treated in those facilities, but cases not coded as self-harm seldom result in hospitalization (Colman, Dryden, et al., 2004; Colman, Schopflocher, et al., 2004). Of those who sought medical attention, 16% will repeat an attempt within the next year thus increasing their risk of suicidal death (Houle & Poulin, 2009; Owens et al., 2002). Therefore, identification and surveillance of prevalence of attempted suicide population represent a precious tool for suicide prevention (Gunnell & Frankel, 1994; OMS, 2014).

There was an estimated 804 000 death attributable to suicide in 2012, with a majority of male, in the world with a traditionally accepted figure of 10 to 20 attempted suicide *per* death (Mann, 2003; OMS, 2014). However, this figure is more and more challenged by both the researcher and clinician communities who seem to view it as underestimating the reality and are more incline to accept a rate which could be twice or even thrice the original (Gwashavanhu, 2010; Hawton & Harriss, 2008). Those communities express multiple complaints about the unreliability of data on attempted suicide; most point to the scarcity and underestimation of rates (Bethell & Rhodes, 2009; Hamel, 2001; Hawton et al., 2007; Langlois & Morrison, 2002a; Rhodes et al., 2002; Walkup, Townsend, Crystal, & Olfson, 2012b). Since prevention program

development and resources allocation depend on trends brought about by data, it is imperative that data represent the situation correctly (Caley & Fowler, 2008).

There are two common ways to cumulate data on attempted suicides (OMS, 2014): The first method for registering attempted suicide is by self reports or surveys. These show much higher rates than national statistics as they include the ones that did not seek medical attention (Bertolote et al., 2005; Hawton & Harriss, 2008; Langlois & Morrison, 2002a) and those who self-inflicted harm without actual suicidal intent (Borschmann, Hogg, Phillips, & Moran, 2012) making the evaluation of false positive and false negative difficult and the use of their data precarious for implementing prevention programs or even inferring trends about attempted suicides (OMS, 2014; Plöderl, Kralovec, Yazdi, & Fartacek, 2011).

The second method for estimating attempted suicide is measuring hospital admission rates (OMS, 2014). Most hospitals use the ICD-10 coding system. ICD-10 stands for 10th revision of the International Classification of Diseases (ICD-10), created by the World Health Organization (WHO) in 1903 mainly for billing purposes (WHO, 2013) which is revised periodically. In this coding system, attempted suicide is traditionally included into the "intentional self-harm" section which are comprise in codes between, in the 10th edition, X-60 to X-84 (WHO, 2013). Until very recently, no distinction was made between suicidal intention and self-mutilation without suicidal intent and therefore both are included in the same categories(Duffy, 2006; Gunnell et al., 2005). Nowadays two components should come into play in the definition of attempted suicide: self-initiation and intention to die (De Leo, Burgis, Bertolote, Kerkhof, & Bille-Brahe, 2006; Suicide prevention ressource center, 2011). However, since intentions are rarely investigated by physicians, most diagnosis of attempted suicide

becomes irrelevant(De Leo et al., 2006). Furthermore, a certain ambiguity exists in the fact that "attempted suicide" is not considered a diagnosis *per se* in psychiatry. It is considered in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) to be a) the 9th symptom of depression or b) the 5th criteria for borderline personality, in the presence of multiple attempts and symptoms are not recorded into administrative databases(American Psychiatric Association, 2000).

The "gold standard" in evaluating medical cases is still the review of medical charts (INSPQ & INESSS, 2012). Even so, many researches rely on medical admission databases because they are of easy access, can produce statistically large number of cases fast and are an attractable way to spend scarce subsidies money because they are inexpensive (Danciu et al., 2014; INSPQ & INESSS, 2012; Ladouceur, Rahme, Pineau, & Joseph, 2007). During the mid-1990's throughout the mid- 2000's, the above mentioned incentives created a stream of studies using administrative databases that revealed many important results in various research area that were enthusiastically received (Elfrink, 2001; Hornbrook et al., 2005; Humphries et al., 2000; Lewsey, Murray, Leyland, & Boddy, 1999). However, a new wave of cautionary studies about the re-use of data present in databases primarily created for other purpose than research is starting to flood the literature and warn researchers about the snares of data mining (Bilici et al., 2002; Hatcher, Sharon, & Collins, 2009; Johnson, Fuller, & Wernli, 2014). Different type of algorithms and charted workflow(mapping) are starting to appear in which it is strongly stressed to increase the numbers of data source in order to increase validity, reliability and to facilitate navigation through various provenance of data (Claassen et al., 2006; Danciu et al., 2014; Hersh, Cimino, Payne, Embi, & Logan, 2013; Johnson et al., 2014; Potter et al., 2005; Urquhart, Rayson, Porter, & Grunfeld, 2011). Missing or incorrect information are even more present in

the sensitive field of suicide and its related items (attempted suicide, mental illness, addiction, etc.) because of the effect of stigma they cause (Houle & Poulin, 2006). Furthermore, a number of caveats have been identified that could force the return to the analysis of medical charts themselves in order to address them as most databases were not meant for research purpose nor meant to answer many research questions (Hersh et al., 2014).

For the attempted suicide situation, comparison between surveys and databases results reveals many discrepancies(see annex 2); and comparing suicide deaths and suicide attempters, we are tempted to think that we are dealing with 2 different population as attempters are mostly young females, using medication as preferred method and from economically deprived communities. Suicide completers are mostly middle-age men, using what is considered more violent methods (hanging and firearms). These trends seem to be universal wherever suicide has been studied(ISQ, 2015; OMS, 2014). However, there is a 0.3%-0.5% of the world population declaring having made an attempt in the 12 month preceding a survey perform by the World Health Organization between the years of 2001-2007 in more than 15 countries (OMS, 2014).However, this survey showed that in countries with high standard of living, the prevalence was of 0.3% equally for men and women(OMS, 2014).

In the event of attempted suicide, it is also accepted that most cases do not seek medical attention, and if they do, most do not conclude by a hospitalization and are discharged from the ED which are not recorded in the hospitalization database (Houle & Poulin, 2006; ICIS, 2011). In Canada, in 2007, the rate of death following an attempted suicide was of 10.2/100 000 persons(ICIS, 2011). The rate of ED presentation could be as high as 1 attempt for every 200 ED

presentations (Colman, Dryden, et al., 2004) therefore posing a true burden to the public health care system.

In a national survey conducted in 2008, 0.5% of Quebecers declared having made an attempt in the 12 months preceding this survey, representing a population of 28 000 persons (MSSS, 2012). In that same year, Quebec suffered the loss of 1103 death by suicide giving a suicidal rate of 14.2/100 000 persons qualifying it the highest suicidal rate of Canada; in the same period, Canada's rate was of 10.2/100 000 persons (ICIS, 2011; St-Laurent & Gagné, 2010). Yet, for the period covering the years 2006-2008, Quebec registered 2 284 hospitalizations for suicidal attempts representing the lowest hospitalization rate for intentional self-harm in Canada, excluding the territories (Robitaille & Gagné, 2011). In 2009-2010, Canada registered 17 482 hospitalizations for suicidal attempts(ICIS, 2011).

This study aims to fulfill three major objectives:

a) Determine the actual amount of underestimating attempted suicide seeking medical treatment then declared in administrative database

b) Determine how the addition of supplemental data from the nurses triage notes can improve the estimation of attempted suicide seeking medical treatment

c) Determine if lethality affects coding in intentional self-harm to the detriment of intention

Methodology

The study took place in one of McGill University Health Center (MUHC) site, the Montreal General Hospital (MGH), which is a level 1 polytrauma center. There are only 3 tertiary polytrauma treatment centers in Quebec and the MGH is the only one in downtown Montreal (CUSM, 2015; INESSS, 2014). Therefore, the catchment area is larger than for most hospitals as these centers usually lack the highly sophisticated equipments needed to treat such complicated cases. Approvals from ethics committee and Professional Services Director's office were obtained.

A list of criteria was elaborated in three steps: firstly, a list of potential ICD-10 pointing to specific trauma lesions resulting from possible attempted suicides was created by a panel of experienced clinicians. ICD-10 stands for 10th revision of the International Classification of Diseases, created by the World Health Organization (WHO), for the purpose of monitoring public health, reimbursement and resource allocation and is also used for research (WHO, 2013). This first list consisted of 243 different ICD-10 codes. This list also includes the ICD-10 codes for intentional self-harm (X60-X84) which are the usual ICD-10 codes associated with attempted suicide even though they are known to also include self-mutilation without suicidal intent (Duffy, 2006; Grescon, 2011; Kapur, 2006; Skegg, 2005). Secondly, another list of 64 different ICD-10 codes focusing on psychiatric diagnosis that could conceal attempted suicide as main reason for admission was generated with a psychiatrist. A total of 307 different ICD-10 codes were sorted out as possible attempted suicide. Thirdly, a list of possible keywords used by nurses to describe such events in the emergency triage software CTAS was also created. The Canadian Emergency Department Triage and Acuity Scale (CTAS) is a tool designed to standardize the triage operation throughout emergency departments (ED) in Canada. It permits uniformity and

therefore comparison between ED's. Implementation was started in 1999, and computerization of data is ongoing (Beveridge et al., 1998; Bullard, Unger, Spence, & Grafstein, 2008). It is used by most triage nurses throughout EDs in Quebec (MSSS, 2006). The CTAS allows annotations from the triage nurses. These annotations represented mostly the chief complaint implicitly or explicitly expressed by the patient at arrival in the ED. All triage information is stored in database format and is therefore readily accessible. Unfortunately, these databases are accessible only on location and the search engine uses only key words. Therefore, a last list made up of key words possibly used by ED nurses was made by one of the author (DD) which works in an ED and had it reviewed by co-workers to limit omissions. The wording used included:"suicid*"; "attempt";"stab*"; "gun*"; "overdo*"; "OD"; "jump*"; "slash*":"hang*". These keywords were used with the Boolean "OR".

All charts from patients admitted through any ED between January 1, 2009 to March 31, 2010 bearing any one of the above mentioned criteria were considered, at the exception of elective hospitalizations for they too had to register in ED. However, even elective admission that bore any ICD-10 criteria for self-harm X-60-X-84, were included.

Each chart was then reviewed by a trained nurse and a doctor which were fluent in both English and French languages, for charts could be filled in either language in Quebec. Data collection occurred between July 2010 and May 2011. Due to the large number of charts involved, only the charts portraying an attempt were reread by both reviewers separately and results were compared subsequently to ensure of concordance.

In order to limit confusion, it was determined that an "attempt" would be any case in which at least two of the health professionals legally apt to write in a patient's chart would have

explicitly written in the medical chart that the event was of a suicidal nature. The wording "suicidal gesture", "suicidal attempt", "suicidal intent", "with intent to die", "attempter" or when it was clearly written that the lesions were self destructing or non-accidental (but not homicidal), in either French or English were taken into account. The health care professionals considered were: physicians, nurses, paramedics, medical specialists or consultants, residents, social worker, physiotherapists and respiratory therapists. Even police reports were considered when they were incorporated in the medical charts.

After having reached a consensus about an attempted suicide definition, an extensive data collection took place encompassing socio-demographics data, diagnosis coded from archives department, medical history available, the present emergency visit, recent past visits to the emergency and subsequent visits to studied episode, psychiatric evaluation of the attempt, hospitalization, all consultation received during the hospitalization, discharge medication, discharge destination and, if any, follow-ups were recorded. All information was made into an ACCESS™ 2007 database format.

To ensure inter-reviewer reliability multiple measures were implemented. On the one hand, an ACCESS™ 2007 file was made in collaboration with an experienced programmer offering user-friendly format specifically designed for clarity, easy data entering, and minimal entry error. On the other hand, a booklet was created explaining in details every field present in the ACCESS™ file and included solutions to possible problems that were encountered during data collection. This booklet was reviewed with the research committee for final approval. Then, two formation sessions were given to future data collectors: the first one was theoretical and reviewed the booklet and software. The second session was with actual selected charts (5-10

charts) from the hospital. Control of inter-reviewers reliability was made at halfway and at 75% of completion of chart review where five “attempt” charts were randomly chosen and reviewed again by reviewer and trainer. Answers were compared and discussed.

Results

Medical charts listing received

There were 1908 medical charts that bore any one of the ICD-10 code for somatic, or physical, complaints from which 11 charts showed an ICD-10 code for "intentional self-harm" (X-60 to X-84). From the possible list of ICD-10 psychiatric codes, another 446 medical charts were added to the original list and, finally CTAS list included 352 medical charts. After elimination of duplicates, there were a total of 2058 charts that met at least one of the above mentioned criteria.

Medical charts audited

All 2058 charts were audited and 182 were found to be actual attempted suicide. Even though only 11 of these bore an ICD-10 code for intentional self-harm, X-60 to X-84 and one of those was found to be a false positive. Review of charts bearing ICD-10 codes related to somatic causes permitted to locate 26 (14.3%) cases of attempted suicide. The selected psychiatric ICD-10 codes added 53 (28.8%) more. There were 24 ICD-10 codes that systematically represented an attempt, 18 came from the list of physical codes and 6 from the psychiatric ones. As for all the other cases of attempted suicide identified (92 or 50.5%), they were located only through the nurses triage notes. CTAS-nursing notes could have permitted to locate a total 122 of the 182 attempts identified. However, 5 of the patient with mention of intentional self-harm, out of the 11 above mentioned, in their medical charts seem to have bypassed triage as did 27 of the patients who had to be hospitalized in ICU at the beginning of their hospital stay.

Age and sex of attempters

Contrary to the literature, there were more male than female attempters identified in our study; 81 (44.8%) females against 100 (55.2%) males (information about the sex of one of the patient was missing). The most important age group in either sex was the 25 to 44 years old with 34 (18.8%) females against 46 (25.4%) males for a total of 80 (44.2%) attempted suicides for that age group. The other age group were the 16 to 24 yr with 40 (22.1%) attempters (25 or 13.8% females against 15 or 8.3% for males); the 45 to 64 yr group presented 49 (27.1%) of the attempted suicides (17 or 9.4% females against 32 or 17.7% males). The remaining 12 (6.6%) cases were 65 yrs and older (5 or 2.8% females against 7 or 3.9% males). A sub-group was made for the 75 yrs and older as they constituted almost 2% (3 or 1.7% females against 1 or 0.6% male) of our entire group of attempters. It has to be noted that we were not able to determine the age of one of the female attempter due to lack of valid identification during hospitalization.

Occupation of attempters

Data on occupation were missing for 3 attempters. From the 179 persons for which we had information on their occupational status, 92 (50.28%) were out of work, 13 (7.26%) were retired, and 76 (42.46%) were actively engaged in an occupation. It is noticeable that from the 76 active persons, 32 were students but that last information is to be taken with caution since the catchment area of that hospital contains many educational establishments.

Method used

Beforehand, it has to be noted that 14 (7.7%) cases of attempted suicide combined more than one method altering the overall calculation of the methods used; in other words, there were

199 methods used for the 182 attempted suicide cases found through the charts audit. Overdose was the most used method for attempting suicide with 86 (47.25%) cases. It was also present in all cases of multiple methods used. Laceration of either wrists or neck arteries or veins counted for 47 (25.8%) cases. In either sex, overdoses and lacerations accounted for the majority of cases.

Jumping from elevated building or in front of moving vehicle accounted for 11, 54% of other cases; and hanging was used by 7, 14% of attempters with no noticeable difference between sex.

Hospitalization

More than half of the cases remained in the ED (97 cases or 53.3%) but 41 attempts (22.5% of cases; 15 women and 26 men) had to be hospitalized in ICU on arrival. Of these, almost all (9 out of 10 positive occurrence of intentional self-harm) of the ones who bored an "intentional self-harm" code underwent ICU care on arrival. Other attempts were usually hospitalized according to their physical conditions, per example in the orthopedic unit. Only 10 (5.5%) attempters were judged medically apt to begin their hospital stay in the psychiatric unit. It is an interesting fact that 84 (46.4%) attempters remained in hospital settings less than 48 hours while 11 (6.1%) attempters were hospitalized for more than 2 months.

Physical restraints, two and four points, had to be used on 20 (11%) attempters of which 15 were males. The constant presence of a sitter was required for 79 (43.4%) attempters of which 46 were males. The need to resort for any kind of restraints reflects the difficulties to meet the obligation to maintain the patient's safety, and can be an indicator of agitation. Physical restraints are highly regulated in Quebec and cannot be applied continuously nor without close

supervision of the patient (MSSS, 2002) . It is an indicator of the risk that those patients represented to themselves during hospitalization.

During their hospital visit 150 (82%) attempters were evaluated by the psychiatric team while another 15 (8.2%) attempters were evaluated for suicide risk by other health professionals such as doctors, nurses or social workers. Others (18 attempters or 9.8%) were discharged without any mention of the suicidal risk evaluation in the chart.

Discharge destination

Because the hospital chosen for this study was one of the major polytrauma center of Montreal, many patients (44 attempters or 24.2%) were transferred to hospitals closest to their home address immediately after stabilization of their physical state for the completion of their hospitalization. Of the remaining 138 attempters residing in the catchment area, 101 (73.2%) were discharged home without any indication of a follow up in their charts. Some (9 attempters or 6.5%) were referred to either the external clinics or the local community service center (CLSC or Centre Locaux de Services Communautaires); others (7 attempters or 5.1%) were directed towards community-based organizations. The remainders (21 attempters or 15.2%) had different outcomes such as going back to living with parents or make themselves an appointment with a psychologist which they had to locate themselves. Death (3 out of 182 patients) was also a recorded outcome if it occurred while hospitalization without any indication about cause of death.

Discussion

Attempted suicide underestimation

Our study found that only 6% of attempted suicide bore an ICD-10 code (X60 to X84) usually used for attempted suicide. This figure support the supposition of clinicians and researchers alike about the lower hospitalization rates registered for attempted suicides found in previous studies (Bethell & Rhodes, 2009; Gwashavanhu, 2010; Langlois & Morrison, 2002). It also support the idea that more than one source of data is necessary to achieve an accurate image of the situation.

CTAS in detecting attempted suicide

CTAS was able to detect 122 cases out of the 182 found (67%). Due to the nature of CTAS, cases needing resuscitation or immediate medical attention were not picked up as nurses had to apply special protocols in those instances (resuscitation). Concordantly, only 10 (24.4%) of the 41 attempters who were admitted in ICU at arrival appeared in CTAS-nursing notes.

CTAS fared well at finding cases that sought medical assistance without being hospitalized and those who presented moderate lethality, given that lethality seems to be associated with an ICU stay on admission.

Chart review also pointed out some wordings or formulations left out from the keyword search list. Words such as punct*, for puncture, or intox*, for intoxication, might have brought about an extended list. Also, patient who were unconscious, but not in need of resuscitation, could not be asked about their major complaints for obvious reasons and were triaged as “loss of consciousness” or “LOC”. Having included these would have probably increased our list.

Is lethality the sole measure for coding self-harm? Yes… and no

It appears that 9 out of the 10 cases bearing an ICD-10 code X60-X84, as one was a false positive, were hospitalized in ICU on arrival, we are agreeing with other authors that suggested that the coding of self-harm was related to lethality alone instead of the combination of lethality and intention (Bethell & Rhodes, 2009). It is also congruent with the fact that very few cases coded as intentional self-harm are false positive and so, were coded correctly (Colman, Dryden, et al., 2004).

However, since only 9 out of the 40 cases hospitalized in the ICU were coded as intentional self-harm, it leaves 31 cases being unrecognized as attempters. Therefore, although lethality seems to be a major factor in the codification and thereof recognition of attempted suicide, it must not be the only contributor to the attribution of a code for intentional self-harm. The determination of such contributors was beyond the aim of this study.

Demographical findings

Our study identified significantly more men than women attempters. This finding could be explained by the fact that the hospital where the study was conducted is a Level 1 trauma center and that cases demanding ultra specialized care are often transferred to this facility. This trend is present for most age group for female outnumbers male only in the 16-24 yrs group as corroborated by the study of ICIS (2004). As compared to national hospitalization percentages, our age group of 16-24 yrs exhibited a lower rate (21% compared to 25%) and our age group of 65 yrs and older a higher rate (7% compared to 4%). However, it should be noted that the MGH provides mainly adult services (ICIS, 2004).

Concerning occupational status of attempters, there is no Canadian study available for comparison. Gwashavanhu (2010) found that 39% of her English sample was unemployed. By comparison we found that half of our sample was unemployed at the moment of their attempt. Our sample showed that a large number of students attempted suicide (32 out of 179 with available occupational information or 17%) but we had to consider the geographical location of the hospital under study; it is located in proximity of 2 University campuses and of several colleges increasing the student density for that area. However, concern should be aroused by the unusually large proportion occupied by students in attempters.

Method used and hospitalization

As expected, overdoses and lacerations were used by most attempters in either sex. However, to a lesser extent than other studies which could find that more than 80% of their cases were overdoses (Gwashavanhu, 2010; Hawton, Fagg, Simkin, Bale, & Bond, 1997; ICIS, 2004). We found far more hangings and jumps, either from a high place or in front of a vehicle, than expected (ICIS, 2004). Again, this is probably due to the status of the hospital under study, and the fact that all polytraumatized patients had to be treated to this establishment. This could also account for the large number of ICU hospitalization as no other study recorded so high ratio for ICU admission. Concurringly, the slightly higher death rate than national data suggested (ICIS, 2004)

Our study was the first to collect data on the use of physical restraints in suicide attempters. Physical restraints are defined as any means that can limit ones movements. So, they included anything from the continuous surveillance by a sitter, chemical tranquilizers, and wrists (2 points) or wrist and feet (4 points) restraints. Their usages are restricted and conditions of

applications are defined by law (MSSS, 2002). It could be used as an indicator of the risk that those patients represented to themselves and of the degree of agitation they presented during hospitalization. However, it was difficult, even through careful reviewing of the chart, to determine the starting and ending time of restraints. Therefore, a mean period of utilization was undeterminable. Most restraints were used on males.

This facility fared well in psychiatric assessment of suicide attempters; only 10% received discharged from hospital without an assessment (Hawton et al., 1997)

Discharge destination

Few patients had any mention of a follow up at discharge. This figure was lower than in previous studies (Gwashavanhu, 2010; Houle & Poulin, 2006) and was unexpected. It is a known fact that suicidal patient are more difficult to engage in follow ups (Hawton et al., 1997) but it was unclear from charts if follow up was refused or unoffered. Lack of any type of follow up after a first suicidal attempt increases the risk of repetition (Owens et al., 2002; Suicide Prevention Resource Center, 2010).

Limitations

This study could not encompass all attempted suicides; only the ones who sought medical treatment could be considered. Another limit was the possibility that some ICD-10 code may have been relevant, but not considered in our study. Therefore, our study may have missed some cases of attempted suicide. Since it was not possible to review all admitted medical charts of all patient going through ED, choices had to be made on the most likely ICD-10 admission codes at

the risk of missing some cases. However, due to the large number of underreported cases detected, a thorough examination would have only increased underreporting percentage.

The exclusion criterion exempted us from examining in-patient suicidal attempts that could have happened during the study period. Although rare event in general hospitals (Martelli, Awad, & Hardy, 2010), they might have shed some light on possible triggers: clinical observations previous to the event could open up new avenues for prevention.

Another limit was the restricting fact in data collection that only one ED visit was under study. Therefore, for some patient, no information could be gained from their previous attempts nor for their follow-up.

As for the CTAS, local wording about specific complaints seems to be of capital importance in order to find more attempted suicide cases and before embarking on a more expanded research, a compendium of nurses usual lexicon in triage should be created to facilitate possible future research. It should be noted that the compulsory use of electronic health record could render that task more accessible. Furthermore, it has to be noted that the CTAS could ameliorate the findings of light to moderate attempted suicide and would have difficulty in improving the number of attempts with a high level of lethality.

Conclusion

As was seen, almost 95% of attempted suicides are currently not included in national statistics even if the attempt is documented in the patient's medical chart by at least 2 different health professionals. Education and sensitization should be established to lower barrier in reporting suicide attempts. Furthermore, monitoring could be enhanced by combining information from different sources. A different method of attempted suicide census might change the global view of attempters as this study reports a majority of male attempters, and a noticeable presence of attempters older than 75 years old.

It is the first known study that used CTAS-nursing notes for epidemiologic research. CTAS-nursing notes seem to be able to detect attempted suicides of moderate and low lethality. CTAS-nursing notes could be combined with another database that would pinpoint more lethal cases. Such combination would produce a more realistic image of attempted suicide being treated in hospital settings. Databases are relatively inexpensive to use but as confirmed by literature(Claassen et al., 2006; Walkup, Townsend, Crystal, & Olfson, 2012a), using a single source as means of monitoring attempted suicide has proven ineffective and greatly underestimates the problem. CTAS-nursing notes are available through hospital administrative departments and use simple keywords. Even if more attention is to be drawn on the list of plausible keywords and special care should be taken in the consideration of its limitations, this method reveals to be efficient and cost effective to study suicide attempts.

This study is also the first known to register the use of restraint, whether physical or by surveillance, of patient during hospitalization after an attempted suicide. This could point to

numerous difficulties regarding treatment of these patients and expose the extra burden imposed on staff to maintain security in order to avoid unfortunate event during hospitalization.

Identifying attempted suicide is crucial for prevention and treatment. Underestimation leads to a poor understanding of the phenomena and misleads in choice of interventions and resources. The usage of databases facilitates researches but sources of data should be diversified to limit bias. Future studies focusing on possible reasons for underreporting of attempted suicide in hospital settings should investigate the following: financial implications, political intrusions, cultural taboos, workers overloads, probable coding limitations and the occurrence of possible prejudices to the patient. Those inputs would be crucial to understand the social interplay involved. Such information would better inform intervention programs and would help create effective interventions.

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Annex 1

Contributors

Directors

Gustavo Turecki, MD,PhD

Elham Rahme, PhD

Alain Lesage, M.D., FRCP(c) (unofficial but always present and important)

Panelists in the creation of physical ICD-10 physical codes

Alain Lesage, M.D., FRCP(c),

Nancy Low MD, MSc, FRCPC(c),

Nadia Szkrumelak, M.D., FRCPC(c),

Suzanne Morin, MD, FRCP, FACP

Angelina Perillo , RN, M.Sc.,

Suzanne Lamarre, M.D. FRCPC, DLFAPA

Elham Rahme, PhD

Hélène Racine, RN, Msc(inf)

Jean-Pierre Bonin, PhD

Panelists in the creation of psychiatric ICD-10 codes

Diane Daneau, RN, Bsc(inf)

Nancy Low, MD, MSc, FRCPC(c)

Wording for CTAS research

Diane Daneau, RN, Bsc(inf)

Revision

Alain Lesage, M.D., FRCP(c),

Gustavo Turecki, MD, PhD,

Nancy Low MD, MSc, FRCPC (c),

Nadia Szkrumelak, M.D., FRCPC (c),

Suzanne Morin, MD, FRCP, FACP

Angelina Perillo, RN, M.Sc.,

Suzanne Lamarre, M.D. FRCPC, DLFAPA

Elham Rahme, PhD

Jean-Pierre Bonin, PhD

Data collectors

Diane Daneau, RN, Bsc (inf)

Elena Molchynska, MD

Rami Ali, MD

Computer programmer

Sylvain Dancausse

Finance

Réseau Québécois de la Recherche sur le Suicide (RQRS)

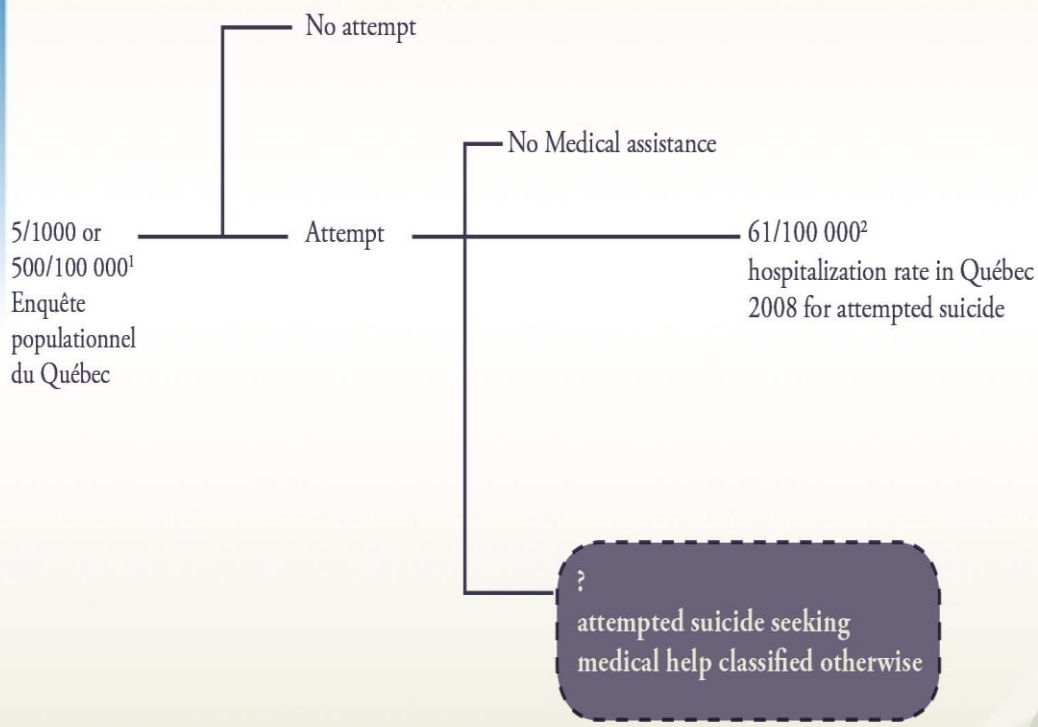
Redaction

Diane Daneau

Annex 2

Aim of the study at a glance

AIM OF THE STUDY AT A GLANCE



1 SQ, L ' Enquête Québécoise Sur La Santé De La Population , 2008 : Pour En Savoir Plus Sur La Santé Des Québécois.
2 http://www.cihi.ca/cihi-ext-portal/internet/fr/document/health+system+performance/indicators/health/release_08june11 consultation le 2012/09/22

Annex 3

Somatic (Physical) ICD-10 codes list

R44-R46	Other symptoms and signs involving general sensations and perceptions, emotional state, appearance and behavior
R78	abnormal laboratory findings on examination of blood
S10-S19	Injury to neck
T00-T07	Injuries involving multiple body regions
T36-T50	Poisoning by drugs, medicaments and biological substances
T51-T65	Toxic effects of substances chiefly non medicinal as the source
T79	Certain early complications of trauma
T90-T98	Sequelae of injuries, of poisoning and of other consequences of external causes
X60-X84	Intentional self-harm
Y10-Y34	Event of undetermined intent
Y40-Y84	Complications of medical and surgical care
Y85-Y89	Sequelae of external causes of morbidity and mortality

Annex 4

Psychiatric ICD-10 codes list

F10-F19	Mental and behavioural disorders due to psychoactive substance use
F25	Schizoaffective disorders
F30-F39	Mood [affective] disorders
F43	Reaction to severe stress, and adjustment disorders
F53	Mental and behavioural disorders associated with the puerperium, not elsewhere classified
F60.3	Emotionally unstable personality disorder

Annex 5

CTAS Keywords Used in This Research

Keywords used	**Expected results**
SUICID*; ATTEMPT	Suicidal attempt; Suicidal; Suicide
STAB*	Auto-stabbing; stab wound
GUN*	Gunshot
Overdose; OD	Surdose; overdose
JUMP*	Jump; jumper
HANG*	hanging

Annex 6

Repartition of reviewed charts

List	Number of charts reviewed	Number of attempted suicide identified
Physical(somatic) ICD-10 codes	1289 (including 11 charts coded « intentional self-harm »)	37 (including the 11 cases coded « intentional self-harm »)
Psychiatric ICD-10 codes	447 charts	53 attempted suicide
CTAS nursing notes	322 charts	93 attempted suicides
total	2058 charts reviewed	183 attempted suicide identified*

* Included is one false positive

Annex 7

ICD-10 codes and the number of medical charts associated to them

ICD-10 code and description	Number of charts bearing these ICD-10 codes	Number of attempted suicide
F10-F19 Mental and behavioural disorders due to psychoactive substance use	348	47
F25 Schizoaffective disorders	31	4
F30-F39 Mood [affective] disorders	239	33
F43 Reaction to severe stress, and adjustment disorders	20	0
F53 Mental and behavioural disorders associated with the puerperium, not elsewhere classified	1	0
F60.3 Emotionally unstable personality disorder	19	10
R44-R46 Other symptoms and signs involving general sensations and perceptions, emotional state, appearance and behavior	65	12
R78 abnormal laboratory findings on examination of blood	16	0
S10-S19 Injury to neck	197	16
T00-T07 Injuries involving multiple body regions	174	11
T36-T50 Poisoning by drugs, medicaments and biological substances	46	24
T51-T65 Toxic effects of substances chiefly non medicinal as the source	5	3
T79 Certain early complications of trauma	98	5
T90-T98 Sequelae of injuries, of poisoning and of other consequences of external causes	172	0
X60-X84 Intentional self-harm	11	10
Y10-Y34 Event of undetermined intent	5	1
Y40-Y84 Complications of medical and surgical care	2565	36
Y85-Y89 Sequelae of external causes of morbidity and mortality	45	0
Grand Total	4057	161

It is important to understand that any chart can hold up to 16 different diagnoses. This explains the 4057 diagnoses for the 2058 charts reviewed.

Annex 8

ICD-10 Association with Attempted suicide

Probability of finding an attempted suicide for a chart bearing a given ICD-10 code	**ICD-10 codes**
100%	F109; F152; F190; F193; F197; F321; T0290; T391; T406; T424; T426; T430; T432; T433; T436; T450; T455; T510; T58; X62; X64; X65; X80; X83
>66,6% à 99,9%	NIL
>50% à 66,6%	F603; S153; X78
>33,3% à 50%	F322; F333;R458; R4688; S1100; S1348; S152;T658; Y11; Y492; Y654
>25% à 33,3%	F140; F141; F150; F192; F251; F314; F339; S158; T0270; T402
>10% à 25%	F102; F103; F112; F121; F122; F132; F142; F252; F312; F319; F323; F432; R451; S1180; S131; S1419; T435; T796; Y579
>0% à 10%	F100; F101; F104; F191; F259; F329; S1190; S12000; S12100; S12210; S12700; T068; T07; T793; T794; T797; Y433; Y442; Y450; Y495; Y831; Y832; Y833; Y834; Y835; Y836; Y838; Y846; Y848
0%	All other ICD-10 codes not mentioned above but included in our study
Grand Total	

How to interpret this chart: Any medical chart bearing one of the ICD-10 codes present in the second column has an X% “chance” of being an attempted suicide.

For example: a medical chart bearing a F100 ICD-10 code has less than 10% probability to be an actual attempt. By opposition, any chart bearing a F109 ICD-10 code will have 100% probability of being an attempted suicide

Annex 9

Brief summary of the Profile of attempters

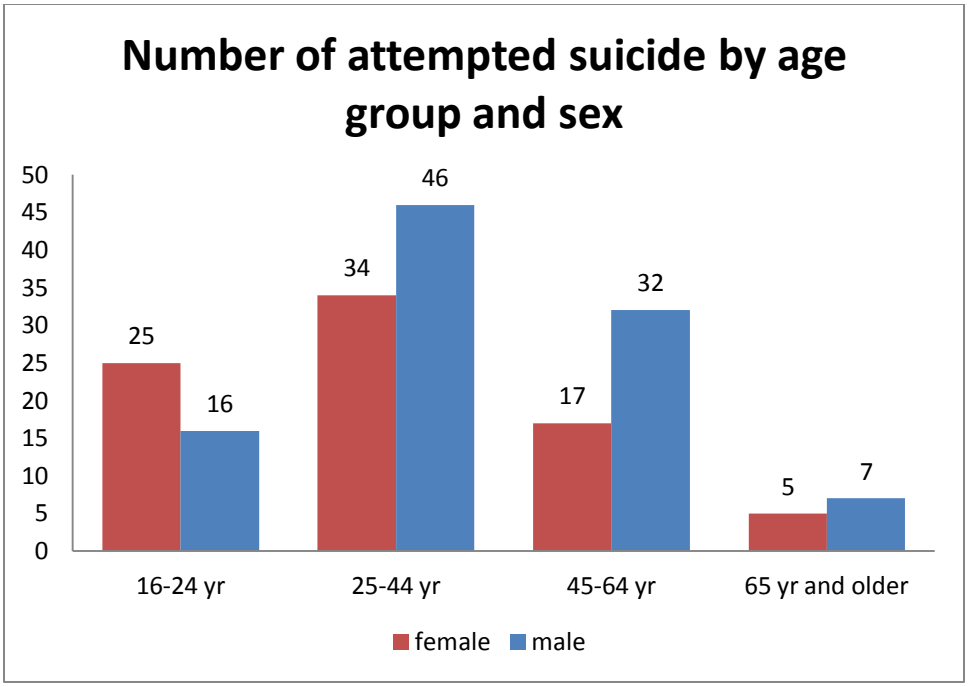


Figure 1: Shows the actual number of attempted suicide identified by a given age group and gender

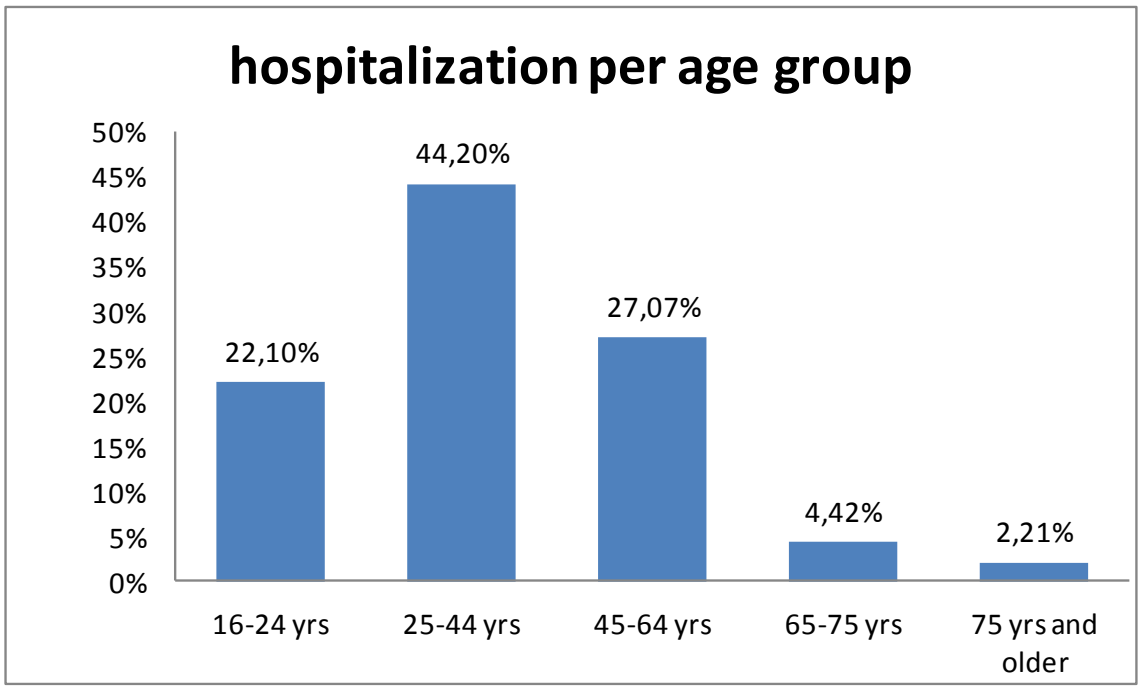


Figure 2: Distribution (in %) of total hospitalization per age group

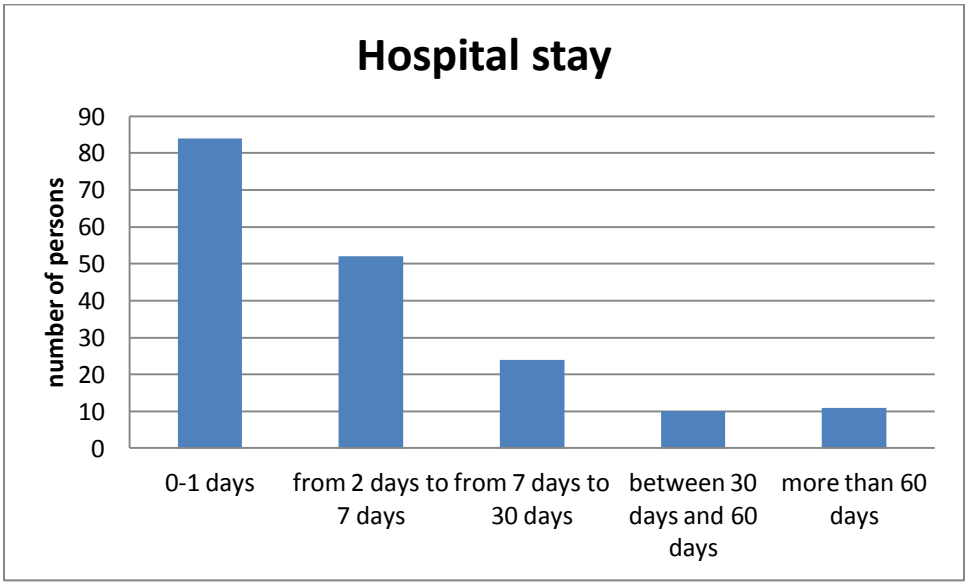


Figure 3: distribution of length of hospitalization

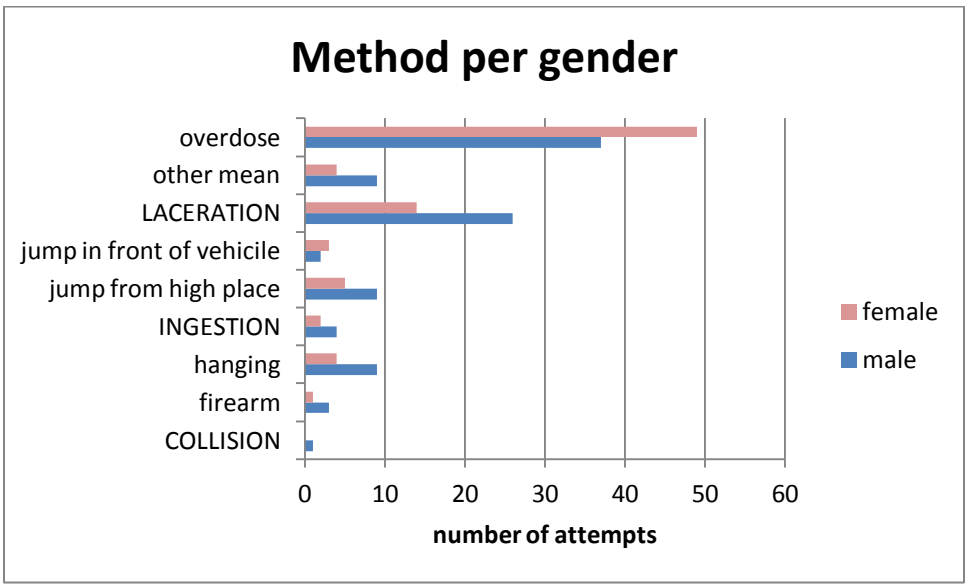


Figure 4: Number of attempts per method type for male and female

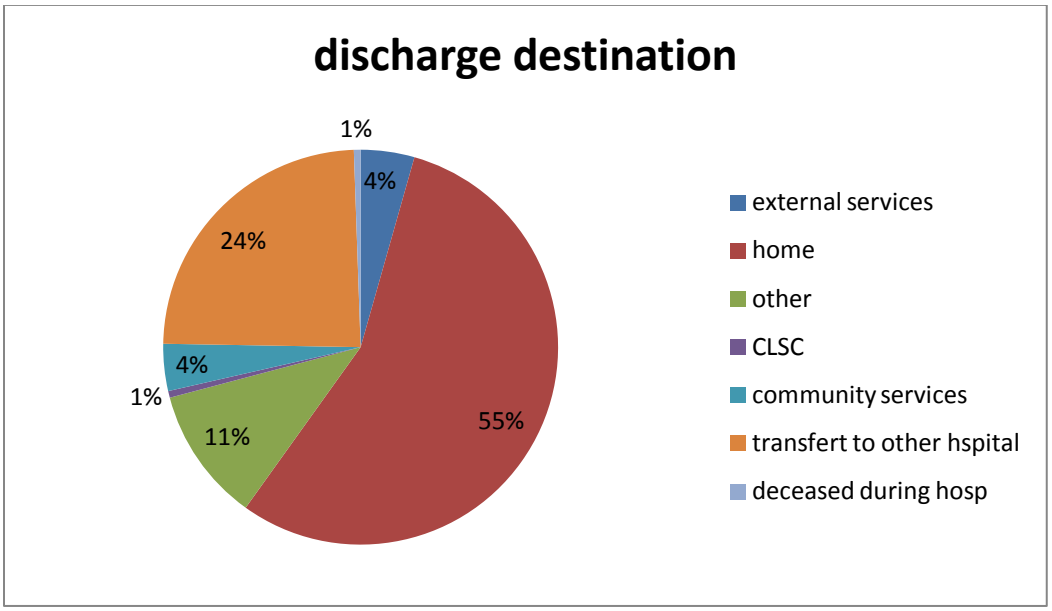


Figure 5: Discharge destination from chart that were documented

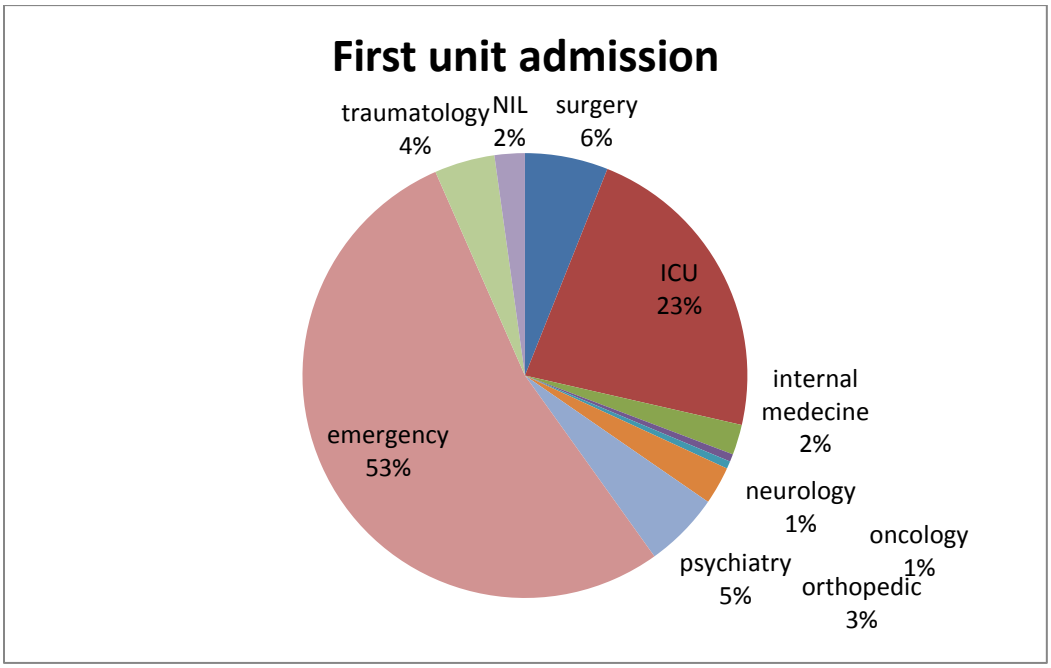


Figure 6: First unit of admission

Annex 10

List of all data collected for each case of attempted suicide

Demographics

1. Medical chart number
2. RAMQ number
3. Name of patient
4. Surname of patient
5. Date of birth
6. sex
7. Postal code
8. Employment
    - Without
    - Retired
    - Other (specified)
9. Accompanied at admission
    - Oui (specified type of relation: relatives, neighbour, etc)
    - Non
    - Do not know
    - Not specified
10. Family doctor
    - Oui (name)
    - Non
    - Do not know
    - Not specified

Diagnosis officially associated with that particular event

1. Medical chart number
2. Date of discharge
3. All diagnosis ICD-10 codes noted in chart for that hospitalization
4. Description of code

Medical history

- Physical co-morbidity (specified)
- Psychiatric co-morbidity (specified)
- Use of hospital services 12 months prior to incident
    - Oui (date of last visit)
    - Non
    - Do not know
    - Not specified

- Name of hospital visited (specified if included in chart)
- Any suicidal attempt in the last 12 months
    - Oui (date & method used)
    - Non
    - Do not know
    - Not specified

Attempt studied

- Method used
- Evaluation of suicidal risk
    - Oui
    - Non
    - Do not know
    - Not specified
- Specialist who has performed evaluation
    - Psychiatrist
    - Nurse
    - General practitioner
    - Other(specified)
- Date of evaluation
- Use of restraints/ sitter
    - Oui
    - Non
    - Do not know
    - Not specified
- Type of restraint/surveillance used
    - 2 points
    - 4 points
    - Constant care
    - Other (specified)

Emergency

- Date of arrival
- Diagnosis at triage
- Transportation used
    - Ambulance
    - Police
    - Autonomous

    - Other (specified)
- Date of admission (if hospitalized)
- Tox screen done
    - Oui
    - Non
    - Do not know
    - Not specified
- Outcome (end of hospitalization)
    - Description (discharge, transfer, other)
    - Where
    - Date
- Subsequent visit to emergency
    - Date
    - Reason (specified)

Hospitalization

(Up to 5 different units could be analysed before discharge. All had the same pattern of questions)

Admission units

- Unit (specified)
- Diagnosis at admission at this particular unit (specified)
- Date of admission

Discharge

- Date of definitive discharge
- Destination
    - Transfer to another hospital
    - CLSC
    - Community services
    - External clinics
    - Home
    - Other (specified)
- Use of "*formulaire interétablissement*"
    - Oui
    - Non
    - Do not know
    - Not specified
- Suicidal risk evaluation at moment of discharge
    - Oui

- Non
- Do not know
- Not specified

Consultation (internal consultation requested)

- Oui
- Non
- Do not know
- Not specified

- If affirmative
  - Type of speciality
  - Date requested
  - Date performed
  - Diagnosis

Discharge prescription

- Oui
- Non
- Do not know
- Not specified

- If positive and included in medical chart
  - Name of medication
  - Dosage
  - Frequency (AM; BID;TID;QID; supper; HS)
  - Renewals (number)

Quality of follow-up

- « c'est le même psychiatre qui a vu le patient lors des différents entretiens » :
  - Oui
  - Non
- « même équipe psychiatrique qui a coordonné l'ensemble des interventions » :
  - Oui
  - Non
- «évaluation du risque suicidaire présente et documentée»
  - Oui
  - Non

- «au moins un entretien familial durant hospitalisation au sujet de la tentative»
    - Oui
    - Non
- «historique de la situation familiale présente au dossier»
    - Oui
    - Non
    - «faite par» :
        - psychiatre;
        - psychologue;
        - travailleur social;
        - infirmière;
        - autre
- «contacts faits avec ressources externes en psychiatrie pour le suivi et sont inscrits au dossier»
    - Oui
    - Non
- «le patient a quitté avec un rendez-vous auprès d'un psychiatre ou un psychologue (date et nom du professionnel inscrit au dossier)»
    - Oui
    - Non
- «le patient avait à sa sortie une information écrite mentionnant les coordonnées d'une ressource et de personnes joignables 24 hres/7jours en cas de besoin»
    - Oui
    - Non
- «La famille a reçu une information écrite mentionnant les coordonnées d'une ressource et de personnes joignables 24 hres/7jours en cas de besoin»
    - Oui
    - Non
- «La ressource utilisée en cas d'urgence connaît l'existence du patient et un contact a été établi avec le patient»
    - Oui

    - Non
- «Un professionnel s'est informé de la venue du patient au rendez-vous fixé et a pris les initiatives nécessaires en cas d'absence de celui-ci»
    - Oui
    - Non
- « Si présence de toxicomanie : évaluation faite par équipe-toxicomanie « addiction unit »
    - Oui
    - Non
- « Est-ce que l'équipe d'urgence psychiatrique a été demandée? »
    - Oui
    - Non

The section of quality of follow-up was only made in French. To facilitate answering, only yes/no questions were used.

Based on (Renaud et al., 2004).