

**OBSERVATIONAL ANALYSIS STUDY ON THE INFLUENCE
OF THE PHYSICAL HOSPITAL ENVIRONMENT ON
AGGRESSIVE BEHAVIOUR AND THE MANAGEMENT
THEREOF IN AN ADULT ACUTE PSYCHIATRIC ADMISSION
UNIT.**

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For M Med Psychiatry

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I wish to dedicate this work to my husband Michael Klerck,
who entertained our kids on endless weekends,
who cooked and shopped, encouraged and supported me.
To my long suffering children whose mother loves to study.

SUMMARY

Aggressive and violent behaviour by in-patients in psychiatric hospitals is a common problem^{1; 2} that is often underreported,^{3; 4; 5} and has costly consequences in terms of injuries, damage to property, work days lost, and a negative influence on the quality of care provided to these patients.^{6; 7; 8}

The level of violence in psychiatric hospitals seems to reflect that in the community.⁹ As highlighted by the Truth and Reconciliation Committee in 2002, South African mental health care facilities experience difficulties with regard to general conditions and level of violence.¹⁰

Aggression is a complex phenomenon that is influenced by a range of factors including individual patient factors, social-interactive factors and environmental factors.^{11; 7} Many studies have tried and failed to demonstrate that changes such as physical environment change, intensive case management, increased staff training or skills reduce the level of violence, as captured by number of incidents occurring in in-patient units.^{12; 13; 14; 15}

Valkenberg Hospital (VBH), with a large and busy adult acute psychiatric service, relocated from buildings dating to 1895 and in disrepair, to a new high care building in July 2006. This provided an opportunity to study the effect of the positive environmental change on aggressive behaviour as measured by use of sedation, number of incidents and hours of seclusion usage before and after the move.

The data was collected from the incident report forms, seclusion registers, nurses day-night handover books, schedule medication books and the hospital's computerised data system: Clinicom.

The Pearson Chi-squared test was used to compare differences between proportions of patients associated with those factors that have been shown to play a role in assaultiveness, namely involuntary admission and diagnosis of bipolar disorder and schizophrenia.¹⁶

It was demonstrated that the proportion of patients with bipolar disorder, and with Involuntary admission increased in the second time frame. This was true for males and females.

The average intramuscular and oral lorazepam use, number of incidents and hours of seclusions were analysed with a two-way analysis of variance (ANOVA), with timeframe and gender as independent variables. Once it was established that there was no difference between males and females with regard to average lorazepam use, incidents or seclusions in the two timeframes, gender was eliminated as variable. One-way ANOVA was used to analyse the data with total daily average number (TDA) of patients in the ward as dependant variable.

This study was unable to demonstrate significant difference in average daily Lorazepam use (either oral or intramuscular), use of seclusion, or number of incidents between the two time frames, which means that the null hypothesis H_0 is confirmed.

No significant difference could be demonstrated between males and females in terms of change in average number of incidents reported, hours of seclusions utilised and amount of intramuscular or oral lorazepam used in the two time frames, using TDA number of patients in the ward as covariant.

It is possible that the change in environment had some positive effect directly or indirectly (via staff morale and better patient care) on patients, since despite evidence that the patients in time frame two were more ill (involuntary admissions and longer in-patient stays); there was no increase in use of sedation, or seclusion, and or in number of incidents reported.

Aggression is a complex phenomenon with many variables, both internal (the patient's psychopathology) and external and is probably best studied using direct measurements or observations, and taking cognisance of a range of factors. These include socio-interactions, environment, staff and individual patient factors.

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CHAPTER ONE: ORIENTATION TO THE STUDY

Introduction

Valkenberg hospital, situated in Cape Town, is one of the oldest psychiatric hospitals in South Africa, with a busy acute adult psychiatric service.

The buildings of the previous acute admissions unit are more than a 100 years old, have design faults and are dilapidated. The new admissions suite ready for occupation on 18 July 2006, has been designed specifically to be friendly, safe, comfortable, and above all practical.

This change in physical environment provides an opportunity to study the effects of physical environment on aggressive/disruptive behaviour in this group of patients. It has long been known, albeit instinctively, that temperature control, overcrowding, the physical design of a ward influence the climate in the ward, and therefore the behaviour of the patients, and staff.¹⁷

Various studies have elucidated various factors that influence aggressive behaviour, including individual patient factors, staff factors, and environmental factors.^{18; 19} One tentative model of aggression on the wards suggest that environmental stressors lead to cognitive distortions, which in turn lead to anxiety and hyper vigilance to threatening stimuli, resulting to aggressive behaviour.^{2; 20} This is further supported by the fact that most outbursts are preceded by some anxiety provoking activity.¹⁹

The studies that have provided insights thus far into in-patient aggressive behaviour have not used rate of sedation as a surrogate for aggressive behaviour. The incident reports completed by nursing staff and nurse ward notes are the commonest source of data for studies on in-patient aggressive behaviour.^{1; 13; 21; 22; 23}

The impracticality of the old buildings possibly resulted in most incidents of aggressive behaviour being missed entirely or not reported upon. The literature supports this, indicating that as many as 5 x more incidents occur than are reported.^{3;}

²⁴ Because of this, there may be an increased number of reported incidents in the new building.

The use of seclusion was avoided in the old wards of Valkenberg hospital due to the lack of safe facilities; therefore an increase in the use of seclusion is envisaged. Since patients are rarely secluded without sedation, it being a last resort measure in managing aggressive behaviour. (Associated Psychiatric Hospitals (APH) seclusion policy: APH circular 5/2005, dated 4 May 2006) Incidents usually result in sedation being administered, thus the writer is assuming that the rate of use of sedation will not necessarily decrease due to the increased use of seclusion and reporting of incidents. Because the working environment influences staff morale, and morale influences quality of nursing care,²⁵ it is reasonable to assume that this study will be measuring both an increase or decrease in aggressive behaviour, and a change in management or approach to aggressive behaviour by the staff.

There is expected to be both direct and indirect effects on patient behaviour as result of the change in environment: the direct effects of a clean, safe, pleasant environment on staff and patients, and the indirect effects of increased patient staff contact, staff morale, and awareness amongst staff that security cameras monitor daily events.

In 2001 the Truth and Reconciliation commission highlighted difficulties with regard to the general conditions and the level of violence experienced in mental health care

facilities, and suggested research be conducted in this area.¹⁰ This was echoed by the 2002 report from the director of the APH in the Western Cape. It has been suggested that the violence in society is reflected in its mental health care facilities.⁹ In a South African study by E. Van Wijk²⁶ (2004) on the contributing factors to patient's perceptions of aggressive and violent behaviour after admission to a mental health facility, the following findings from the literature were confirmed:

- Multiple internal and external factors play a role in in-patient aggression
- Dual diagnosis of Schizophrenia and substance abuse, manic bipolar diagnosis, psychosis, previous history of violent behaviour and non-adherence to medication are common risk factors for aggressive behaviour
- Aggressiveness is more common in closed wards, during the acute phase (first 2 weeks after admission), perpetrated by involuntary patients
- The Nurses' style of limit setting may provoke incidents of aggressive behaviour
- Lack of privacy, smoking areas and access to outside areas, as well as the level of cleanliness of the wards seem to play a role
- Very little therapeutic contact with nursing staff leads to frustration.

The study hopes to demonstrate an association between a positive change in environment and a reduction in aggressive behaviour in the acute psychiatric setting of Valkenberg hospital.

Aims And Objectives

Aims

To establish how the physical environment of the acute psychiatric unit in which adult patients are cared for, influence aggressive behaviour, and the management thereof.

Objectives

- To identify changes in surrogates for aggressive behaviour in a set time period prior to and after a change in the environment
- To establish if there is a significant change in aggressive behaviour or the management thereof after a change in the environment
- To establish whether there are in any differences in response to the environmental change between the males and the females.

Background And Motivation

Valkenberg Hospital

Valkenberg hospital is a 370 bed training hospital, affiliated with the Faculty of Psychiatry at the University of Cape Town. There are 15 wards, 145 of the 370 beds are in the 5 forensic wards, the remaining 225 include 6 acute wards, 1 neuroclinic (therapeutic ward) and 3 medium stay wards.



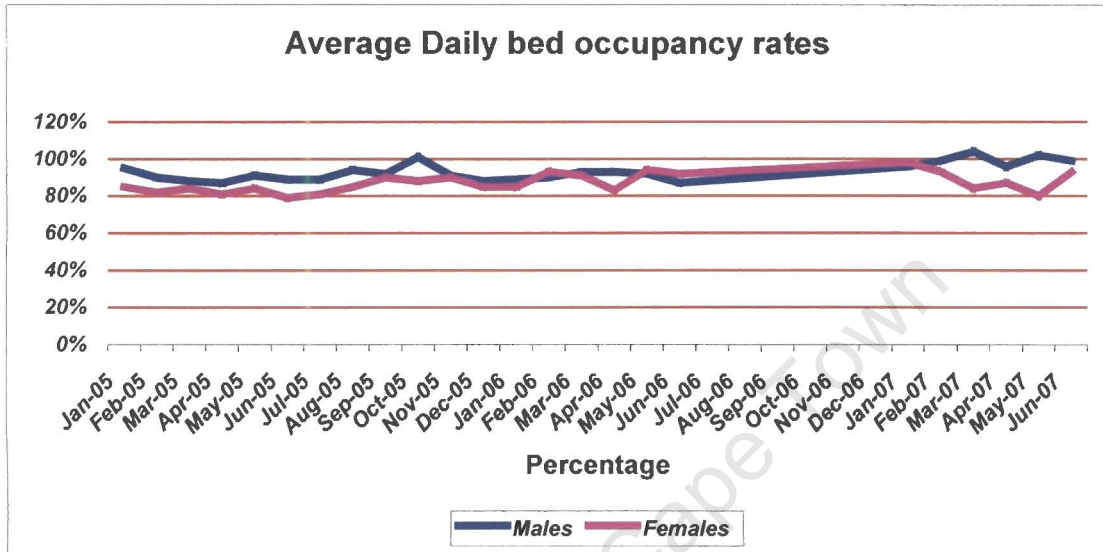
Figure 1: Valkenberg Hospital High Care Unit

The hospital provides acute in-patient psychiatric services to 2 million people in a defined district of the city of Cape Town, and the Western Cape Province. (APH Metropolitan catchment area, June 2006) The hospital comprises 6 acute wards, 3 for male, and 3 for females. Each admissions unit currently consists of

- An acute admissions ward, with 24 beds each in the male and female wards (in the old wards: 22 male beds, and 20 female beds),
- A locked step-down ward
- An unlocked pre-discharge ward

The admissions units processed 1376 admissions in the year 1 April 2005 to 31 March 2006; 1346 in the year ending 31 March 2007 and 1376 in the year ending 31 March 2008. (APH statistics) The average daily bed occupancy rate for both male and female

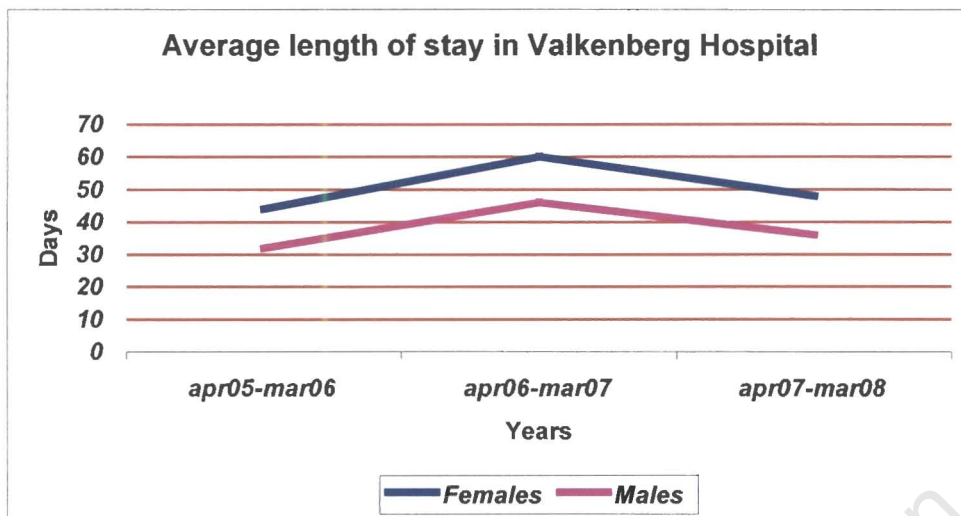
units remain consistently above 80%. (see Graph 1) The average length of stay in the acute admission wards is 14 days for males, and 14.25 days for females. The total length of stay in the hospital is around 40 days for males, and 50 days for females.(See Graph 2)



Graph 1: Average daily bed occupancy rates in percentages.

The daily bed occupancy was calculated as a percentage using the last total entered into the ward movement book for each day, over the total number of beds available.

The acute male admissions ward beds were reduced from 30 to 22 on 5 October 2005 when a fire destroyed the previously occupied building, accounting for the peak occupancy of 101% for a few days.



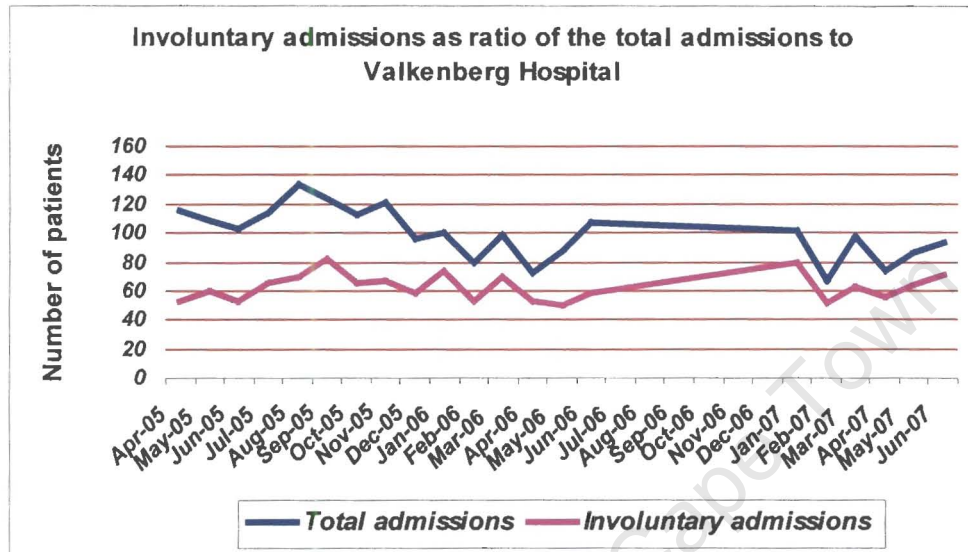
Graph 2: Average Length of stay in Valkenberg Hospital

The average length of stay in the hospital refers to the number of days between admission and discharge.

Mental Health Care legal status

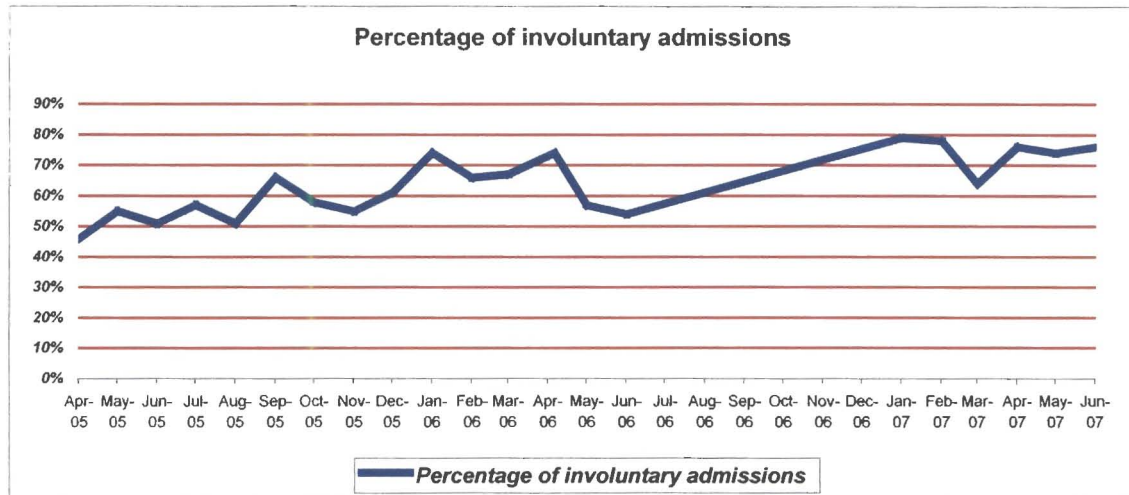
The Mental Health Care Act of 2002²⁷ makes provision for mentally ill persons to be admitted with one of three legal statuses. If a person is evaluated as having the capacity to make a decision regarding their Mental Health Care, and they require admission, then they are required to sign a consent form, and are admitted with a Voluntary status. If deemed to lack capacity to make such a decision, and are a danger to themselves and/or others, and/or pose a risk to their own reputations then they are certified. Under these circumstances if the person is agreeing to be admitted, their legal status is that of an Assisted patient, if they are refusing admission they are admitted as Involuntary patients.

The majority of patients are admitted because they are deemed to be a danger to themselves or others, and/or to their reputations, and require in-patient psychiatric treatment. By far the majority of patients are certified and admitted in an involuntary or assisted capacity.(see Graphs 3 and 4)



Graph 3: Involuntary admissions as a ratio of total admissions to Valkenberg Hospital

All admissions to psychiatric hospitals are either Involuntary, Assisted or Voluntary as specified by the Mental Health Care Act of 2002.



Graph 4: Percentage of admissions that were involuntary

The percentage of total admission that are Involuntary has clearly increased over the past 3 years, possibly indicating that patients are more seriously ill, or that there are fewer beds and more ill persons, thus allowing only the most ill to be admitted.

Diagnoses of patients admitted to Valkenberg Hospital.

The diagnoses cover the range of major psychiatric conditions. As has happened elsewhere in the psychiatric world, with fewer beds available the most seriously ill patients are admitted. The Psychiatry Department of University of Cape Town and Valkenberg Hospital utilises DSM IV-TR²⁸ to diagnose psychiatric conditions, but an ICD-10 diagnosis code is entered on the discharge summary.

Environmental change - the new acute admissions unit

In the year 2000 a new acute admission ward was commissioned by the Department of Public Works (the governmental agency responsible for all government owned land and buildings) in collaboration with the psychiatrists and superintendent of

Valkenberg hospital. The new building was officially handed over the hospital administration on 11 May 2006. The building is practical, concentrating on double volume spaces, maximum use of natural light, security provided by camera systems, central nursing stations with a clear line of sight of the patient areas. There are many alternative daytime spaces, for activities, garden spaces, visitor's rooms, occupation therapy rooms, and smoking and non-smoking areas. The acute admissions units moved into the new buildings on 18 July 2006.

Environmental change - the old admissions unit/history of Valkenberg Hospital

The valley in which the current Valkenberg hospital complex is situated, was allocated to an early settler in the Cape of Good Hope in 1657, for the purposes of growing tobacco. In 1881 the Government of the Cape Colony purchased the land on which the hospital currently stands in order to establish a reformatory. In 1890 the reformatory buildings were converted to accommodate male and female persons with mental illnesses to be transferred off the notorious Robben Island. A new hospital was built in 1895, and of these original buildings the administration building is currently in use, and the two acute admission wards for males and females were vacated on 18 July 2006. The unfortunate patients of the 1880's lived under prison like circumstances, with few medicines available, and over-crowding constantly a problem. (from a brochure produced in 1981 for the Centenary celebrations at Valkenberg hospital)

The previous acute admission wards are more than a hundred years old, and have enjoyed few renovations or maintenance over the years. The buildings have design

faults as well as being dilapidated, with rising damp on the walls, cracks in the walls and tiles, peeling paint, and fire detection systems that do not work. The ward design is impractical with one large sleeping dormitory, (on the upper story for the males), one day-room, a small yard, a visitor area at the front door, and the nursing station separated from all the patient areas. 'The Management Of Imminent Violence: Clinical Practice Guidelines To Support Mental Health Services' developed by the Royal College of Psychiatrists' Research unit 1998²⁹, was used to compare the new and old acute admission wards in terms of the guideline statement of good practice in the clinical environment.

Guidelines include:

- Calming features, such as a clean friendly environment that avoids crowding; natural daylight and fresh air; a choice of smoking and non-smoking areas; safe 'time out' areas; safe outside areas; patient and staff privacy areas and controlled temperature and ventilation.

The old wards were difficult to clean and mouldy, with the patients crowded into one day room in which people smoked. The patients slept in one big dormitory and the building had no air conditioning or heating. The seclusion facilities were unsafe, and the staff had no private tearoom for the nurses.

- Safety in the environment: includes unimpeded sight lines, safe seclusion rooms, entrances and exits within sight of staff and lock back facilities on doors.

Neither the many entrances to the old wards, nor the patient areas were visible from the nurses' station. There were no lock back facilities. The seclusion rooms were dark and cold, and therefore avoided.

- Activities: The recommendations include a gym, garden or special areas.

The old wards had a day room, dormitory and dining room, the latter doubled up for other activities.

- Private interactions: areas for phone calls, meetings, visitors, conversations or interviews with staff are suggested.

The old wards did not have any private spaces.

- Day accommodation: needs to be separate from sleeping areas, with a day room open at night for those who cannot sleep.

The old wards provided a day room downstairs, but all patients were confined to the dormitory up stairs for the night.

The new unit complies with all of the features suggested in the guidelines for good clinical practice in the clinical environment.

CHAPTER TWO: LITERATURE REVIEW

Method

Strategy for the literature study

The primary theme for choosing suitable literature was the effect of the physical environment on aggressive behaviour/assaultiveness in psychiatric hospitals. This yielded a single study by Daffern et al published in 2004.¹³ The theme was extended to include various aspects of psychiatric in-patient aggression:

- Various analyses and models.
- Causal factors/predictors of aggressive behaviour
- Gender differences
- Underreporting/ under detecting of incidents of aggressive behaviour
- Patient and staff perceptions, as well as the effects and costs
- Reviews on various management strategies
- Strategies to reduce this behaviour

Search Methods

The search for literature was a lengthy process conducted in stages since the initial theme gradually expanded. This was due to the scarcity of literature on the influence of physical environment on aggressive behaviour in in-patient psychiatric settings.

The bibliographies of particularly relevant articles sometimes provided leads to other helpful articles. Additionally articles sometimes referred to concepts developed by other authors, which was then valuable to read more about, such as the role of various factors such as over crowding on psychiatric in-patient aggression.

Database searches were performed, using MEDLINE and PUBMED on the Internet. The search terms used singly or in combination were: influence of environment on aggressive behaviour, in-patient violence/assaultiveness, surrogates, or proxies for aggression. With the assistance of the Librarians at 2 Military Hospital, and University of Cape town, other literature was located. This included textbooks, other articles, and lecture notes.

Including and excluding literature

The literature included addressed:

- Environmental effects on psychiatric in-patient aggression, including the physical environment, structure of the ward program, crowding, lack of privacy, staffing issues.
- Reviews dealing with management of psychiatric in-patient aggression
- Analyses, suggested models, and suggested mechanisms to reduce psychiatric in-patient aggression

The literature that was not the primary focus, but contributed towards the review included:

- History of Valkenberg hospital.
- The history of the development of so-called moral treatment of psychiatric patients.
- Risk assessment for psychiatric in- and out-patient aggression
- Management of the violent person and safety recommendations.
- The links between violence and mental illness

Literature was excluded if it did not relate in some way to the central theme of the influence of the physical environment on psychiatric in-patient aggression. There were no defining criteria on the type of studies; hence all the literature the writer could find complying with the theme was included. Literature written in languages other than English or Afrikaans was excluded.

Deficits

Throughout the literature the terms aggression, violence, assaultiveness, aggressive behaviour were used interchangeably, and not clearly defined. There is often no differentiation between verbal abuse/threat or physical assault, damage to property or self-injurious behaviour.

No literature was found where proxies/surrogates for aggressive behaviour other than incident reports were used. Although the gold standard quoted in the literature for management of acutely behaviourally disturbed patients suggests the use of benzodiazepine with or without antipsychotics, no study has used the rate of benzodiazepam use per patient per day as surrogate for such behaviour.

Only one study dealing with inpatient violence in South African psychiatric hospitals was found.

Results

Books:

Reid, WH. Lion, JR.¹¹ edited a book : Assaults Within Psychiatric Facilities, published in 1982 in New York by Grune Stratton. This is a collection of research papers and reviews by psychiatrists studying violence and aggressive behaviour.

Although dated, this book was a helpful resource to identify the different factors involved in the phenomenon of inpatient aggression.

Monahan J. et al.³⁰ summarised the MacArthur study of mental disorder and violence in : Rethinking Risk Assessment: The MacArthur Study Of Mental Disorder And Violence published in 2001 in New York by Oxford University Press. This was a study of risk assessment and prediction of community violence, as opposed to inpatient violence, but helpful reading.

S. Kalsiki's book on Medico Legal Assessment in South Africa³¹, chapter seven deals with risk assessment and management of violent offenders who are mentally ill.

Editorials:

There were three editorials: in the July 1990 edition of Hospital and Community Psychiatry, M. Rosenbaum³² commented on inpatient violence, and specifically the unstructured milieu. T.Palmstierna³³ urged researchers to standardise definitions and research methodology when studying aggression/violence in persons suffering from mental illness. He suggests that direct measurement and the use of scales might

provide more robust results that can be compared with similar studies. This was in Acta Psychiatrica Scandinavia, 2000.

T. Steinert³⁴ commented in the British Medical Journal of November 2001, that the current model of community care world wide is not containing nor reducing the violence related to mental illness in the community.

Theoretical models:

Nijman, in an article named: A Tentative Model Of Aggression On Inpatient Psychiatric Wards², and published in Psychiatric Services, June 1999, proposes a model that takes into account ward, staff and patient variables and how they, as well as the patient's psychopathology influences perception, cognition and behaviour. This is complimented by a cognitive model proposed by Winstanley,²⁰ suggesting that cognitive distortions arising from the method of admission and detention, environment, and staff attitudes, could lead to hypervigilance and then to aggression.

Policies, guidelines and position statements:

The following were used to benchmark practices within Valkenberg, such as recommended physical environment, sedation and seclusion practises.

Royal College of Psychiatrists (1998)²⁹ The Management Of Imminent Violence: Clinical Practice Guidelines To Support Mental Health Services.

Beck, P. Roy, R. 1996. Assaultive and Destructive behaviour in a treatment setting: Guidelines for the Psychiatrist³⁵. Canadian Association Position paper, 1-5,

http://www.cpa-apc.org/Publications/Position_Papers/Assaultive.asp

Moscovitch, A. Chaimowitz, GA. Patterson, PGR. Trainee safety in psychiatric units and facilities.³⁶ Canadian Psychiatric Association, copyright 2001, off internet 24 May 2006.

The recognition, prevention and therapeutic management of violence in mental health care.³⁷ UK college of Nursing, Midwifery and health (UK) 2001

Reviews:

The fourteen review articles covered topics such as links between mental illness and violence, violence amongst psychiatric in- and out-patients, in emergency settings and against staff. Additionally the treatment of violent patients, the use of benzodiazepines, seclusion and restraint was discussed. Many reviews addressed risk appraisal and management. One review examined possible reasons why high bed occupancy is associated with an increase in violent incidents and another explored the issues around non-compliance.

Case reviews:

There was a single case study by Flannery³⁸ in 1996 illustrating the effect of management style on the incidence of violent behaviour in psychiatric in-patient units.

Focus groups, Surveys and audit cycles:

Many of the surveys were conducted with staff (psychiatric residents and nurses), gathering data about experiences of assaults, training and skills levels, the effect of assaults on quality of nursing care or attitudes towards patients. Bensley³⁹ conducted a

very interesting survey amongst staff and patients asking for explanation for violent incidents, and confirming what is known instinctively by health care workers in mental health, namely that smoking policies and availability of tobacco is a major source of conflict in in-patient units. One audit cycle was reported by Hunter⁴⁰ in which a total quality management survey identified possible areas of conflict, made changes and then recorded a decreased in incidents as result.

Prospective observational studies:

21 prospective studies addressed a range of issues such as:

- Characteristics :demographical, sociocultural, symptomatology, neurology of patients who are assaultive
- Underreporting of incidents
- Accuracy of risk assessment, staff prediction of violence
- Effects of crowding on the number of incidents
- Effects of staffing ratios and skills on in-patient violence
- Gender differences with regard to violent behaviour

The data stems from a mixture of direct observation scales, chart reviews and incident reports.

Retrospective observational studies:

24 studies were retrospective, mostly using incident reports and chart reviews and a variety of other measurements such as bed occupancy, staffing ratios, behaviour

preceding the incident, and rhythms to try and illustrate associations with violent behaviour.

Pseudo-experimental studies:

6 studies were found in which some intervention occurred, such as change in hospital environment, change in number of beds, increasing staff competency. Many used direct measures of aggression (Staff Observation Of Aggression Scale-SOAS), but most still relied on incident reports. The current literature cannot convincingly show that any one intervention decreases the number of incidents in psychiatric inpatients.

Randomised controlled trials:

Walsh¹² 2001 from UK compared intensive case management of psychiatric patients with standard of care for a period of 2 years to try and illustrate reduction in number of violent incidents, without success.

Summary of Literature Review.

Aggressive or violent behaviour is usually the reason for psychiatric patients to be taken to emergency units for possible admission,⁴¹ roughly 10-15% commit an act of violence prior to admission.⁴²

Prevalence

Aggressive behaviour amongst in-patients on psychiatric wards is a common phenomenon,^{1; 2} with differing levels reported, ranging from 0.65 to 13 incidents per occupied bed per year depending on the author's definition of an incident.^{4;43} It has often been suggested that the increase in aggressive behaviour on psychiatric inpatient units is due to a combination of fewer acute beds, leading to a higher turnover, and gradually changing admission criteria to allow only the most disturbed patients admission.¹⁵ Risk assessment for aggression, prevention of incidents and management of aggression has become an important part of the day-to-day work of all acute psychiatric units.²³ The regularity with which incidents of aggressive behaviour occurs is estimated to be up to 5 times more common than is reported.^{3;4; 5} There are substantial consequences to such aggressive behaviour for patients and staff, including physical, psychological and financial.^{6; 7; 8}

Associated factors

Many studies have demonstrated the importance of the treatment environment for in patients with psychosis, as well as the deleterious effects of poor working environment on staff.⁴⁴ This mostly refers to ward atmosphere, social structure, and

organisational aspects of in patient facilities, but it is not inconceivable that the nature of the physical surroundings form part of the treatment environment. Many different factors could be influencing aggression. In the paper on biological and behavioural treatments for aggressive psychiatric inpatients Corrigan states: “ A multi dimensional approach to aggression assumes an interaction between biological and environmental aetiologies as well as between drug and behavioural treatments.”⁷

There have been many studies investigating the predictors of violence, as well as the variables influencing the risk of violence. Recent history of violence is the predictor with the highest correlation with aggression in patients.^{4; 5; 23} Environmental risk factors include over-crowding of wards,^{1; 2; 18; 43; 45} too much or too little structure in ward programs,⁴⁶ locked wards with lack of privacy^{6; 43} and the stress of being nursed in seclusion/isolation.⁷

Theoretical models

There are many variables influencing aggressive behaviour in this population of patients, and two models have been proposed to try and account for in-patient aggression taking many these factors into account.^{2; 20} The model proposed by Nijman (see figure 2) suggests that the core variable that leads to admission is the psychopathology. After admission a range of physical and therapeutic environmental stressors play a role. Stressors include crowding, lack of privacy, cognitive distortions, negative consequences of aggression (seclusion, sedation) and communication problems. These factors interact to perpetuate aggressive behaviour.

A cognitive model suggested by Winstanley complements the Nijman model by proposing that increased anxiety due to environmental stressors leads to cognitive distortions: “I am in jail”, I am never going to get out of here” “I am not safe” “I am going to be hurt”. This in turn leads to increased vigilance for threatening stimuli, and selective attention given to those stimuli, with resultant aggressive behaviour. This is further supported by the fact that an aggressive incident seldom occurs without signs warning that the patient is distressed or feels threatened, either by the demands made of him/her in terms of complying with medication or ward routines, or by limit setting perceived as posing a threat to the patient’s autonomy. ¹¹

University of Cape Town

A tentative model of inpatient aggression from Nijman et al 1999.²

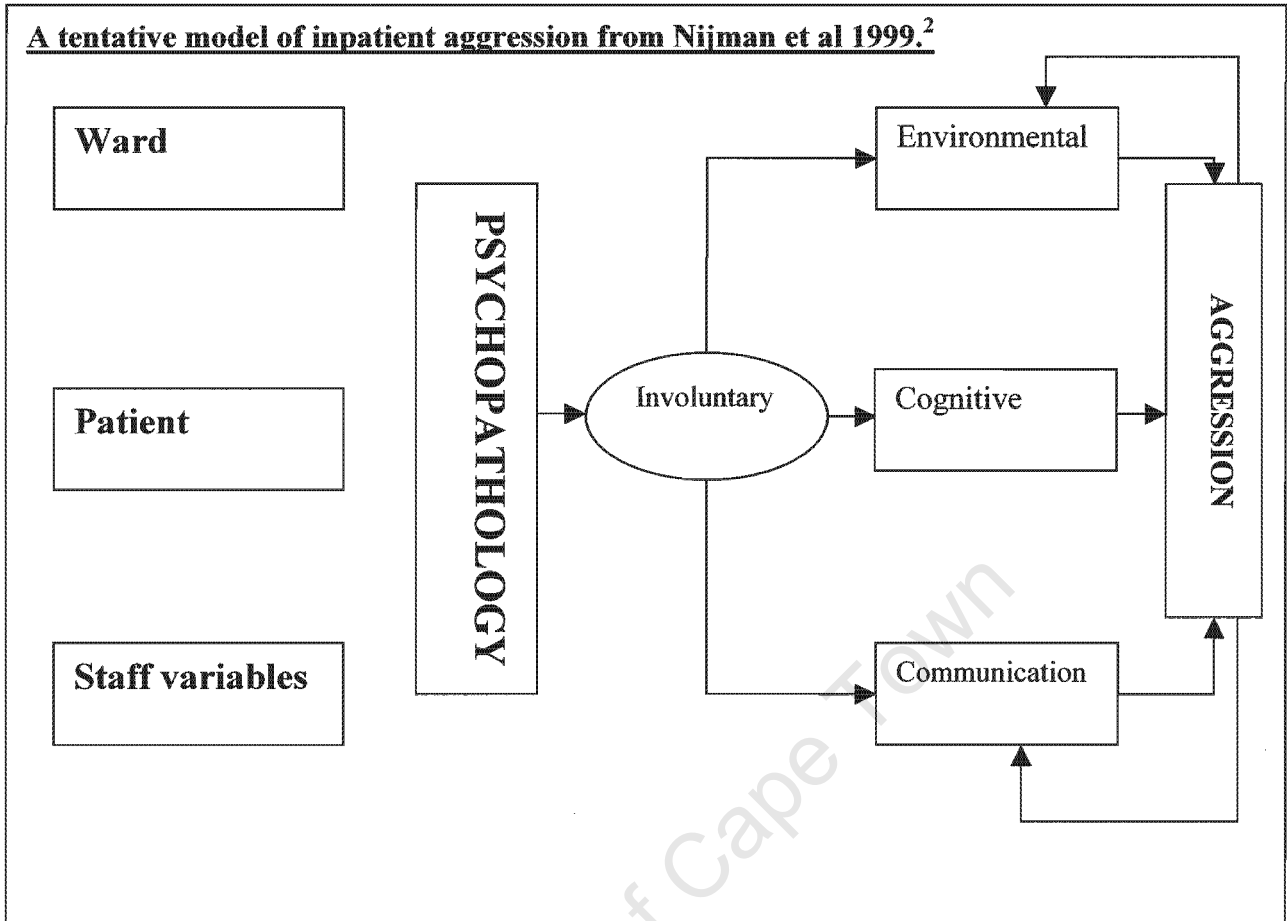


Figure 2: A model of inpatient aggression

Ward variables

It has been suggested that aggressive behaviour is an interactive phenomenon, a function of the environment,³⁸ varying with time of day, demands made on patients, level of activity, limit setting, lack of privacy and overcrowding.^{11; 18}

Environmental factors shown to influence aggressive behaviour in inpatient units include time of day, crowding, un-therapeutic environment and ward turmoil factors.¹

Environmental stressors in Valkenberg Hospital

The environmental stressors in the old wards of VBH possibly include:

- Overcrowding (bed occupancy rate for both males and females consistently above 80% see Figure 1). The literature shows increased incidence of both physical and verbal aggressive behaviour when the bed occupancy rises above 70%.¹
- Inadequate staffing, clinical staff activities.¹ In 2006 the hospital nursing posts were 75% occupied, but the problem is more complex than a simple lack of numbers. Only 60 % of the chief, senior, and professional nurse posts were filled, the other nurse posts are filled with enrolled nurses, and nursing assistants. (APH structure 2006) James demonstrated that staffing patterns influenced the number of violent incidents.⁴⁷ He showed that while there was a negative correlation between number of violent incidents and level of permanent staff, there was a positive correlation between number of violent incidents and level of agency staff.⁴⁷ Although the trends in psychiatric hospital management in terms of staff-patient ratios seems to be 'more is better', there is evidence that the amount of attention patients receive from the clinical staff per day is a much better indicator of unit effectiveness, when community tenure is used as measure of effectiveness.⁴⁸ Previous studies have shown that patients spend less than five percent (<5%) of their waking day in therapeutic activities and less than eleven percent (<11%) in any contact with clinical staff members in the average state run psychiatric hospital⁴⁸

- Lack of training to manage aggressive patients (especially amongst private non-permanent nurse agency staff)¹;
- Environmental stressors in the form of old dilapidated mouldy buildings, seclusion rooms that are dark and dungeon-like, no privacy, and few ward activities. All of these could lead to cognitive distortions and increased anxiety, hyper vigilance and resultant aggressive behaviour, according to both proposed models. These factors could also contribute to the conflicting messages of custodial versus therapeutic care to the patient.¹¹

Literature on environmental change

Contextual contributors towards aggression is acknowledged, but seldom researched.^{11; 13} The environmental or contextual influences could include the physical characteristics of the ward, the attitudes and behaviour of staff, and/or the ward program. Daffern¹³ had the opportunity to study the rate of aggressive incidents as reflected in incident forms for 2 yrs prior to and after an old forensic psychiatric hospital closed down and the patients were moved to a new, improved building. The researchers hypothesised that the aesthetic appeal, increased personal space, less restrictive regime and more access to activities would reduce rates of inpatient aggression, partly by improving patient satisfaction with the service. They failed to demonstrate the expected reduction in overall inpatient aggression. This was attributed to a range of factors, including the fact that the new hospital had twice the number of beds, leading to a higher number of acute ward patients, the new ward was more fragile physically with dry walling and less sturdy fittings, resulting in a large

number of the incidents related to damage to property. Lastly, the patients had free access to their bedrooms during the daytime in the new facility, resulting in incidents when there was no staff supervision.

Patient variables

Inpatient aggressiveness has been linked to positive symptoms, specifically persecutory delusional thinking and hallucinations, disorganisation and excitability. Other factors include mania, substance abuse, younger age, organic brain disease, a wide range of medical conditions, intellectual disability, personality disorders (antisocial especially). The best predictor of aggressive incidents is a history of violent behaviour.^{7; 47; 49; 50; 51; 52; 53} Disorder related variables are a better predictor of aggressive behaviour amongst in-patients than demographic data.⁵⁴ Involuntary admission is another factor that shows positive correlation with aggressive incidents.⁵⁵ Most incidents occur in the first 2 weeks of admission.^{4; 5; 18; 56}

Gender differences

The literature suggests that females are generally less aggressive than males, but that this may not be the case with psychiatric patients, where males and females have been found to perpetrate acts of aggression at equal rates, even though females might cause less damage or less harm.^{21; 42; 57; 58} It has also been found that staff commonly underestimate the risk of violence in females, and are therefore less vigilant.⁵⁷ As with males, recent history of physical assaults prior to admission, and a history of non-compliance with medication are the best predictors of inpatient aggressive

behaviour.^{21; 57; 58} In both males and females severity of psychotic illness, specifically positive symptoms is associated with higher frequency of aggressive behaviour.^{57; 58} It is also suggested that the emergence of aggressive behaviour in females is related to the increased arousal and excitement of acute mental illness, since in one study females had a much higher incident of aggressive behaviour in the first 10 days of admission.⁵⁸ In males however, emergence of aggressive behaviour during acute illness may be due to psychotic symptoms enhancing more chronic predispositions to violence.⁵⁸

Staff variables

Staff factors leading to increased aggressive behavior on inpatient units include inexperience, lack of clear roles, and low staff to patient ratios.¹ Physical 'provocation' by staff during times of demand on the patient, such as administering medication, showering, or restraining a patient may provoke aggressive behaviour.⁵⁹ Attitudes of staff members towards patients, as well as their style of limit setting may influence aggressive behaviour.^{18; 19; 60; 61} External locus of control and trait anxiety in staff members seem to lead to more frequent involvement in aggressive incidents, whilst there are conflicting results regarding whether an authoritative attitude is a protective or a risk factor.⁶²

Organisational issues, such as overtime, chronic staff shortages, lack of training or support from management can influence staff morale, and therefore quality of care. Aggressive incidents contribute to low morale.^{25; 63} Staff morale is likely to be positively influenced by the change in physical environment, it is therefore anticipated

that increased morale will in turn influence quality of patient care, which could translate into changes in the management of aggressive behaviour.

Reducing aggressive behaviour

Clearly a multidimensional model should be used in trying to address the complex issue of inpatient aggressive behaviour.¹¹ Since the 1970's hospital beds have been reduced, increasing bed pressure, decreasing length of stay, increasing readmissions, and effectively ensuring that only the most ill of psychiatric patients are admitted to hospital.^{14; 18; 46} This has resulted in an escalation of aggressive behaviour, especially in the acute phase of illness, with all its negative consequences.^{14; 18; 46}

Therapeutic alliance:

A promising concept in trying to reduce aggressive inpatient behaviour is therapeutic alliance. This concept refers to the quality of the relationship between the patient and the therapist, and has been shown to

- (a). Be a predictor of effectiveness of hospital treatment, and
- (b). To show a high level of correlation with inpatient violence (the lower the therapeutic alliance the higher the risk of aggressive behaviour).⁵⁸

The implications of this finding is that if one can increase therapeutic alliance, and thereby improve patient collaboration with the treatment process, one might be able to reduce the risk of aggressive behaviour. Studies have shown that non-compliance is associated with younger patients, and substance abusers, leading to increased number of acute admissions.⁶⁴ It has been shown that the likelihood of compliance is

increased when the therapeutic alliance is good and when the physician is able to convey optimism about treatment to the patient.⁶⁴

Two key elements emerge from the literature regarding enhancing therapeutic alliance: firstly treating patients with dignity and respect, and secondly conveying optimism regarding outcome of the treatment to the patient.^{11; 58; 64} When combining this concept with the model proposed by Nijman to understand in-patient aggressive behaviour, it can be postulated that by removing some of the causes for cognitive distortions, such as physical surroundings that are reminiscent of prison, one might be increasing the chances of therapeutic alliance. The reason for this would be that the physical environment could contribute to the message of respectfulness, dignity and optimism, which in turn might increase the possibility of improving therapeutic alliance with the patient.

CHAPTER THREE: RESEARCH METHODOLOGY

Design

This is a retrospective observational analytic study of the levels of aggressive behaviour in an acute psychiatric admission ward before and after a positive environment change as measured by surrogates for aggressive behaviour.

Study Population And Sampling.

The convenience sample is all acutely ill patients admitted into the acute psychiatric wards at Valkenberg Hospital during the set time frames of January to June 2006 and the same period in 2007. The sample does not include patients who were already in the ward on 1 January 2006 or 1 January 2007. There is no reason to believe that this sample is 'unrepresentative' of the bigger population of mentally ill patients who fall in the catchment area and could possibly have been admitted to the Valkenberg acute psychiatric units. Statistical inference will be used to refer to the population of all *possible* patients or to the larger population of patients admitted to the hospital over a longer period than the time intervals studied. A proportion of the mentally ill adults in Valkenberg Hospital's catchment area remain out of hospital due to lack of bed availability.

Definition Of Terms

Aggressive behaviour:

for the purposes of this study this concept is defined as: *an act intended to cause physical or psychological injury to the self or another human, or damage to property.*

(Adapted from *The violent person* Woods2001)⁶⁵

The reason this definition is so broad is that the study will not examine specific incidents of aggressive behaviour, but surrogates for such behaviour in the form of the number of incident reports and rate of benzodiazepine use. There is also some suggestion that there is no purpose in distinguishing between aggressive (verbal and threats) or violent (acts) behaviour, that they are of the same construct.⁶⁶ The definition therefore will refer to all grades of aggressive behaviour that might be regarded by nursing staff as an indication to administer as-required sedatives, including:

- Agitation
- Verbal insults
- Verbal threats
- A attempt to or destruction of property
- Physical assaults, or self injurious behaviour
- Assaults using a weapon of some kind.

The writer acknowledges that sedation is also used for restlessness, a symptom of the psychopathology, as well as an adverse effect of antipsychotic medication. However, since these two biological processes drive restlessness, it is assumed that the physical environment will not have a significant influence on this phenomenon. Additionally, restlessness causes patients to move around, often bumping into, or inadvertently touching another patient, resulting in an aggressive incident.⁴⁹

Surrogates for aggressive behaviour:

Incident:

The word 'incident' in Valkenberg hospital refers to an occurrence in the ward that was deemed serious enough by the nursing staff to be managed as an emergency, leading to the doctor being called to examine the patient/ injured person and provide treatment; and incident forms being completed. This implies that there may be many occurrences of aggressive behaviour and injuries that were not deemed serious enough to become an incident. Both Lion³ and Crowner²⁴ show significant difference between occurrence of incidents and the completion of incident forms. In comparing incident report forms with nurse ward notes in a state-run psychiatric hospital in Maryland, United States, Lion demonstrated 5 x as many assaults on staff as were formally reported on the incident forms. Crowner defined assaults very narrowly in his study in an intensive psychiatric service in New York, United States, as physical contact between patients, such as hitting, slapping, kicking etc. Two independent raters reviewed 3330 hours of tape recordings to identify assault incidents. When compared to a combination of incident forms, chart notes and ward journals, many more

incidents occurred than were reported. The reasons often suggested for this phenomenon include:

- An acceptance by staff that incidents are part of psychiatric care, and becoming inured to them.³
- Fear that reporting of incidents will be seen as performance failure.³
- Completing forms require effort, are seen as too troublesome, especially when there is no change resulting from them.³
- ‘Blind spots’ non-visible areas where staff simply cannot see the incidents lead to non-reporting.²⁴

Sedation:

Sedation refers to the administration of medication to cause sedation, rather than treat the underlying psychiatric condition, in order to minimise the risk posed to the patient or others by aggressive behaviour.^{7; 29} In this study both oral and intramuscular as required (p.r.n) dosages will be the measured.

Lorazepam is the drug of choice, since it acts quickly, is effective and safe, can be administered intramuscularly.^{41; 49; 67} It is routinely prescribed for new admissions to Valkenberg hospital, usually in a standard as-required format, in keeping with literature on behaviour control.^{7; 29; 49; 67}

Seclusion and restraint:

In spite of both of these modalities of treatment being part of the management of disruptive and dangerous behaviour in psychiatric patients for almost 200 years,⁶⁸ only rate of seclusion use will be used as a surrogate for aggressive behaviour in this study. The reason for the exclusion of restraint is not the controversies that surround the use of these two modalities of treatment, but more practical issues.

Seclusion:

‘Seclusion’ refers to the practice of isolating a patient whose behaviour is uncontrollable or dangerous, usually after administering a sedative, in a single room, for a period of time. By definition the patient is prevented from leaving the seclusion area of his/her own accord, therefore locking the patient into any area where free movement in or out of the area is restricted is regarded as seclusion. (APH seclusion policy: APH circular5/2005 dated 4 May 2006) This must be prescribed by a doctor, and entered into a register. A form must be completed that is attached to the nurse ward notes. Rate of seclusion will be used in this study and it is unclear what effect if any the move to the new buildings will have since:

- The seclusion records in Valkenberg Hospital have been inaccurate and mostly unavailable, this has already been addressed.
- In the past staff members have tried to avoid using the seclusion rooms as far as possible because they were unsafe.

Restraint:

Restraint refers to the physical restraining of patients as part of emergency treatment, to reduce the risk of serious injury to self or others. Mechanical restraint methods are no longer common in psychiatric hospitals in South Africa, following a cultural shift, with increased awareness of human rights, and concerns of patient safety. This demand by society that the least possible restrictive measures be used has been seen elsewhere in the world, specifically the United States.^{69; 70}

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Measurements

The proxies for aggression (please see definitions) to be measured include:

Total units in milligrams per patient per day of as- required (p.r.n) sedative medication, namely lorazepam (oral and intramuscular) from the pharmacy schedule books (there was a time that intramuscular lorazepam was unavailable world wide, and midazolam was substituted, this will be converted to an equivalent dose of lorazepam). This was collected as a total daily amount administered in the ward (in milligrams), and then a total daily average in milligrams calculated.

Number of administration events per patient per day

Note: Rossberg⁷¹ used defined daily dosage (DDD) in his study as a score of severity of illness. DDD or the recommended average daily dosage of a drug is defined as one haloperidol equivalent (8mg). He scored antipsychotics, antidepressants, and sedatives separately and then calculated a total medication score, using this score as a measure of severity of illness. He was examining staff members' emotional reactions to aggressive and suicidal behaviour of inpatients in Norway, using severity of illness as one of the predictors.

Soliman²² completed a case controlled study to identify risk factors and correlates of violence committed by acutely ill adult psychiatric inpatients. In the group of patients exhibiting aggressive/violent behaviour there was significantly higher daily dosage of p.r.n antipsychotics and benzodiazepine, as well as higher daily dose of regular medication. The researchers suggested that medication variables could be useful

predictors of in-patient violence, especially when no other information about risk factors is available.

Raja⁵⁰ reviewed aggressive violent incidents over 6yrs in an Italian acute psychiatric unit. The researchers used among other measurements benzodiazepine equivalents and chlorpromazine equivalents for antipsychotics. The patients showing aggression or committing acts of violence required higher dosages of drugs.

For this study the number of administration events per day for the ward was centered into the data, since the dosage administered to individual patients could vary if their age, weight and previous exposure to benzodiazepines or similar medication was taken into account by the prescriber.

Number of reported incidents according to the nursing incident register

The incident reports completed by nursing staff and nurse ward notes are the commonest source of data for studies on in-patient aggressive behaviour.^{1; 13; 21; 22; 23}

Number of hours of seclusion as per seclusion register

Other measurements to be used in the analysis (These are for the two study periods, for men and women separately):

1. Total number of admissions per month
2. Average bed occupancy per month
3. Legal status of all patients admitted and percentage of admissions that are involuntary.

4. Discharge diagnosis of each patient admitted during the two study periods.

The diagnosis is entered as an ICD 10 code on the discharge summary, despite the Department of Psychiatry at the University of Cape Town, and the Hospital using DSM IV – TR to diagnose psychiatric conditions.

In spite of the suggestion that clinical studies on aggressive behaviour should include the use of one of the scales developed to measure aggression,³³ no scale will be used in this study, since the move to the new unit has already occurred hence the opportunity for pre-intervention measurement is lost.

Logistics And Time Schedules

The surrogates for aggression will be measured from 1 January to 30 June 2006 and 1 January to 30 June 2007, the move to the unit having occurred on 18 July 2006. It was decided to allow a settling in time into the new unit prior to commencing the study. The time frames are the same 6 month period in two different years to avoid the complication of possible seasonal variance in admissions.

Data Management And Analysis

The hypothesis is simple and one-sided. The null hypothesis states that improved environmental conditions have no effect on aggressive behaviour or the management of aggressive behaviour in acute psychiatric setting. The alternative hypothesis states that improved environmental conditions reduce aggressive behaviour and change the management of such in acute psychiatric settings, as shown by a decrease in the rate

of sedatives use, and/or increase in use of seclusion. Discrete and continuous data will be collected. Categorical data analysis will be used to analyse the discrete data and ANOVA for the continuous data, and p-values will be used to test whether the observed differences are statistically significant. Covariates such as the total daily average bed occupancy, diagnoses and gender will be included in the model to eliminate unexplained variance. Since it is not known what the expected rate of incidents per occupied bed per year is for acute admissions in South Africa, it is very difficult to predict the power of the study.

Variables

The confounding variables include

- Possible seasonal variance (There is some evidence that specifically patients with affective disorders may show seasonal variance in aggressive episodes.⁷² To control for this the same 6 months of two different years will be compared.
- The disruption of the actual move from one unit to another and the adjustment period for staff and patients to the new unit. The second study period commences almost 6 months after the move to the new unit.
- The improved morale amongst staff members, as result of the changes in the physical environment is expected to positively influence the attitude and tolerance of the staff towards aggressive behaviour. This could influence not only the occurrence but also the management of aggressive behaviour. This might be reflected in increased use of seclusion, and less of sedation.

- Patient diagnoses. The literature has indicated that inpatient aggressive behaviour is linked to positive symptoms, specifically persecutory delusional thinking and hallucinations, disorganisation and excitability, also involuntary admission, mania, substance abuse, younger age, organic brain disease, a wide range of medical conditions, intellectual disability, personality disorders (antisocial especially) and the best predictor is a history of violent behaviour prior to admission. The discharge diagnoses of all patients admitted to the acute admissions units during the 2 study times will be compared. The ICD 10 codes will be translated into the nearest DSM IV-TR equivalent diagnosis in the following 8 groups: 1. Substance-related disorders; 2. Schizophrenia and other psychotic disorders (excluding Schizoaffective disorder, Psychotic disorder due to General medical Condition and Substance induced psychotic disorder); 3. Schizoaffective disorder; 4. Bipolar disorders; 5. Personality disorders; 6. Mental disorders due to a General Medical Condition; 7. Depressive disorders; 8. Other (including diagnoses such as Posttraumatic Stress disorder and Adjustment disorders.)
- The percentage of patients admitted as involuntary users of the mental health care services during the two study periods will also be compared between the two time frames.

Constants

The assumption is made that the prescribing habits of the doctors working in the acute units remain unchanged. This is reasonable to assume, since it is standard practice to write up p.r.n (as required) sedation for all new admissions.

The second assumption is that the nursing staff complements are going to remain more or less constant, with similar numbers and the usual rotations in shifts. This seems to be reasonable considering budgetary restraints, and unavailability of psychiatrically trained staff.

Data collection

The data was collected, coded and categorized on MS Excel and then imported for further analysis into the statistical package STATISTICA.

The total milligrams of intramuscular and oral lorazepam used per day (not per individual patient) was obtained from the Medication schedule books in Valkenberg Pharmacy, as was the total daily administration events.

The number of seclusion hours was obtained from the Seclusion registers of the male and female wards. The number of incidents was obtained from the incident forms kept by nursing management.

The total daily bed occupancy was obtained from the Nurse day-night hand over books, where the last daily total for the previous 24 hours is entered in the handover report in the morning.

The total number of admissions per month, the status and discharge diagnosis of every patient admitted with the two time frames was obtained from the computerised hospital record system, Clinicom.

The purpose of the analysis was to accept or reject the null hypothesis: that there are no significant differences between the two time frames.

1. By comparing the ratios of the different diagnoses and legal admission status between the two timeframes
2. By comparing the average intramuscular and oral lorazepam use (in milligrams and administration events) between the two timeframes, with total daily bed occupancy as covariant, since more patients will require more lorazepam.
3. By comparing the average number of incidents reported and hours of seclusion utilised between the two time frames.
4. Additionally the data was analysed to establish if there was a difference between the male and female population with respect to; seclusion use, number of incidents, diagnoses, legal status and lorazepam use.

Timeframes

For the sake of the analysis the time 1 January 2006 to 30 June 2006 in the old wards is referred to as timeframe 1; and the time 1 January 2007 to 30 June 2007 in the new wards will be referred to as time frame 2.

Pearson Chi-squared test

The Pearson Chi-squared test was used to compare differences between proportions of patients associated with those factors that have been shown to play a role in assaultiveness of patients, namely involuntary admission and diagnosis of bipolar disorder or schizophrenia.¹⁶

This test compares the observed proportions with the “expected” proportions under the null hypothesis that there are no significant differences between the two time frames. Large differences between the observed and expected proportions will be evidence against the null hypothesis.

P-value

A test statistic which is based on these differences in proportions is calculated and the corresponding p-value is then obtained. A p-value of smaller than 5% is accepted as sufficient evidence against the null hypothesis to reject it.

Confidence interval

The null hypothesis can also be tested by obtaining a confidence interval for the difference between the population proportions. Here, the “population” refers to the total group of patients (all mentally ill patients in Valkenberg Hospital’s catchment area who could possibly be admitted if there were beds available) from which the sample was taken. The sample shows the same relevant characteristics among the

patients as for the greater population. A confidence interval for the difference between two proportions which includes zero indicates that there is no proven significant difference between the population proportions. An added advantage of using confidence intervals, is that the width of the interval gives a measure of the precision of the results.

Diagnoses

The proportions to be compared include the proportion of patients with one of eight different diagnoses as well as involuntary admissions status.¹⁶

The ICD diagnostic codes were not tested by chart reviews but accepted as it appeared on the discharge summaries. The Author acknowledges that in the absence of the verification of diagnosis by the administration of rating scales or MINI (Mini International Neuropsychiatric Interview) could lead to inaccuracies.

Additionally the hospital and Psychiatry department of University of Cape Town utilises DSM IV –TR to diagnose psychiatric disorders, but enter an ICD-10 code into the computerised discharge summary. This could lead to more inaccuracies. Often secondary diagnosis codes were entered, only the primary diagnosis was used.

The ICD diagnostic codes provided on discharge summaries of all of the patients admitted to the acute wards within those two timeframes were grouped together under the following DSM IV-TR diagnostic categories: 1. Substance-related disorders; 2. Schizophrenia and other psychotic disorders (excluding Schizoaffective disorder, Psychotic disorder due to General medical Condition and Substance induced

psychotic disorder); 3. Schizoaffective disorder; 4. Bipolar disorders; 5. Personality disorders; 6. Mental disorders due to a General Medical Condition; 7. Depressive disorders; 8. Other(including diagnoses such as Posttraumatic Stress disorder and Adjustment disorders.)

Legal status

The legal admission status is involuntary, assisted or voluntary. The Mental Health Care Act of 2002 makes provision for mentally ill persons to be admitted as voluntary, assisted or involuntary users.

ANOVA (analysis of variance)and T-test

An Analysis of variance (ANOVA) was used to compare the intramuscular lorazepam use in the two timeframes, using total daily average number of patients in the ward as dependant variable. The T-test is used to compare sets of data in order to establish whether any difference in more than chance. The T-test difference is expressed as a P value. This was also applied to oral lorazepam use, as well as number of incidents and hours of seclusions over the two time frames.

Ethical And Legal Issues

Introduction:

The ethics section of this proposal is based on

1. Hulley, SB. Et al (ed) Designing clinical research. 2001. Chapter 14.
Philadelphia, USA: Lippincott Williams and Wilkens.

2. Lecture notes Prof Zabouw, University of Cape Town, South Africa, 2005
3. Declaration of Helsinki, adopted by the 52nd WMA General assembly, Edinburgh, Scotland, October 2000.

This proposal has been submitted to UCT Ethics Committee and approval was obtained prior to commencement of the research. See Appendix A.

Permission to conduct this study was obtained from the Medical superintendent Valkenberg Hospital and the APH.

Value and application:

1. The research is aiming to make deductions about the influence of a clean, safe, pleasant environment on the patients and staff of acute admissions units, specifically with regard to aggressive behaviour.
2. The findings should be generalisable to the community of acute psychiatric patients in South Africa, and should benefit the same community by showing positive outcomes of better care and working environments.
3. A report will be made available to the Superintendent of Valkenberg hospital and the Research ethics committee of the University of Cape Town.
4. The implications of the research include showing that it is worth spending money on building and maintaining safe, clean, practical facilities for acutely mental ill patients, due to the direct (reduction in aggression, improved patient satisfaction) and indirect effects (increased staff morale, and improved quality of patient care).

Human subjects:

1. All patients admitted to the acute male and female admission units during the 2 specified study time frames will be included in the study. Selection is equitable.
2. The only data to be collected that relates to patients as individuals is discharge diagnosis. The other data relates to as-required lorazepam use, number of seclusions, number of reported incidents, and will be collected anonymously and in group context. The confidentiality and privacy of all patients will be protected.
3. Since no interventions will be applied except for the change in environment the study poses no risk to the individual.

Informed consent:

1. The study is researching trends and phenomena, as opposed to the individual responses of patients
2. No participation is expected from patients
3. The research poses no risk to individual patients, nor the group.
4. The research would not be practical if individual consent was to be obtained, since an average of 110 patients are admitted per month to the acute admission wards, making a total of 1320 patients admitted over the two 6 month study periods.
5. By not obtaining informed consent the rights and welfare of the patients are not adversely affected in any way.

6. The research question cannot be answered by studying a less vulnerable population group.

Researcher:

1. The literature review is properly referenced.
2. The research will be conducted personally, and adhering to GCP guidelines (Guidelines For Good Practice In The Conduct Of Clinical Trials In Human Participants In South Africa, DOH policy document, September 2000, available online at <http://www.doh.gov.za/docs/policy-f.html>)
3. There are no conflicts of interest, no dual roles, and no financial gain.

Limitations:

1. There are many variables that influence aggressive behaviour, including internal ones (the patient's inner world) and external ones. It is impossible to control for all of these.
2. The change in environment may have many direct and indirect effects, many may be intangible, and not reflected by change in use of as-required lorazepam or seclusion, or in number of incidents reported.
3. The extent and nature of the problem of in-patient violence in South African psychiatric hospitals is not known, due to a scarcity of local studies.

CHAPTER FOUR: RESULTS AND DISCUSSION

Results

Patients

1058 patients were admitted during the two time frames, 544 in T1 and 514 in T2.

Females totalled 476(N=239 in T1; N=237 in T2) and males totalled 582(N=305 in

T1 and N=277 in T2). Of the 1058 patients admitted all the legal status data was

available and diagnosis available in 1004 cases(missing data in 54 cases). The

diagnostic groups during the two time frames were:

Diagnosis	Timeframe 1	Timeframe 2
Schizophrenia	29,9%	26,5%
Bipolar affective disorder	21,8%	29,7%
Substance related disorders	20%	17,3%
Schizoaffective disorder	12,1%	12,2%
Depressive disorders	7,5%	5,1%
Organic disorders	2%	2,8%
Personality disorders	1,1%	2,4%

Table 1: Diagnostic groups in percentages

The only significant difference between the two timeframes was for Bipolar Disorder.

This was true for the female populations, but not for the male population. $P=0,0356$

for females and $P=0,134$ for males.

The legal status differed between the two time frames, with there being far more involuntary admissions in T2, and correspondingly fewer assisted admissions, whilst the voluntary admissions remained unchanged.

Admission type	T1 N=544	T2 N=514	Confidence intervals
Assisted	121	73	0,03-0,12
Involuntary	345	384	-0,168 to -0,057
Voluntary	78	57	NS

Table 2: Admission status all admissions

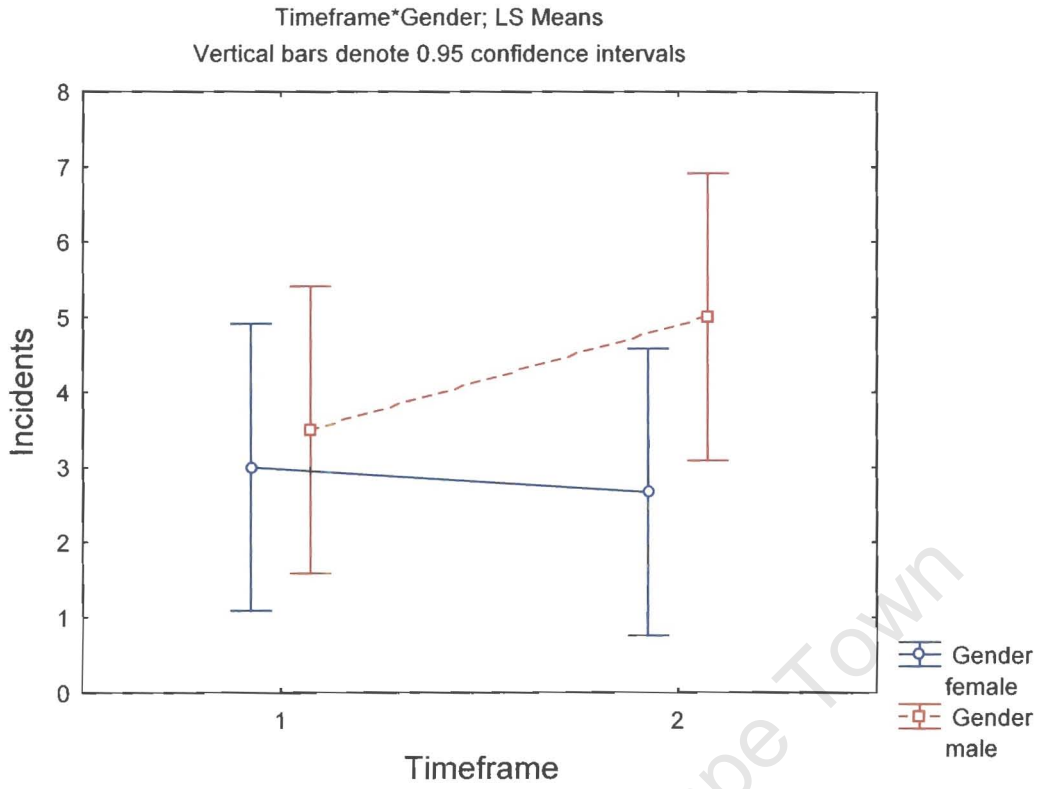
Gender	Admission type	T1 Female N=239	T2 Female N=237	Confidence intervals
		Male N=305	Male N=277	
Female	Assisted	61	38	0,023to 0,167
	Involuntary	134	158	-0,19to-0,019
	Voluntary	44	41	-0,16to-0,004
Male	Assisted	60	35	0,01to0,13
	Involuntary	211	226	-0,19to-0,05
	Voluntary	34	16	0,009to0,098

Table 3: Admission status by Gender

Measures Of Aggression

Two-way ANOVAs

The graph below gives an interaction plot of time frame and gender with respect to the average number of incidents. A two way ANOVA with the independent variables Time frame and Gender and dependent variable the number of incidents shows no significant differences between the two time frames and genders with respect to average incident rate. (see ANOVA table below)



Graph 4: Two-way ANOVA table showing incident rate by gender in T1 and T2.

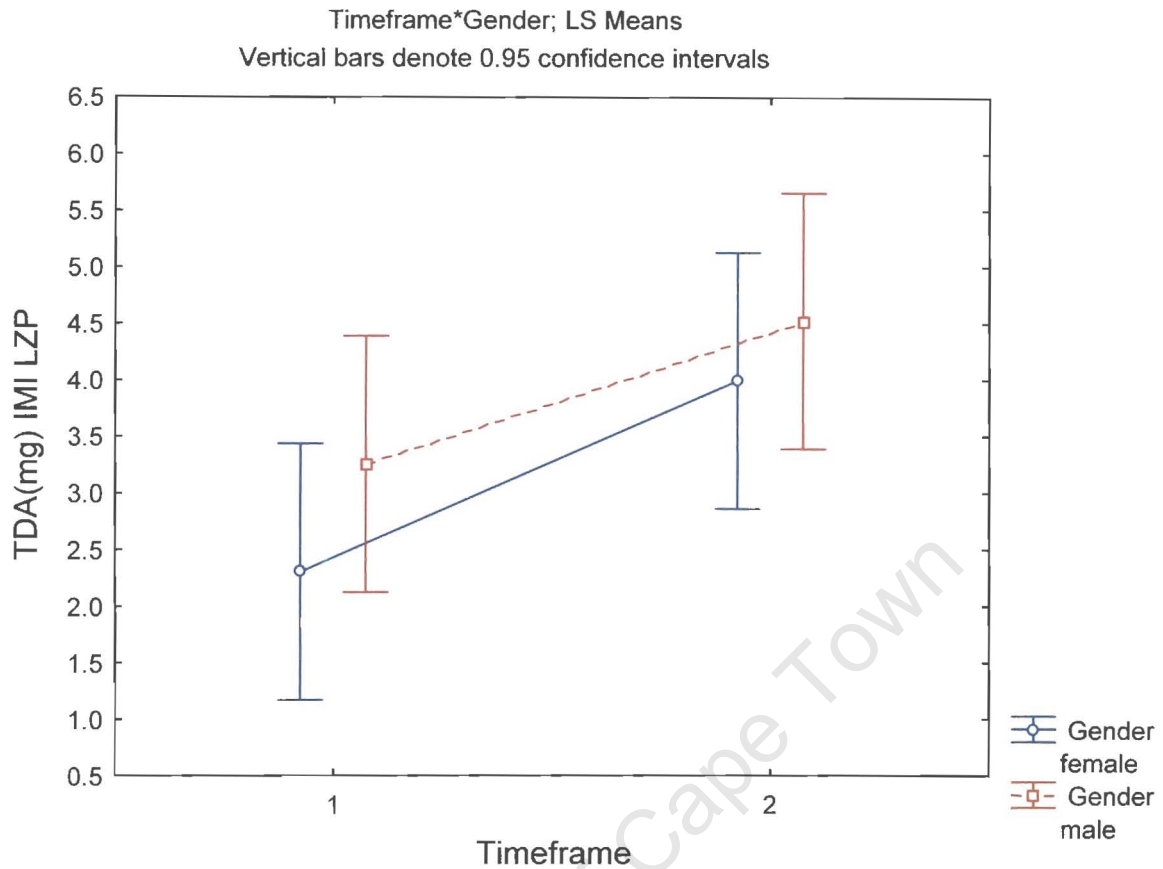
	SS	df	MS	F	p-value
Timeframe	2.0417	1	2.0417	0.40496	0.531756
Gender	12.0417	1	12.0417	2.38843	0.137914
Timeframe*Gender	5.0417	1	5.0417	1.00000	0.329257
Error	100.8333	20	5.0417		

Table 4: Two-way ANOVA results: Independent variables: Gender & Time frame. Dependent variable: Incident rate

	SS	df	MS	F	p-value
Timeframe	13.0685	1	13.0685	7.3914	0.013225
Gender	3.2930	1	3.2930	1.8625	0.187497
Timeframe*Gender	0.2752	1	0.2752	0.1557	0.697367
Error	35.3614	20	1.7681		

Table 5: Two-way ANOVA results: Total Daily Average intramuscular Lorazepam as the dependent variable.

There is a significant increase in the use of Total Daily Average intramuscular lorazepam from the first to the second time frame ($p=0.0132$) but there is no detectable difference between males and females with respect to Total Daily Average intramuscular lorazepam in the two time frames. The interaction plot looks as follows:

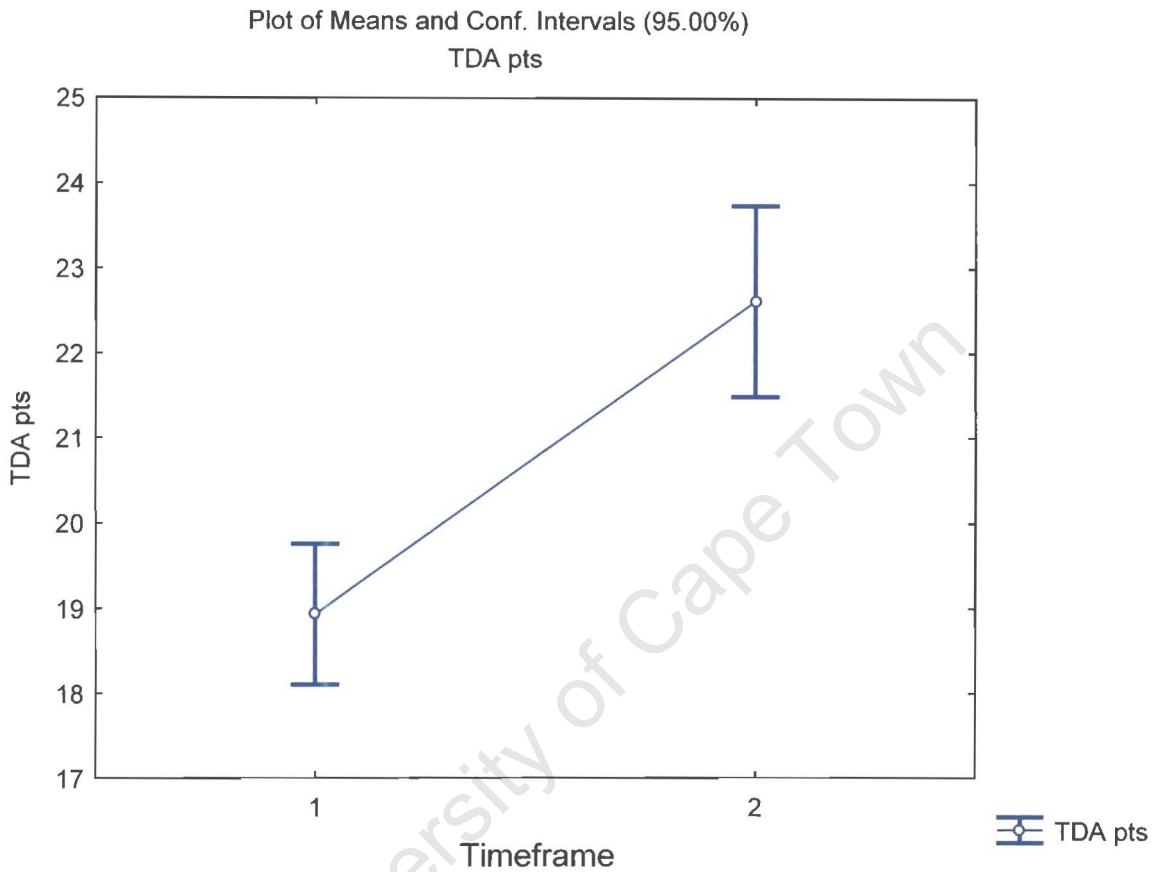


Graph 5: Two-way ANOVA table showing total daily average lorazepam by gender in T1 and T2.

Since no difference between males and females with respect to lorazepam in the two timeframes could be detected, the variable “gender” can be eliminated from the linear model.

The difference between average lorazepam use between the timeframes is apparently significant (one way ANOVA, $p=0.013$). However, the effect of the total daily average number of patients (TDA patients has not been taken into account. An one

way ANOVA with TDA patients as dependent variable shows a highly significant difference between the two time frames. A set of 95% confidence intervals for TDA patients for each time frame looks as follows:



Graph 6: Two-way ANOVA table showing Total Daily Average lorazepam in T1 and T2.

If the TDA patients are introduced in the linear model as a covariate, it transpires that the apparent relationship between Total Daily Average lorazepam and time frame is spurious: this difference is explained by the large difference between TDA number of patients in the ward in both time frames. *Thus we must conclude that given the*

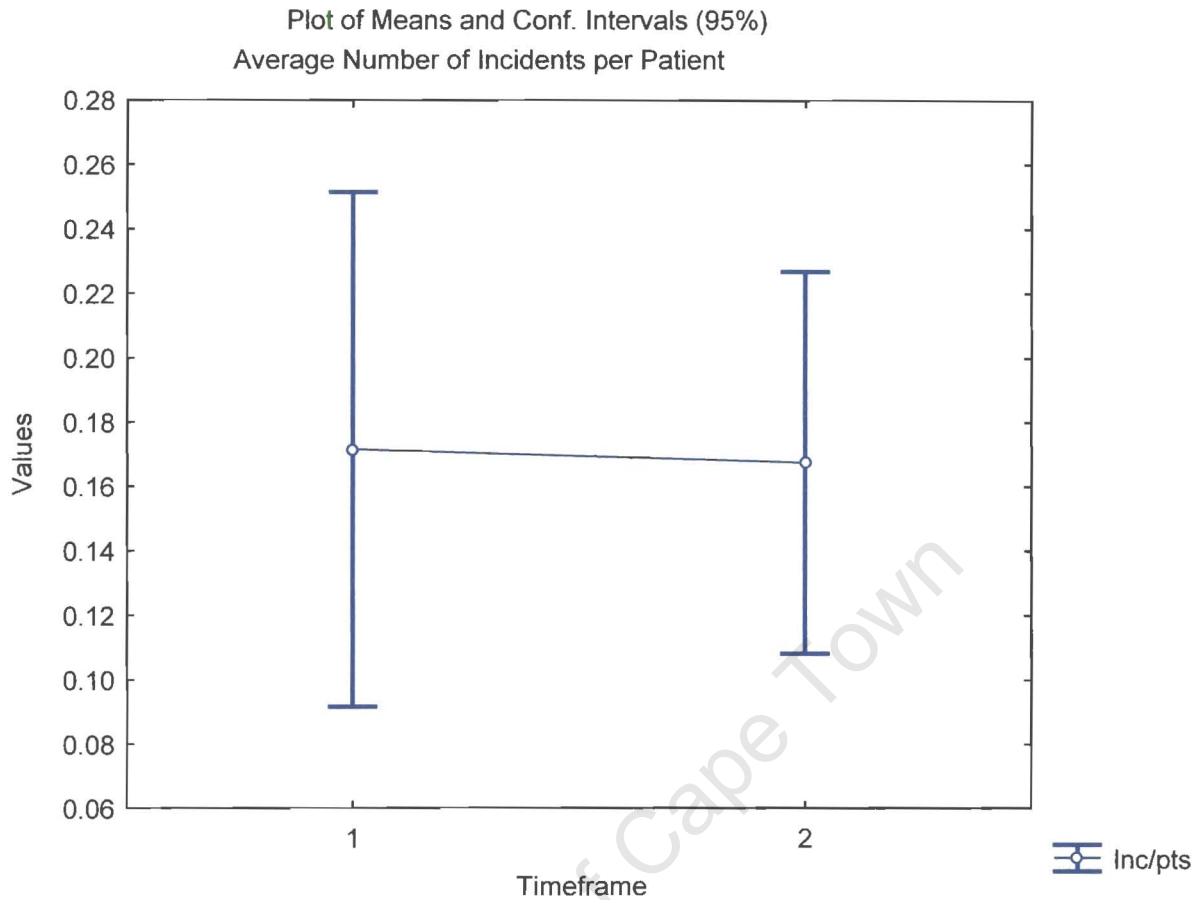
observed differences between the TDA no of patients in the wards, there is no significant difference detected between the two time frames with respect to TDA LZP.

One-way ANOVAs

To eliminate the effect of the large difference between the timeframes with regard to the number of patients, a new variable which gives the number of incidents per patient has been created.

This variable can now be used in a one way ANOVA to compare the average number of incidents per patient in the two time frames.

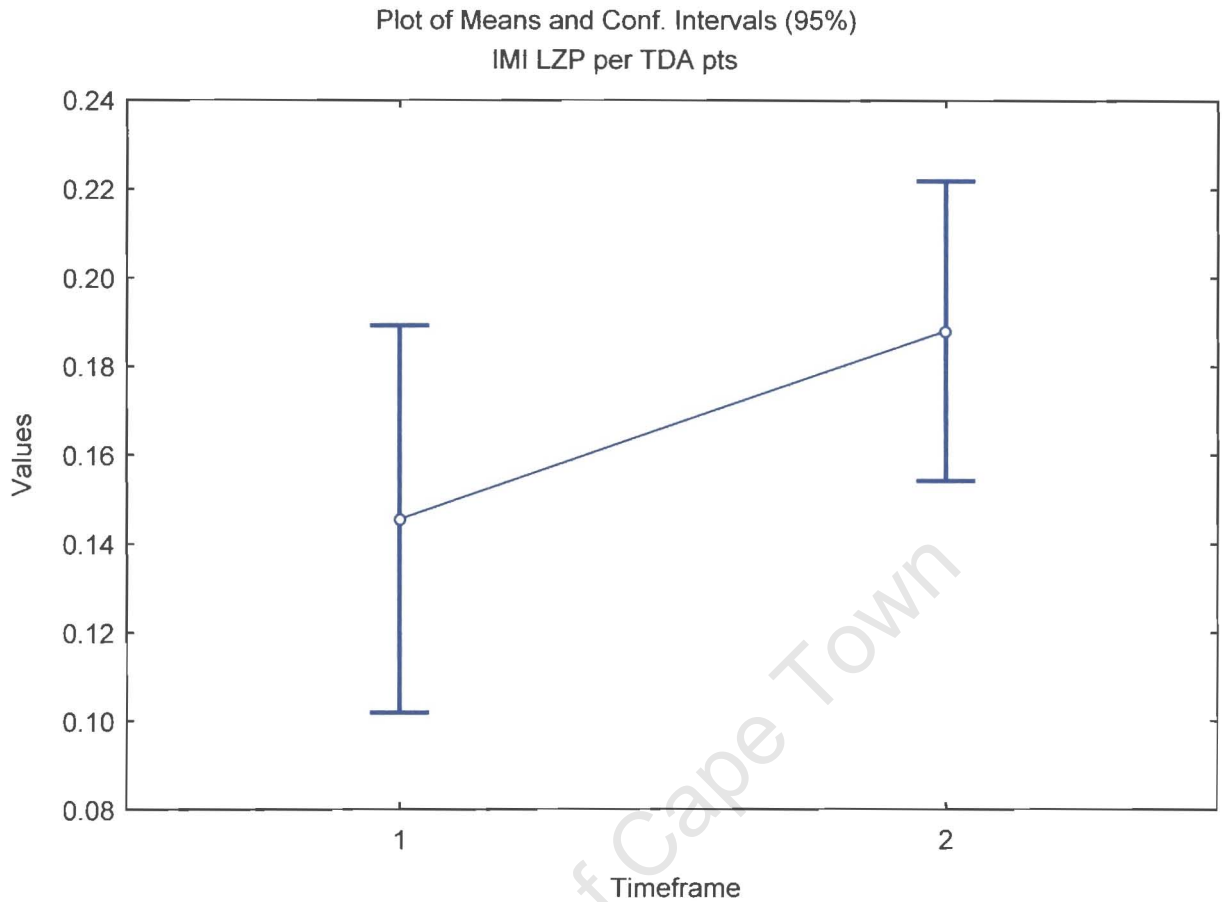
A means graph together with 95% confidence intervals is shown :



Graph 7: One-way ANOVA showing average number of incidents per patient in T1 and T2

As is already clear from the confidence interval in this means graph, there is no detectable difference between the average number of incidents per patient from time frame 1 to time frame 2. The p-value ($p=0.928$) for this ANOVA confirms this.

A similar one way ANOVA run on the average amount of Intramuscular lorazepam per patient for the two time frames shows us the following:



Graph 8: One-way ANOVA: intramuscular lorazepam per total daily average number of patients.

The apparent increase in average intramuscular lorazepam per patient in the second time frame is not significant ($p=0.105$). Thus there is no evidence that the average IMI LZP per patient has increased during the second time frame. The formal ANOVA table is given below:

Variable	SS	df	MS	SS	df	MS	F	p
IMI_LZP/TDApts	0.0108	1	0.0108	0.0832	22	0.0038	2.8514	0.1054

Table 6: One way ANOVA for IMI LZP on time frame 1 and time frame 2

Statistical Definitions:⁷³

Population: a collection of numbers for this discussion.

Error: variation within groups

SS: Sum of the squared deviations around some point, usually a mean or predicted value), a measure of the variability within each group.

df: degrees of freedom refers to the number of deviations that have been squared around the grand mean.

MS: Mean Square refers to the population variance.

F statistic: The ratio of MS_{group} (estimate of population variance as long as null hypothesis H_0 is true) to MS_{error} (estimate of population variance independent of null hypothesis being true or not). If they are estimating the same thing, they should be equal, F should be 1 or close to 1, and H_0 is true.

P-value: refers to the probability that a particular result would occur by chance if H_0 is true.

Lorazepam

There was no difference in TDA intramuscular lorazepam use between T1 and T2. (P=0.105) This was true for number of administration events as well as amount used in milligrams.

There was no difference in total average daily oral lorazepam use between T1 and T2. (P=0,06)

Incidents

There was no difference in average number of incidents between T1 and T2; (P=0,928)

Seclusions

There was no difference in average number of hours seclusion was used, between T1 and T2.

Gender differences

The study was unable to demonstrate a difference between genders in T1 and T2 with regard to average number of incidents, lorazepam use, nor hours of seclusion.

Discussion

In an attempt to investigate the effect of positive environmental change on measures for aggression, lorazepam use, number of incidents and use of seclusion were measured in two timeframes before and after the environmental change. An analysis of variance was run to compare group means. The results show no significant difference in the means of the two groups. This study was therefore unable to demonstrate significant difference in lorazepam use (either oral or intramuscular), use of seclusion, or number of incidents between the two time frames, which means that the null hypothesis H_0 is confirmed.

Increase in proportion of Involuntary patients

It has been demonstrated that an increase in the proportion of more severely ill patients (as demonstrated by their involuntary admission status) can lead to an increase in aggressive behaviour.^{15; 16} In view of the significant increase in proportion of involuntary patients in T2 but no increase in incidents, seclusions or lorazepam use, this may indicate that the change in environment had some effect.

Direct or indirect effects

It could not be determined whether the effect was due to increased containment of the patients, or better morale amongst staff members, and thus better management of potentially violent situations by the staff. The new wards have very few 'blind spots' hidden from the security cameras, indicating that there might have been an effect on

number of incidents, namely that the number of incidents seen and reported are a truer reflection of the number of incidents that occurred.

The complexity of aggressive behaviour

The phenomenon of aggressive behaviour in psychiatric patients is a complex one,^{7; 74} with a multitude of factors playing a role, making it very difficult to research and to demonstrate conclusively what all the potential factors are and how they influence a particular patient's behaviour.

These potential factors include patient factors such as demographics, personal history, symptomatology, medication, substance use, neurological deficits, and personality.

The staff factors include level of training and expertise, personal style, and morale.

The environmental factors are numerous and include bed occupancy, the physical environment, the availability of tobacco, times of high demand, visibility.

Studying aggression

Measuring surrogates for aggression may not be the best way to study this phenomena. In particular it became apparent that the use of sedation is driven by more than just aggression in patients. The medication could be administered for restlessness, insomnia, and a range of other symptoms that could also lead to incidents; for example an intrusive manic person might provoke other patients and be hurt. Considering the above, it would appear that the clinical disposition of the nurse on duty influenced the use of sedation. Certain nurses regularly used far more applications and higher dosages than others, perhaps indicating a lack of 'talk down'

skills, or a particular style of management. Intramuscular lorazepam is probably a better measure of an intervention used for threatening violence or aggressiveness, since it is in practice a last resort measure, used only if a patient refuses oral sedation.

Socio-cultural influences

A range of sociocultural and political phenomena influence presentation and management of mental illness. An example is the current situation in the Western Cape and specifically Cape Town where a sharp rise in metamphetamine abuse⁷⁵ has resulted in an increase in patients presenting with a severe maniform psychosis that is slow to respond to treatment, resulting in longer hospital stays.⁷⁶ This could explain the fact that in spite of having more acute hospital beds (20 vs. 24) in T2, there were fewer admissions and the average length of stay increased for females from 44 days in 2006 to 60 in 2007, and for males from 32 days in 2007 to 46 in 2007.

The effect of the increasing HIV epidemic on mental illness is not yet clear. There is a high prevalence of mental illness amongst persons infected with HIV (43,7% in a study by Freeman et al⁷⁷ in 2007), increasing with more advanced WHO stages of disease. Lagios et al⁷⁸ demonstrated that severe mental illness is a risk marker for HIV, without being able to illustrate whether this was due to increase risk of infection amongst persons with serious mental illness, or the influence of HIV on the mental illness.

Substances

The diagnosis of a substance induced disorder can not be sustained if the symptoms persist for a month after cessation of withdrawal or intoxication,²⁸ and since patients with metamphetamined induced mental illness remain ill for significantly longer,⁷⁹ a diagnosis of bipolar disorder or schizophrenia is made at discharge, influencing the diagnostic categories of the two timeframes.

Gender differences

Additionally no significant difference could be demonstrated between males and females in terms of change in average number of incidents reported, hours of seclusions utilised and amount of intramuscular oral lorazepam used in the two timeframes, using total daily average number of patients in the ward as covariant. This confirms the findings of many researchers that mentally ill males and females are equally aggressive in inpatients settings.¹⁶

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The hypothesis that a positive change in environment reduces aggressive behaviour as measured by surrogates was not supported by this study. However when taking into account the better surveillance of all patients areas and the fact that the patients admitted in the second time frame were more ill, it is possible that there was some increase in the containment of aggressive behaviour. Whether this was due to increased staff morale and therefore better management of potentially violent situations or changes in patient responses to the environment has not been shown in this study. A final conclusion from this study is that aggression is a complex phenomenon with many variables playing a role, and it is unlikely that one factor can be singled out to influence inpatient aggression.

Limitations

Study design

The study design was inadequate to demonstrate a causal relationship between change in environment and aggressive behaviour.

Using surrogates for aggressive behaviour was problematic in that each measurement could have been influenced by a range of factors.

In order to make more meaningful deductions, a large number of other variables could have been studied. For example these could have included staff factors such as absenteeism, and sick days.

Data collection

The study design required the data to be collected in group context, but in future studies it would be preferable to collect data on an individual patient basis in order to use a regression model to analyse the data.

Recommendations

Environment

All Psychiatric hospitals should adhere to minimum standards of safety, comfort and cleanliness.^{10; 29} Considering the high rate of incidents that involve damage to property¹³ psychiatric hospitals should be well designed and sturdy. As patients admitted with an involuntary status are likely to have perceptions that lead to cognitive distortions, it is postulated that a clean, appealing and comfortable environment could have a positive influence on these distortions.

Future studies

There was a single published study from South African Psychiatric hospitals with regards to inpatient violence and aggression. The extent of the problem should be quantified and described in the local setting, prior to attempts to reduce the inpatient violence.

The aggression literature makes it clear that in order to make meaningful deductions and comparisons, the definitions will have to be standardized, and direct observation scales used.

Directions for future research

There are three areas that future research in local settings should focus on:

- Describing the nature and extent of the problem of inpatient violence in psychiatric hospitals in South Africa.
- Designing interventions to reduce inpatient violence and measuring them prospectively.
- An intriguing discrepancy arises from the low rate of incidents found in this study (0.22 per occupied bed over 6 months). The literature shows that the level of violence in psychiatric hospitals reflects that in the community.⁹ South Africa has high levels of violence in the community.⁸⁰ This discrepancy requires further investigation.

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**APPENDIX A: LETTER OF APPROVAL FROM THE
UNIVERSITY OF CAPE TOWN ETHICS COMMITTEE**

University of Cape Town

UNIVERSITY OF CAPE TOWN



Health Sciences Faculty
Research Ethics Committee
Room E52-24 Groote Schuur Hospital Old Main Building
Observatory 7925
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10 May 2007

REC REF: 073/2007

Dr M Van Den Berg
Psychiatry & Mental Health

Dear Dr Van Den Berg

PROJECT TITLE: OBSERVATIONAL ANALYSIS STUDY ON THE EFFECTS OF THE PHYSICAL ENVIRONMENT ON AGGRESSIVE BEHAVIOUR AND THE MANAGEMENT THEREOF, IN AN ADULT ACUTE PSYCHIATRIC ADMISSION UNIT.

Thank you for submitting your study to the Research Ethics Committee for review.

It is a pleasure to inform you that the Ethics Committee has **formally approved** the above-mentioned study.

Your comments to the queries raised are noted with thanks.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please quote the REC. REF in all your correspondence.

Yours sincerely

A/PROF. M. BLOCKMAN
CHAIRPERSON, HSF HUMAN ETHICS