

Economic impact of aggression in closed long-stay psychiatric wards

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Abstract

Background : Aggressive behaviour (i.e. verbal, physical towards objects, self, or others) is highly prevalent in long-term psychiatric inpatient care. We aimed to estimate the overall incidence of aggression, the time staff took to handle aggression incidents, and the weighted average financial costs thereof.

Methods : A random sampling procedure was conducted at three long-term psychiatric inpatient care facilities, covering all weekdays and work shifts (day, evening, and night). Psychiatric nurses were asked to recall all incidents of their shift. For the time spent on each type of incident, members of staff were monitored in real-time for a period of one week. Estimated costs were calculated by the time spent multiplied by hourly wages in addition to any material-related costs.

Results : The incidence rates were 90 incidents per patient year: 63 for verbal aggression, 8 for physical aggression towards objects, 7 for self-harm, and 12 for physical aggression towards others. The average time spent per incident was 125 minutes but differed for each type of incident. Almost 80% of this time was consumed by nursing staff. The average cost per aggression incident was €78; extrapolated per patient year, the total costs were approximately €7000.

Conclusions : The current study found a high rate of aggression incidents in closed long-stay psychiatric wards, particularly when accounting for verbal aggression. Reports of aggression on these types of wards are scarce. Nevertheless, aggression seems to have a severe impact on invested time and related costs, which suggests a need for aggression-prevention and de-escalating programs.

Background

Aggression incidents frequently occur among psychiatric inpatients (1), and may lead to social and political unrest. Aggression incidents consist of verbally or physically aggressive behaviour and can be directed at objects, patients themselves, other patients, or staff members. Consequences of aggression incidents are diverse and occasionally substantial. For instance, incidents may have physical consequences, may cause distress, and may be traumatic for patients and staff (1, 2). The majority of reports from psychiatric nursing staff members include exposure to violence, and about 16% of staff members have experienced severe physical aggression (2). This exposure to aggression may lead to post-traumatic stress disorder (PTSD) in severe cases (14–17% of exposed staff members), but more frequently, it leads to subclinical symptoms such as hyperarousal (3, 4). Besides violence directed at staff members, a survey among psychiatric inpatients revealed that 54% had been exposed to threats and aggression from other patients and 31% had been physically assaulted (5).

Furthermore, aggression incidents have substantial financial consequences relating to, for example, damaged property, higher medication use, and higher staff costs due to time spent (6). As far as we know, only two studies contain information on the costs of agitation and aggression in psychiatric inpatients. Annual economic costs of aggression incidents were estimated to be €280535 and £179 million

(€211 million (7)) in Spain and the United Kingdom, respectively (8, 9). Both estimates are considered underestimates of the actual costs because indirect costs were not taken into account. High indirect costs include lost staff work days, which range between 38 and 85 days per injured staff member (2, 10, 11); longer hospital admissions; and more readmissions (6).

Estimates of incidence rates for aggression in psychiatry vary widely, ranging from less than 1 to 60 incidents per patient year in two systematic reviews (1, 12). The wide range of estimates may be explained by the large variation in study design (e.g. prospective vs. retrospective data collection), the focus on different patient populations (e.g. acute or long stay; open or closed wards; and forensic, mixed, or psychiatric wards), and the differences in how the studies' authors defined aggression (e.g. including or excluding verbal aggression and self-harm). In addition, staff members may be significantly underreporting aggression incidents by 23 to 45% (13, 14), particularly with regard to verbal aggression.

Previous estimates were mostly based on data collected in (acute) admission wards (8, 15, 16) and forensic hospitals (10, 11). Little is known about long-stay facilities for psychiatric care, but aggressive behaviour can lead to a referral to long-term inpatient care (17). The severely ill and more complex patients residing in these facilities may show different patterns of aggressive behaviour than patients in acute-admission wards.

In this study, we aimed (i) to estimate the incidence rates of different types of aggression in closed long-stay psychiatric wards in the Netherlands, (ii) to estimate the time spent by staff members per aggression incident, and (iii) to estimate the direct costs associated with aggression in long-stay psychiatric wards.

Methods

Institutes for long-term psychiatric inpatient care

The study was conducted in closed psychiatric long-stay wards belonging to three regional mental healthcare centres in urbanized areas of the Netherlands: Rivierduinen Psychiatric Center in Oegstgeest, Parnassia Psychiatric Institute in The Hague, and Inforsa in Amsterdam. All three institutes provide long-term inpatient care. In all three centres, patients had been diagnosed predominantly with psychosis spectrum disorders or severe personality disorders, with approximately 80% of patients meeting diagnostic criteria for either type of disorder. Patients were mainly admitted involuntarily. The Medical Ethical Committee of Leiden University Medical Center granted permission for this study.

Definition of aggression incidents

We categorised aggression incidents into four categories, based on the Overt Aggression Scale (OAS) (18). First, we defined 'verbal aggression' as yelling, shouting, using obscenities or swearwords, sexual remarks, and threatening others (with or without a threatening posture). Second, we defined 'physical aggression towards an object' as kicking, hitting, throwing objects (e.g. chairs, dishes, or cups), and slamming doors. Third, we defined 'self-harm' as any act of physical aggression towards the self, such as

hitting, cutting, burning, strangulation, overdosing on medication, and jumping from heights (with or without suicidal intent). Fourth, we defined 'physical aggression towards others' as a physical assault on another person by means of hitting, pushing, pulling, holding, scratching, kicking, biting, spitting, touching inappropriately, strangulating, and/or attacking someone with an object (e.g. a chair or a knife). Case vignettes illustrating each of the categories are presented in the Supplementary Material.

Aggression incidence

To estimate the incidence of aggression across the four categories, we applied a random sampling procedure, which included 21 nursing shifts over a 6-month period (February–July 2014) at all three facilities. All weekdays (Mon–Sun) and shift types (day, evening, and night) were covered. Psychiatric nurses were interviewed via telephone at the end of each of their shifts; we asked them to recall all incidents during the preceding 8 hours. If one patient caused several incidents, or if an incident escalated to a graver category, only the most severe incident was recorded for that shift. Using a random number generator, participating staff members were randomly selected from the total available ward staff per shift. The number of patients observed per shift was used to calculate the total number of observed patient years. This total, along with the observed incidents, was then used to calculate incidence rates per patient year. The ratio of the occurrence of the four types of aggression was used as a weight factor to calculate the time spent and the total cost of all aggression incidents.

Time spent on aggression

The time spent on each type of incident by staff members was monitored in real-time by a researcher who was present during day shifts and evening shifts over a period of one week at each of the three facilities. The researcher followed all incidents from start to finish in order to record all the activities by all staff members who handled the incident. These activities were collapsed into two categories: direct time (i.e. de-escalating conversation, restraining patients, checking up on isolated patients, administering medication, and tending to medical needs) and indirect time (i.e. administrative activities, discussing and evaluating the incident, information transfer, consultation, and transport).

Costs of aggression incidence

In order to estimate costs for each type of aggression incident from an institutional perspective, staff wages and material costs of both damaged property and immediate medical care were taken into account. We defined 'nursing staff' in a psychiatric ward as licensed nurses and psychiatric social workers whose responsibilities include the day-to-day care for patients. We labelled other assistive personnel as 'paraprofessionals', which included patient supporters, activity supervisors, and specially trained security personnel who support nursing staff during aggression incidents. Average yearly wages were derived from the Collective Labour Agreement for the Mental Health Sector (2017–2019) (19). Consistent with the guidelines of the Dutch Healthcare Authority, these wages were adjusted incrementally with the mandatory insurances provided by the employer. The same Collective Labour Agreement also provides the yearly number of available work hours per staff member, taking into account

average days of sick leave and annual leave. Yearly salary costs were divided by the total available work hours, resulting in hourly wages for each staff category. To account for the incidents occurring outside the standard 40-hour working week, hourly wages were increased with a percentage surcharge for irregular shifts in proportion to the number of incidents taking place during evening and night shifts and during the weekend. Finally, staff costs were calculated by multiplying appropriate hourly wages with the average amount of time spent by each type of professional per incident type.

Material-related costs consisted of property damages caused by the patient (e.g. broken furniture or windows) and immediate medical expenses at the ward (e.g. costs of administering medication or necessary medical treatment of injured patients or members of staff as a direct consequence of the incident). The costs of non-immediate medical treatment or sick leave taken by staff members as a result of the incident could not be included, as it was impossible to link these to individual aggression incidents.

Adding the average personnel and material costs for each type of incident allowed us to calculate the average costs per incident for each of the four incident categories. Using the previously estimated number of incidents per patient year, we inferred the annual costs (i) per patient and (ii) per ward (assuming 20 patients per ward). The psychiatric clinical capacity for long stay (defined as a clinical stay of more than one year) in the Netherlands in 2017 was 6250 beds, of which 1438 (or about 23%) are in a closed setting (20). Although patients can be admitted or discharged during the year, the total number of admitted patients at any time stays close to 1438 – a rather high occupancy rate for long-stay clinical psychiatry.

Results

Ward characteristics

Table 1 shows the characteristics of the psychiatric wards; the psychiatric center Inforsa in Amsterdam has the highest number of nurses and psychiatrists per patient. The average number of patients per ward was 23, and the average number of patients per nurse across all shifts was five. The proportion of patients admitted involuntarily was above 85% for all wards.

Incidence rate of aggression

Data on aggression incidents for the three wards together are shown in Table 2. In total, 81 incidents occurred. The data were extrapolated to yield incidence rates per patient year, leading to an average of 90 incidents per patient per year. The incidence rates per patient year for the different categories were 63 for verbal aggression, 8 for physical aggression towards objects, 7 for self-harm, and 12 for physical aggression towards others. Eighty-eight percent of incidents occurred during the day and evening (7:00–23:00). Incidents were roughly evenly divided among weekdays and weekends (31% occurred on the weekend).

Table 1
Characteristics of the three included closed psychiatric wards

Name of psychiatric centre	Psychiatric center Inforsa	Psychiatric center Rivierduinen	Parnassia psychiatric institute
City	Amsterdam	Oegstgeest	the Hague
Number of admitted patients (all wards)	45	36	48
Number of admitted patients per ward	9	36	24
Number of nurses per ward per shift ^a	3	6	4
Average number of patients per nurse	3	6	6
Average number of psychiatrists (Fte; fulltime-equivalent)	1.7	1.0	1.0
Proportion of patients involuntarily admitted ^b	100%	89%	85%
^a Occupancy during day and evening shifts; night shifts usually have about half the daytime occupancy.			
^b According to the Dutch law BOPZ, concerning involuntary admittance in psychiatric hospitals.			

Time spent on aggression

While we measured personnel costs of time spent by members of staff dealing with aggression, we directly observed 29 incidents during three consecutive one-week observation periods (verbal aggression n = 8, physical aggression towards an object n = 7, self-harm n = 5, physical aggression toward others n = 9). In total, 5324 minutes were spent on the 29 incidents that we observed. Table 2 shows that the average time spent on aggression incidents varied among the types of incidents. Of this time, 77% was spent by nursing staff, 6% by medical doctors, and 18% by paraprofessionals. For all aggression incidents, average total time spent was 125 minutes; 44% of that time (i.e. 55 minutes) was spent in contact with the patient during and after the incident, and 56% (i.e. 70 minutes) of that time was spent on 'indirect' consequences such as information transfer among staff, administrative activities, and care for involved personnel. Assuming a staff occupancy of five patients per nurse and 96 minutes per incident spent on nursing time, nurses spend 39 minutes on average per shift dealing with aggression.

Table 2
Characteristics and time- and material-related costs of four types of aggression incidents

	Verbal aggression (n = 57)	Aggression towards objects (n = 7)	Self- harm (n = 6)	Aggression towards other persons (n = 11)	All aggression incidents^a (n = 81)
Incidence rate per patient per year ^b	63	8	7	12	90
Incidence rate per ward per year (assuming 20 patients)	1261	155	133	243	1,792
Average total time (min) (range) ^c :	80 ± 67 (17–185)	77 ± 35 (34–124)	223 ± 110 (112–399)	336 ± 329 (83–1117)	125 ± 165 (17–1117)
- direct time (min) ^c	39 ± 40	30 ± 27	111 ± 53	124 ± 120	55 ± 67
- indirect time (min) ^c	42 ± 28	47 ± 18	112 ± 78	212 ± 313	70 ± 134
- for nursing staff (min) ^c	52 ± 38	72 ± 33	185 ± 57	292 ± 289	96 ± 141
- for medical staff (min) ^c	2 ± 4	0 ± 0	31 ± 62	21 ± 35	7 ± 24
- for paraprofessionals (min) ^c	26 ± 39	5 ± 9	7 ± 8	24 ± 26	23 ± 35
Material-related costs per incident (range) ^c	€1 ± €2 (€0–€6)	€27 ± €39 (€0–€101)	€1 ± €1 (€0–€3)	€1 ± €4 (€0–€11)	€3 ± €14 (€0–€101)
Costs per incident (range) ^c	€50 ± €44 (€10–€116)	€89 ± €74 (€20–€234)	€117 ± €68 (€54–€230)	€194 ± €193 (€45–€645)	€87 ± €109 (€10–€645)
Annual costs per patient	€3100	€700	€800	€2400	€7000
Annual costs per ward (assuming 20 patients)	€63000	€14000	€16000	€47000	€139000
^a Incidence weighted averages are given.					
^b Data between brackets are the 95% confidence intervals of the estimated incidence rate.					
^c Data are mean ± standard deviations (SD).					

Costs of aggression

The average hourly gross personnel costs for nursing staff are €26 (ranging between €17–€29). At the psychiatric centre Rivierduinen, a security guard trained for healthcare receives an hourly wage of €33. Hourly costs for medical staff are €42 for doctors and €65 for psychiatrists. Average costs per incident are shown in Table 2. The average cost per incident was €78. Material costs were on average €3 per incident, with the highest costs in the category of physical aggression towards an object (€27). With 90 incidents per patient year, costs per patient amount to about €7000 annually. In a typical closed ward setting that supports 20 patients for long-term psychiatric care, the annual cost would amount to €139000 annually.

Discussion

We found an incidence rate of 90 incidents per patient year, amounting to five incidents per day in an average ward with 20 inpatients. The average time spent was 125 minutes per incident, which indicates that (given average staff occupancy) each individual nurse spent more than half an hour per shift dealing with aggression. These costs related to incidents amounted to approximately €78 per incident and €7000 per patient per year. The maximum cost for a psychiatric nursing day was €328.43 in 2018 (21), implying that 6% of the total budget was earmarked for aggression.

The incidence rates we found for aggressive behaviour were higher than those reported in earlier studies (which range from less than 1 to 60 incidents per patient year), mostly in acute and forensic settings (1, 12). These differences exist partly because these studies used retrospective data collection or data from officially reported incidents only (1). Such designs have a risk of selective recall and underreporting for milder incidents. Furthermore, the varying incidence rates could be due to differences in how the aggression incidents and ward types were defined and which sampling methods were used. The current study used a broad definition that included verbal aggression; most previous studies did not include these incidents. Verbal aggression is the most common form of aggression (22, 23), but it is often overlooked when reporting all types of aggressive behaviour. In line with existing literature, we found that verbal aggression occurred most often and aggression relating to self-harm occurred the least often (23, 24).

Interestingly, the current study found that time spent indirectly lasted longer than time spent in direct contact with patients (on average 55 vs. 70 minutes). Around 85% of indirect time consisted of the transfer of information and consulting. Much of this indirect time was used for interpersonal support among colleagues and the venting of emotions by staff members, which reflect the emotional impact of aggression on the staff. Among the different disciplines, nursing staff spent the majority of time (and cost) dealing with aggression. This confirms previous research, which states that nurses working in inpatient psychiatric wards are at high risk for experiencing aggression at work (2, 25).

The largest contributors to total cost were verbal aggression (due to its highest incidence rate) and physical aggression towards others (due to the large amount of time needed to intervene in these incidents). That verbal aggression was expensive in absolute terms was also found in acute psychiatric

wards (8). Further, staff members are often the target of both verbal aggression and aggression towards others; this could increase burnout and sick leave (2, 26), meaning our estimated costs were likely conservative. Likewise, an incident sometimes took place during multiple shifts (and even days) and may have incurred costs long after the initial incident happened. Aggressive patients are more often secluded and consume higher doses of medication (6). Like most other studies that focused on healthcare costs (8, 9), we did not include costs that were indirectly caused by aggression (e.g. staff absence, re-admissions, and assistance of police or ambulance). Thus, total costs of aggression are likely higher than presented in the current study.

To date, studies providing information on costs of aggression are scarce. Recently, a systematic review was conducted on health-service use and costs associated with aggressiveness and agitation in psychiatric care (6). In the review, nine out of ten studies analysed the impact on care such as longer stay and more frequent re-admissions, but they did not quantify the costs. Only one study estimated the cost of conflict-related behaviour using a bottom-up approach similar to ours. They converted time involved in conflicts to a monetary amount using national unit cost data and found annual costs to be €182616 per ward. Estimated costs per aggression incident ranged from £23 (€27) to £200 (€236) per incident (7, 8), compared to an average of €78 per incident in the present study. However, due to differences in the organisation of mental healthcare between countries, it remains difficult to compare studies across countries (27, 28). In order to better estimate the costs of aggression, future studies in different settings and countries are needed.

To our knowledge, our study is the first that prospectively estimates aggression in closed long-stay psychiatric wards and suggests a methodology that can be employed in different settings. Real-time observation of incidents enabled us to make accurate assessments of the time invested by staff. Additionally, we sampled from three different centres, which moderated some of the differences between each location.

An important limitation of the current study is that we sampled a relatively small group of patients within a short amount of time. Studies show considerable variation in the prevalence of aggression between patients; a small number of patients is often responsible for a large proportion of aggression (2, 22). Likewise, we did not observe patients during all seasons, and studies have indicated that this could affect the incidence rate of aggression (29). Furthermore, interviewing nurses at the end of their shift may have led to underreporting. We posit, however, that our method of asking specifically for all types of aggression that occurred over a recently completed 8-hour shift may be more accurate than retrospective data collected over much longer time intervals. Another contributor to underreporting may be that only the most severe incident was registered even when a patient caused several incidents. However, we may have also overestimated the related costs. It is possible that mild incidents, which consumed no time, were included in calculating the incidence rate but were not taken into account in the time measurement, which would result in an overestimation of the time spent as well as the costs for aggression.

Conclusions

Incidence rates of aggression, the workload for staff members, and the associated direct costs in closed long-stay psychiatric wards are high. Aside from the financial perspective, reduction of aggression is highly valuable for both patients and staff. Aggression reduction already has a high priority in long-term psychiatric inpatient care (e.g. de-escalating programs, adequate pharmacotherapy), but more effective and innovative methods to prevent aggression are needed.

Abbreviations

PTSD

post-traumatic stress disorder

OAS

Overt Aggression Scale

Declarations

Ethics approval and consent to participate

According to the Central Committee on Research involving Human Subjects (CCMO), this type of study did not require formal ethical assessment. This study was approved by the Ethical Committee of Leiden University Medical Center, that issued a statement of no objection (P14.003). This is an assessment of the study protocol on due diligence (serving the codes of good practice and good conduct). As there was no direct patient contact, no informed consent needed to be obtained.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

AWH and EJG designed the study. NJdB, AWH and EJG analysed and interpreted the data. NJdB and AWH wrote the first draft of the manuscript. AWH, JPB, and CM collected the data. WvdH helped with designing economic analyses and reviewed the analyses. EJG and NRO supervised the study. All authors critically reviewed and edited the manuscript, and approved the final version of the manuscript.

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References

1. Bowers L, Stewart D, Papadopoulos C, Dack C, Ross J, Khanom H, et al. Inpatient violence and aggression: a literature review. 2011.
2. Nijman HLI, Bowers L, Oud N, Jansen G. Psychiatric nurses' experiences with inpatient aggression. *Aggressive behavior*. 2005;31(3):217-27.
3. Richter D, Berger K. Post-traumatic stress disorder following patient assaults among staff members of mental health hospitals: a prospective longitudinal study. *BMC Psychiatry*. 2006;6:15.
4. Lee J, Daffern M, Ogloff JR, Martin T. Towards a model for understanding the development of post-traumatic stress and general distress in mental health nurses. *International journal of mental health nursing*. 2015;24(1):49-58.
5. Frueh BC, Knapp RG, Cusack KJ, Grubaugh AL, Sauvageot JA, Cousins VC, et al. Patients' reports of traumatic or harmful experiences within the psychiatric setting. *Psychiatric services (Washington, DC)*. 2005;56(9):1123-33.
6. Rubio-Valera M, Luciano JV, Ortiz JM, Salvador-Carulla L, Gracia A, Serrano-Blanco A. Health service use and costs associated with aggressiveness or agitation and containment in adult psychiatric care: a systematic review of the evidence. *BMC Psychiatry*. 2015;15:35.
7. European Central Bank. <http://www.ecb.europa.eu/stats/exchange/eurofxref/html/index.en.html> [cited 2020 03 February].
8. Flood C, Bowers L, Parkin D. Estimating the costs of conflict and containment on adult acute inpatient psychiatric wards. *Nursing economics*. 2008;26(5):325-30, 4.
9. Serrano-Blanco A, Rubio-Valera M, Aznar-Lou I, Baladon Higuera L, Gibert K, Gracia Canales A, et al. In-patient costs of agitation and containment in a mental health catchment area. *BMC Psychiatry*. 2017;17(1):212.
10. Hillbrand M, Foster HG, Spitz RT. Characteristics and cost of staff injuries in a forensic hospital. *Psychiatric services (Washington, DC)*. 1996;47(10):1123-5.
11. Hunter M, Carmel H. The cost of staff injuries from inpatient violence. *Psychiatric Services*. 1992;43(6):586-8.

12. Nijman HLI, Palmstierna T, Almvik R, Stolker JJ. Fifteen years of research with the Staff Observation Aggression Scale: a review. *Acta psychiatrica Scandinavica*. 2005;111(1):12-21.
13. Nolan KA, Citrome L. Reducing inpatient aggression: does paying attention pay off? *The Psychiatric quarterly*. 2008;79(2):91-5.
14. Hvidhjelm J, Sestoft D, Bjorner JB. The Aggression Observation Short Form identified episodes not reported on the Staff Observation Aggression Scale–Revised. *Issues in mental health nursing*. 2014;35(6):464-9.
15. Hankin CS, Bronstone A, Koran LM. Agitation in the inpatient psychiatric setting: a review of clinical presentation, burden, and treatment. *Journal of psychiatric practice*. 2011;17(3):170-85.
16. Nijman HLI, Merckelbach HL, Allertz WF, a Campo JM. Prevention of aggressive incidents on a closed psychiatric ward. *Psychiatric services (Washington, DC)*. 1997;48(5):694-8.
17. Daffern M, Howells K. Psychiatric inpatient aggression: A review of structural and functional assessment approaches. *Aggression and Violent Behavior*. 2002;7(5):477-97.
18. Yudofsky SC, Silver JM, Jackson W, Endicott J, Williams D. The Overt Aggression Scale for the objective rating of verbal and physical aggression. *The American journal of psychiatry*. 1986;143(1):35-9.
19. GGZ Nederland. Collectieve arbeidsovereenkomst GGZ 2017 - 2019. Amersfoort: GGZ Nederland; 2017.
20. Kroon H, Michon H, Knispel A, Hulschbosch L, de Lange A, Boumans J, et al. Landelijke monitor ambulantisering en hervorming langdurige GGZ. Utrecht: Trimbos instituut; 2018.
21. Nederlandse Zorgautoriteit. Tariefbeschikking Generalistische basis-ggz - TB/REG-18608-01 2017 [cited 2020 February 3].
22. Foster C, Bowers L, Nijman H. Aggressive behaviour on acute psychiatric wards: prevalence, severity and management. *Journal of advanced nursing*. 2007;58(2):140-9.
23. Stone T, McMillan M, Hazelton M, Clayton EH. Wounding words: swearing and verbal aggression in an inpatient setting. *Perspectives in psychiatric care*. 2011;47(4):194-203.
24. Li W, Yang Y, Hong L, An FR, Ungvari GS, Ng CH, et al. Prevalence of aggression in patients with schizophrenia: A systematic review and meta-analysis of observational studies. *Asian journal of psychiatry*. 2019;47:101846.
25. Campbell JC, Messing JT, Kub J, Agnew J, Fitzgerald S, Fowler B, et al. Workplace violence: prevalence and risk factors in the safe at work study. *Journal of occupational and environmental medicine*. 2011;53(1):82-9.
26. Bowers L, Allan T, Simpson A, Jones J, Van Der Merwe M, Jeffery D. Identifying key factors associated with aggression on acute inpatient psychiatric wards. *Issues in mental health nursing*. 2009;30(4):260-71.
27. Kalisova L, Raboch J, Nawka A, Sampogna G, Cihal L, Kallert TW, et al. Do patient and ward-related characteristics influence the use of coercive measures? Results from the EUNOMIA international

- study. *Social psychiatry and psychiatric epidemiology*. 2014;49(10):1619-29.
28. Raboch J, Kalisova L, Nawka A, Kitzlerova E, Onchev G, Karastergiou A, et al. Use of coercive measures during involuntary hospitalization: findings from ten European countries. *Psychiatric services (Washington, DC)*. 2010;61(10):1012-7.
29. Bader S, Evans SE, Welsh E. Aggression Among Psychiatric Inpatients: The Relationship Between Time, Place, Victims, and Severity Ratings. *Journal of the American Psychiatric Nurses Association*. 2014;20(3):179-86.

Figures

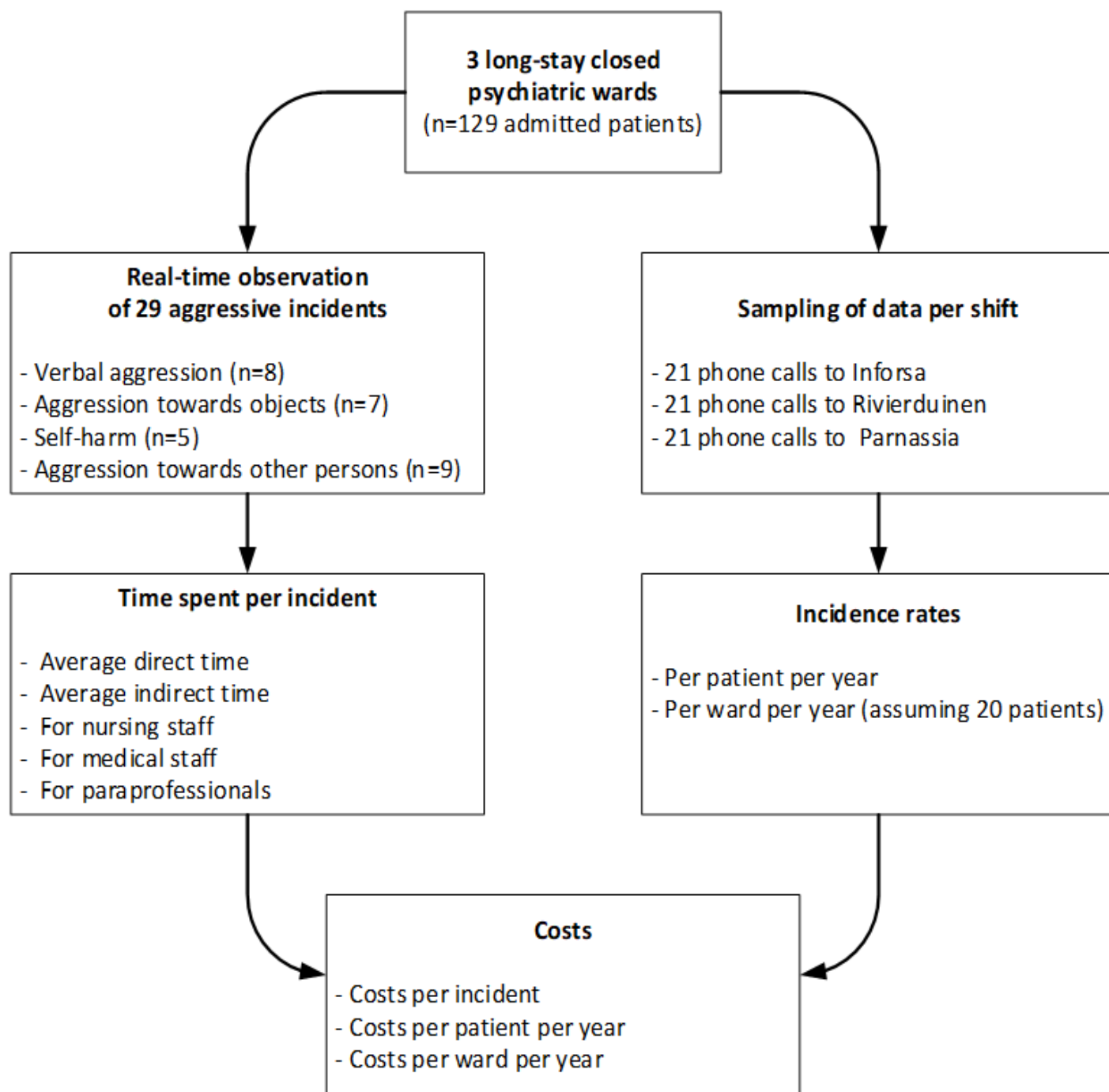


Figure 1

Flowchart displaying data collection.

Supplementary Files

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