Challinor, A, Whyler, J, Meggison, N, Cresswell, P, Evans, L, Bingley, M, Somarathne, P, Thompson, J, McIntyre, J, Washington, D and Nathan, R

An investigation of mental healthcare pathways for patients with psychosis who engage in antisocial behaviours

An investigation of mental health care pathways for patients with psychosis who engage in antisocial behaviours

Authors:

Alexander Challinor[1,2]
Jonathon Whyler[3]
Neil Meggison[4]
Phoebe Cresswell[4]
Leah Evans[4]
Michael Bingley[4]
Praveen Somarathne[4]
Jodi Thompson[4]
Jason McIntyre[6]
Dawn Washington[4]
Rajan Nathan[1,3,5,6]

1. Faculty of Health and Life Sciences, University of Liverpool, United Kingdom
2. Mersey Care NHS Foundation Trust, United Kingdom
3. Cheshire and Wirral Partnership NHS Trust, United Kingdom
4. Lancashire and South Cumbria NHS Foundation Trust, United Kingdom
5. Chester Medical School, University of Chester, Chester, United Kingdom
6. John Moores University, Liverpool, United Kingdom

Corresponding Author:

Dr Alexander Challinor
ORCID identifier is 0000-0001-7305-0007

alex.challinor1@nhs.net

Churton Resource Centre
Countess of Chester Health Park
Liverpool Road

Chester
CH2 1BD

Conflicts of interest

None.

Funding Statement

This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author (AC), The data are not publicly available due to ethical restrictions e.g., their containing information that could compromise the privacy of research participants.

Abstract

Secure mental health services aim to assess and treat mentally disordered offenders, where a patients care pathway involves their movement from service to service on an individual journey towards recovery. Research has attempted to understand the relationship between psychosis and violence for mentally disordered offenders. From this empirical evidence base a tripartite typology has emerged. Three subgroups have been categorised as (i) schizophrenia preceded by conduct disorder (SZ+CD), (ii) offenders with schizophrenia who begin offending at illness onset (SZ+AS), and (iii) offenders with schizophrenia (SZ).

This study aimed to examine differences in care pathways between subgroups. The sample consisted of 77 male patients admitted to low- and medium-secure care. The subgroup of patients was determined from data collected from health records. Analysis examined the differences of patient care pathways.

The results demonstrated differences in subgroup pathways to, within and from secure services. The SZ+CD subgroup had a higher number of placements used, were more likely to transition between the same level of security and had an increased use of the private sector. The SZ+AS subgroup were significantly more likely to use intensive care and less likely to use high secure services. Examining care pathways of mentally disordered offenders will ensure a more evidence-based approach to the configuration and operationalisation of services, help guide policy makers and hopefully improve patient care.

Keywords: schizophrenia, antisocial personality disorder, conduct disorder, violence, criminality, forensic psychiatry**,** care pathways

Word Count: 4343

1.0 Introduction

Secure mental health services aim to assess and treat the mental health of mentally disordered offenders. Treatment in secure services often involves the movement of the patient between services, on a journey to optimal health and social well-being (Durcan, 2011). This pathway through services is dependent on multiple factors with little research has been conducted on the use of adult secure services (Edworthy and Vollm, 2016, Durcan, 2011, Geheran et al., 2023). The stratification of care pathways involves decision-making around a patient's mental health and their risks of violence. The relationship of a patient's mental health and violence has been explored with specific pathways to offending in psychotic patients suggested (Hodgins et al., 2008, Volavka, 2016). From this literature, a theoretically postulated typology has emerged, attempting to provide a theoretical explanation for the link between psychosis and violence (Hodgins et al., 2008). The typology categorises three distinct pathways to offending for patients with psychosis. The use of mental health services by each subgroup has been investigated, demonstrating differences in how each subgroup use services (Challinor et al., 2023). To the authors knowledge, no studies to date have investigated the care pathways of each typology subgroup within secure services.

1.1 Psychosis and Antisocial Typology

The association between schizophrenia and violent offending has been observed throughout the literature, with evidence showing that individuals with schizophrenia are at elevated risk of engaging in violence towards others (Hodgins, 2008). Research on offenders in general often assumes that those that offend constitute a homogenous group, however, evidence has accumulated indicating that there are subtypes of both non-mentally ill offenders and offenders with schizophrenia (Moffitt and Caspi, 2001). As a group, offenders with schizophrenia have been found to be very heterogenous, leading to attempts to try and structure this heterogeneity (Hodgins, 2008, Lau et al., 2019).

Three distinct subgroups of psychosis and antisocial behaviours have been proposed (Hodgins et al., 2014). The subgroups are categorised by the relationship between the onset of psychosis and antisocial behaviours. There is an evidence base that supports the presence of three distinct subgroups, with studies demonstrating significant differences between subgroup factors of aetiological importance (Simpson et al., 2015). The three subgroups are labelled as (i) Schizophrenia and Conduct Disorder (SZ+CD), also termed early-start offender), (ii) Schizophrenia and antisocial behaviour (SZ+AS), also termed late-starter, and (iii) Schizophrenia alone (SZ) also termed late-late-starter. The SZ+CD subgroup has been identified as patients with psychosis that have previously shown signs and symptoms indicative of a diagnosis of conduct disorder. The SZ+AS subgroup displays antisocial behaviours at approximately the same time as the first episode of psychosis. The SZ subgroup is defined as a group of patients who have a longstanding diagnosis of a psychotic disorder without a significant history of antisocial behaviours, who then present to services following a conviction for a significant crime.

A limitation of the research on the typology is inconsistent results amongst studies, with some identifying the early and late start offenders (SZ+CD and SZ+AS) but not

supporting the third subgroup (Kirchebner et al., 2021, Penney et al., 2018a, Simpson et al., 2015, Tengström et al., 2001). More novel approaches to investigating the presence of subgroups over time, where the typology is supported by research identifying qualitatively different subgroups within populations (Lau et al., 2019, Penney et al., 2018a). Latent class analysis has found distinct subgroups akin to those proposed within the typology and discovered that the typology is a useful classification for predicting psychopathological response to inpatient mental health treatment (Kirchebner et al., 2021). A better understanding of patterns of service utilisation and differences in these patterns between the subgroups is required. A previous study conducted by the same authors showed validity of the typology and differences in how each subgroup utilised services (Challinor et al., 2023). The study examined clinical factors (e.g., substance misuse, antisocial history) to determine typology and examined how each subgroup use services. The pathway each subgroup uses to reach the secure service was not investigated.

1.2 Secure Mental Health Service Pathways

Secure mental health care is focussed on the treatment of mentally disordered offenders and is comprised of multiple service components. Figure 1 illustrates the different services that make up secure mental health service pathways (Natarajan et al., 2012). These services aim to improve a patient’s mental health and reduce risk of harm to others.

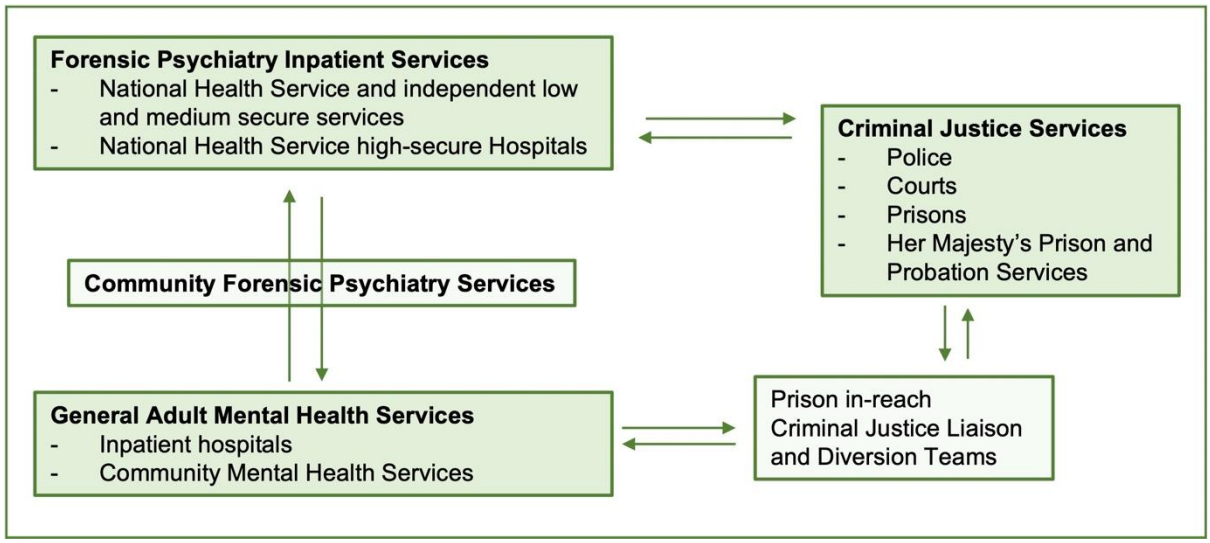

Figure 1. Interface of secure mental health services

A pathway in this context is defined as the movement a patient makes from service to service on their individual journey (Durcan, 2011). This movement can occur within multiple directions and involve other (non-secure) mental health services and criminal justice services (figure 1). Within secure mental health services in the United Kingdom, the inpatient services are categorised into three tiers (high, medium, and low), stratified according to the assessed potential for harm from the patient. Typically, a patient would be admitted to the least restrictive setting possible, and the direction of a patient's pathway should lead in the direction of eventual community re-integration (Seppänen et al., 2018).

Overall, there is limited literature examining secure care pathways or their efficacy (Geheran et al., 2023). To the authors knowledge, no research has been conducted on the care pathways of subgroups within the proposed typology. Care pathways through services are often dependent on individual characteristics but can also be influenced by primary or co-morbid diagnoses (e.g., personality disorder) (Durcan, 2011). This study wanted to assess whether there are patient groups that have a heterogenous set of characteristics and needs related to their psychosis onset, antisocial history, and their therapeutic needs, and whether these groups experience differences in their service use and care pathways. Combining research on the service use and care pathways of the subgroups will yield important findings that would be particularly helpful in informing the way secure care pathways are designed and in facilitating better use of these pathways.

2.0 Aims

This study aimed to (i) investigate the care pathways for patients admitted to medium and low secure mental health services, and (ii) examine the possible differences in care pathways of the subgroups within the psychosis and antisocial typology.

3.0 Method

3.1 Sample

The sample consisted of patients within a low secure forensic hospital and a medium secure forensic hospital within the North West of England, UK. The study period was for five years, from 2015 to 2020, with patients identified as those admitted to the hospital service within that date range. A total of 90 patients were identified. A total of 77 patients were included in the study, thirteen patients were excluded from the study, of which the reasons for exclusion were, (i) duplicate patient (n = 2), (ii) limited clinical information within EHR (n = 8), and (iii) patient did not have a diagnosis of a psychotic disorder (n = 3).

All patients were detained under the Mental Health Act. The average age of the sample was 42 years, and all patients were male. The most common primary diagnosis found was a schizophrenia spectrum disorder and highest frequency secondary diagnosis was mental and behavioural disorders due to psychoactive substance use. A patient without a diagnosis of psychosis was excluded from the study.

3.2 Data Collection

Retrospective data collection was undertaken on patient case notes and clinical reports within electronic health records (EHR). The data was copied verbatim from patient records.

As an initial step, authors AC and RN identified appropriate documents that are likely to include the information of interest within the EHR. The data was obtained from a variety of sources, including formal records of offences/convictions, relevant multidisciplinary reports (e.g., Mental Health Act tribunal reports, access assessment reports, Historical Clinical Risk-20 risk assessment reports) and from patient self-reports within the clinical records.

Data was collected on mental health diagnosis, which was determined by International Classification of Diseases (ICD-10) criteria recorded formally within EHR. The date of onset of a psychotic disorder was based on when a formal diagnosis of psychosis was documented. If this was not present, the identification of relevant diagnostic criteria for psychosis (e.g., hallucinations) and an expression of time was used.

Data was collected on the extent and onset of antisocial behaviour. A diagnosis of CD was documented if there was a formal historic diagnosis of CD, or if there was evidence of a pattern of antisocial behaviour that was persistent throughout childhood and adolescence that would meet diagnostic criteria for CD. Conduct disorder is characterised by a repetitive, persistent and enduring pattern of dissocial, aggressive or defiant conduct, whereby the basic rights of others or major age-appropriate societal norms or rules are violated (American Psychiatric Association, 2013). A detailed personal and antisocial history was obtained from each patient's EHR to determine whether the diagnostic criteria for CD would have been retrospectively met. If the required information from the EHR was inaccessible and/or unreliable, the patient was excluded from the study.

Data was gathered on the patient's care pathway including discharge destination and previous placement(s). All the previous placements were documented for each patient's care pathway into the secure service being studied. The community was determined to be the entry point into the care pathway.

3.3 Typology Categorisation

Authors AC and RN developed a categorisation checklist to systemically determine the typology subgroup allocation. The categorisation checklist and a narrative description of the checklist can be viewed in the supplementary material. Each patient case was applied to the checklist and categorised to the subgroups. For a patient that did not fit into the criteria for the three subgroups, (i.e., there was no clear relationship between antisocial behaviour and psychosis that matched the subgroup descriptions) then this patient was labelled as indeterminate. Where there was felt to be a significant degree of subjectivity when discriminating the subgroup, a consensus discussion was completed. Four patients (*n* = 4) were excluded from data analysis as they did not fit into a typology subgroup. This subgroup was excluded due to statistical and ethical concerns related to patient identification via their care pathways. The subgroup has been described in previous research by the authors (Challinor et al., 2023).

The reliability of the categorisation was examined using statistical analysis. Researchers applying the checklist were separated and blinded to data collection procedures. Two researchers independently applied the checklist and determined subgroup typology using patient data for each hospital site. Inter-rater reliability was investigated using Cohen's kappa statistical test. The two independent researchers agreed with the typology of 98% patients. This yielded a near perfect agreement on Cohen's kappa (kappa = 0.844, n = 41). These results show excellent reliability of the categorisation checklist.

3.4 Data Analysis

We used descriptive statistics to investigate the use of different services in the samples care pathways and for the care pathways for each subgroup. Differences between typology for the use of different services within the patient care pathways

were examined using statistical tests of differences, a one-way ANOVA for continuous variables.

3.5 Ethics

The study received ethical approval from Health Research Authority and Health and Care Research Wales (ref: 274820).

3.0 Results

3.1 Pathways to low and medium secure services

Low Secure Services included a total of thirty-two patients, which involved nine different types of service. The total number of placements was one-hundred and eleven (*n*=111). The average number of placements per patients was 3.47. The number of placements ranged from one placement to a total of twelve placements for a patient. The independent sector was used nineteen times (n= 19, 17%).

Medium secure services included forty-one patients, which involved nine different types of services. The total number of placements was eighty-seven (*n*=87). The total number of placements per patient was 2.12, with a range of one placement to a total of seven placements for a patient. The independent sector was used seventeen times (n= 17, 20%).

Table one demonstrates the use of different placement types within the pathway to low and medium secure services. The two most used placements on the pathway to LSU was PICU and MSU, followed by use of general adult services and other LSUs. The MSU pathway was more likely to utilise high secure services and criminal justice services. The independent private sector was used more in the LSU pathway.

Insert Table one here.

The study investigated the previous placement prior to admission to low and medium secure services. Table two shows the admission and discharge placement for MSU and LSU services. Patients were transferred to MSU directly from the community

three times and were more likely to be discharged to community services from the MSU. There was a much higher percentage of discharges directly into the community from MSU in comparison to LSU.

Insert Table two here.

The most common placement prior to admission to LSU was a step-down from MSU or a transfer from PICU services. The most common admission to MSU was from prison, however there was substantially less discharges to prison from MSU than admissions. The most common discharge from LSU was step-down and rehabilitation services. Rehabilitation services were not used on any patients care pathway toward admission to MSU. Rehabilitation services were used on discharge from MSU (*n*=4, 10%).

3.3 Care Pathways Determined by Typology

The study investigated the care pathways of each subgroup of the psychosis and antisocial behaviour typology. Table three shows the services that make up the subgroup's clinical pathway to low secure services. The CD+SZ subgroup had a higher frequency of service use (4.7 placement per patient) in comparison to the AS+SZ subgroup (2.77 placement per patient) and the SZ subgroup (2.4 placements per patient). The CD+SZ subgroup had a higher use of hospitals that are of the same level of security as the current placement (LSU, *n*=12, 18%). The AS+SZ subgroup were more likely to have used GA mental health hospitals (*n*=20, 56%) and PICUs (*n*=14, 39%) within their clinical pathway. The difference in PICU use was statistically significant. The CD+SZ subgroup had the highest use of independent sector hospitals (*n*=14, 21%).

Insert Table three here.

Table four shows the subgroup service use along the care pathway to MSU. The frequency of service use for each typology was less than on the care pathway to MSU in comparison to the LSU care pathway. There was similar frequency of use between each subgroup. There were twenty-six patients within the CD+SZ subgroup

using fifty-five placements (2.11 placements per patient). There were ten patients within the AS+SZ using 2 placements per patient and five patients within the SZ subgroup using 2.4 placements per patient.

Insert Table four here.

The CD+SZ subgroup had a high use of GA mental health inpatient services and prison services. This subgroup also had a statistically significantly higher use of independent private care services (*n*=12, 21%). The AS+SZ subgroup had a higher percentage use of criminal justice services (*n*=9, 45%). The SZ subgroup were found to have a higher percentage of secure inpatient services on their pathway to the MSU in the study.

4.0 Discussion

This study emphasises the heterogeneity of patients within different levels of security and the variability in patients' pathways to, within and from secure services. The most used services in both pathways were in keeping with the secure mental health tier system (i.e., PICU step-up to secure services and MSU step-down to LSU was the most used service in the LSU pathway). However, a wide range of placements were used in each care pathway.

The MSU had a higher use of criminal justice services than LSU. This may be due to the rehabilitative function of LSU, meaning patients were more likely to be stepped down from higher tiers of secure care than from prison. There were also more admissions to MSU from prison than there were discharges to prison. The local population needs, Mental Health Act status, and configuration of services would impact decisions on levels of security for transfers from prison, i.e., there may be local systems in place that result in more risk averse decision-making, or the patient population may be deemed to be a higher risk to the public, requiring higher levels of security (Hill et al., 2023, Leonard et al., 2022). Additionally, the quality of provision of prison in reach mental health services will impact decisions to remit patients back to prison following hospital assessment and treatment.

An admission and/or discharge to and from each placement requires a decision to be made by a clinician for each individual patient's care. The process of this decision-making involves using one's experiential knowledge of care pathways and a patient's stratification of their risk alongside this. In essence, each patient is matched to an appropriate level of security at different stages of their care pathway, with the goal to achieve meaningful outcomes. There is a limited evidence base on the association between the characteristics of patients admitted and relevant outcomes within secure service placements (Davies et al., 2007). However, an important outcome, risk of reoffending, has been found to be associated with the onset of offending (Fazel et al., 2016). For those with late-onset offending (e.g.., the SZ subgroup whose violence is almost exclusively against family and related to acute mental health symptoms), the probability is low (Fazel et al., 2016). Subgroup categorisation of mentally disordered offenders may provide a useful framework for studies investigating interventions aimed to target characteristics of each type of offender (Hodgins, 2008). Understanding more about how certain characteristics of our patients impact on the services used and care pathways chosen is important as secure service are organised to stratify patients to the risk they present (Kennedy, 2002).

Population needs, the stratification of care pathways and existing service provision all impact the configuration of secure services (NHS England, 2018). The efficient use of each tier of services (high, medium, and low) requires the well-developed provisions of the lower levels of security. A limited provision of NHS services may result in the higher use of independent sector beds. The use of independent sector beds found in our study was similar to other studies (Völlm et al., 2018). The cost of using independent sector provision could have an impact on NHS services, patient care pathways, and their aftercare (Coid et al., 2001). The relatively high use of the independent sector highlights the need to consider standardising treatment programmes between NHS and independent sectors and between tiers. Research is needed to further establish whether NHS resources are being used efficiently and effectively for low and medium secure services.

Gaining greater clarity on a patient's likely future pathway will improve vital aspects of care often overlooked in secure services. This includes patient involvement and collaboration in assessing and managing their own risk and stratifying this risk to

gain knowledge of their care pathway (Markham, 2020). If treatment and supervision response were to alter, then care pathways for patients can change. Research is needed to better inform how care pathways are designed and how patients use these pathways. This will hopefully improve patient outcomes, reduce length-of-stay in secure services and improve opportunities for collaborative decision-making with patients. Greater understanding and transparency on patient care pathways will lead to improvements in patient care. There will be less reliance on individual risk, and it would instil hope and promotes autonomy for our patients.

Typology Care Pathways

This study investigated the care pathways of distinct subgroups of patients with psychosis and antisocial behaviours. To the authors knowledge, there have been no studies investigating the care pathways of this typology.

A key factor is a patient's pathway is the assessment of their risk, which is based on the Risk Needs Responsivity (RNR) model and involves the use of structured risk assessments (Andrews et al., 2011, Challinor et al., 2021). Risk assessment instruments are used to assess risk of violence and provide interventions to manage that risk (Habets et al., 2020). This, alongside clinical judgement, allows the stratification of the individuals risks and needs to develop a patient focused care pathway within and from secure care. Transitions between services take place as a patient progresses through their care pathway as their risk is managed, but conversely, they may transition when their mental state deteriorates and their risk increases. At each stage decisions are made through clinician's assessments carried out with or without risk assessment tools. Gaining a greater understanding of how specific subgroups of patients transition along their care pathway would aid clinicians in making more effective decisions and consequently more effective patient care pathways.

Our study examined how different trajectories of antisocial behaviour and psychosis may influence patients care pathways. An earlier onset of antisocial behaviours and illness onset have been found to be associated with a higher overall risk and

criminogenic needs (Penney et al., 2018b, Penney et al., 2019). The SZ+CD subgroup would therefore theoretically encompass a higher overall risk, and this may influence the decision-making when transitioning between services. Those with a diagnosis of CD alone have been found to consume mental health inpatient services at an increased rate, which correlates with the findings from out study with a higher frequency of placement use for the LSU pathway (Hofvander et al., 2017). The SZ+CD subgroup were significantly more likely to use private independent services in the MSU pathway. Possible reasons are that this subgroup are less likely to be accepted by NHS services and/or are more likely to be accepted by the independent sector. It is also possible that these patients pose more challenges in their risk management resulting in them exceeding the treatment and supervision needs within each local hospital, warranting a re-location to the independent sector. Research into the reasons why patients with similar characteristics to the CD+SZ subgroup (i.e., increased criminogenic activity) are more likely to use private hospital beds is needed.

Based on previous studies, the SZ+CD subgroup are likely to have an overall higher risk score, which may result in the use of higher tiers of services, longer stays, and a greater number of placements (Eckert et al., 2017, Tärnhäll et al., 2022). It is important that we are not over-emphasising the patient's risk as this may impact on their pathways through services. Concerns have been noted about the high number of false positives (individuals who incorrectly are considered having a high-risk of offending) when using structured risk assessment tools for violence (Fazel et al., 2012). Misperceptions or misjudgements of the degree of risk posed to others may result in prolonged lengths of stay and unnecessary transfers to different levels of security. This also raises concerns of harms related to epistemic justice, iatrogenic maltreatment, loss of liberty, and deprivation of autonomy (Markham, 2021). Research into the service utilisation of Hodgins' theoretically postulated typology in relation to their risk assessments is needed. Early recognition of this typology within services may allow timely interventions to be delivered in their care pathways and result in tailored treatments to reduce their length of stay and transfers between services.

Tailored treatments will include the use of antipsychotic medication to treat mental disorder, but also to reduce risk of harm to others (Fazel et al., 2014). Interestingly,

the later starter subgroups (SZ+AS and SZ) used high secure services less in their care pathways. This may indicate that the subgroups where the majority (if not all) of their offending behaviour is in relation to psychosis are provided more timely, effective interventions that prevent their transitions up security levels. A greater awareness of the likely clinical trajectories of patients will enable clinicians to better treat mental disorder and to assess, predict and manage risk. This will, in turn, lead to more effective care pathways.

Limitations

Limitations of this study is the operationalisation of the data for typology subgroup categorisation using the retrospective content analysis of patient health records. The the use of electronic health records as a source of data can limit the generalisability of the frequencies of data. The study gathered both structured data (e.g., diagnosis) and unstructured data such as clinical narratives, which can be highly heterogenous, thus limiting generalisability. Steps were taken to improve accuracy and reliability, including the collection of multiple sources of data and typology subgroup categorisation using a categorisation checklist. The categorisation checklist showed excellent interrater reliability.

This study was undertaken at two secure units focussing on an individual's pathway for each specific hospital. It aimed to assess the use of care pathways to, within and from secure services. A useful avenue of research would be to look at point of admission to secure services and patients' pathways from secure services generally across a wider geographical area. There is likely to be significant geographical variability between patient demographics, risks, and care pathways. This research requires significant expansion to explore the heterogeneity of patients between different locations, to enable greater definitions of security levels, and to reduce the differences in secure service configuration and operationalisation. A larger sample size and the use of more complex data collection and analysis would also improve the outputs from the research.

There was no recognised care pathway in our data for a patient transitioning from child and adolescent mental health services. This is secondary to the existing service

provision, with secure child and adolescent mental health services being in a different geographical location locally. This may have excluded certain patients that may fall within the CD+SZ subgroup and could be considered a limitation of the study.

Conclusion

There is a paucity of evidence on adult secure services, both nationally and internationally (Durcan, 2011, Geheran et al., 2023). This study adds to the literature, investigating care pathways to medium and low secure services. Research exploring secure health services is needed to evaluate the effectiveness of secure healthcare, which depend on many system components working in harmony (Ryland et al., 2021, Furst et al., 2021). This will help inform decisions about effective and efficient use of secure hospital resources, and to enable improved decision-making to ensure patients are on the right care pathway. Studies investigating care pathways of secure services and the processes of stratification of patient risk along stages of their care pathways is required. Examining care pathways of subgroups of mentally disordered offenders will likely yield important results. This will ensure adequate configuration and operationalisation of services, help guide policy makers, and improve patient care.

References

American Psychiatric Association 2013. *Diagnostic and statistical manual of mental disorders : DSM-5,* Arlington, VA, American Psychiatric Association.

Andrews, D. A., Bonta, J. & Wormith, J. S. 2011. The risk-need-responsivity (RNR) model: Does adding the good lives model contribute to effective crime prevention? *Criminal Justice and Behavior,* 38**,** 735-755.

Challinor, A., Ogundalu, A., Mcintyre, J. C., Bramwell, V. & Nathan, R. 2021. The empirical evidence base for the use of the HCR-20: A narrative review of

study designs and transferability of results to clinical practice. *International Journal of Law and Psychiatry,* 78**,** 101729.

Challinor, A., Whyler, J., Meggison, N., Cresswell, P., Evans, L., Bingley, M., Somarathne, P., Thompson, J., Mcintyre, J., Washington, D. & Nathan, R. 2023. The utilisation of services in patients with psychosis who engage in antisocial behaviours. *The Journal of Forensic Psychiatry & Psychology*.

Coid, J., Kahtan, N., Gault, S., Cook, A. & Jarman, B. 2001. Medium secure forensic psychiatry services: Comparison of seven English health regions. *The British Journal of Psychiatry,* 178**,** 55-61.

Davies, S., Clarke, M., Hollin, C. & Duggan, C. 2007. Long-term outcomes after discharge from medium secure care: a cause for concern. *British Journal of Psychiatry,* 191**,** 70-4.

Durcan, G. 2011. *Pathways to unlocking secure mental health care*, Centre for Mental Health.

Eckert, M., Schel, S. H. H., Kennedy, H. G. & Bulten, B. H. 2017. Patient characteristics related to length of stay in Dutch forensic psychiatric care. *The Journal of Forensic Psychiatry & Psychology,* 28**,** 863-880.

Edworthy, R. & Vollm, B. 2016. Long-stay in high and medium secure forensic psychiatric care – Prevalence, patient characteristics and pathways in England. *European Psychiatry,* 33**,** S180-S180.

Fazel, S., Fimińska, Z., Cocks, C. & Coid, J. 2016. Patient outcomes following discharge from secure psychiatric hospitals: Systematic review and meta-analysis. *The British Journal of Psychiatry,* 208**,** 17-25.

Fazel, S., Singh, J. P., Doll, H. & Grann, M. 2012. Use of risk assessment instruments to predict violence and antisocial behaviour in 73 samples involving 24 827 people: systematic review and meta-analysis. *British Medical Journal,* 345.

Fazel, S., Zetterqvist, J., Larsson, H., Långström, N. & Lichtenstein, P. 2014. Antipsychotics, mood stabilisers, and risk of violent crime. *Lancet,* 384**,** 1206-14.

Furst, M. A., Bagheri, N. & Salvador-Carulla, L. 2021. An ecosystems approach to mental health services research. *BJPsych International,* 18**,** 23-25.

Geheran, B., Kumar, S. & Ma'u, E. 2023. Care pathways in forensic mental health services in New Zealand. *Psychiatry, Psychology and Law,* 30**,** 553-564.

Habets, P., Jeandarme, I. & Kennedy, H. G. 2020. Determining security level in forensic psychiatry: a tug of war between the DUNDRUM toolkit and the HoNOS-Secure. *Psychology, Crime & Law,* 26**,** 868-886.

Hill, C., Bagshaw, R., Hewlett, P., Perham, N., Davies, J., Maden, A. & Watt, A. 2023. Estimating the Effects of Secure Services on Reconviction. Part 2 – Fewer Convictions Than Expected? Six Year Follow Up of an England and Wales Medium Secure Cohort. *International Journal of Forensic Mental Health***,** 1-9.

Hodgins, S. 2008. Violent behaviour among people with schizophrenia: a framework for investigations of causes, and effective treatment, and prevention. *Philosophical Transactions of the Royal Society B,* 363**,** 2505-18.

Hodgins, S., Cree, A., Alderton, J. & Mak, T. 2008. From conduct disorder to severe mental illness: associations with aggressive behaviour, crime and victimization. *Psychological Medicine,* 38**,** 975-87.

Hodgins, S., Piatosa, M. J. & Schiffer, B. 2014. Violence among people with schizophrenia: phenotypes and neurobiology. *Current Topics in Behavioural Neurosciences,* 17**,** 329-68.

Hofvander, B., Anckarsäter, H., Wallinius, M. & Billstedt, E. 2017. Mental health among young adults in prison: The importance of childhood-onset conduct disorder. *BJPsych Open,* 3**,** 78-84.

Kennedy, H. G. 2002. Therapeutic uses of security: mapping forensic mental health services by stratifying risk. *Advances in Psychiatric Treatment,* 8**,** 433-443.

Kirchebner, J., Lau, S., Kling, S., Sonnweber, M. & Günther, M. P. 2021. Individuals with schizophrenia who act violently towards others profit unequally from inpatient treatment—Identifying subgroups by latent class analysis. *International Journal of Methods in Psychiatric Research,* 30**,** e1856.

Lau, S., Günther, M. P., Kling, S. & Kirchebner, J. 2019. Latent class analysis identified phenotypes in individuals with schizophrenia spectrum disorder who engage in aggressive behaviour towards others. *European Psychiatry,* 60**,** 86-96.

Leonard, S., Webb, R. T., Doyle, M. & Shaw, J. 2022. Characteristics of People Returned to Prison From Medium Secure Psychiatric Services in England and Wales: National Cohort Study. *Frontiers in Psychiatry,* 13.

Markham, S. 2020. Collaborative risk assessment in secure and forensic mental health settings in the UK. *General Psychiatry,* 33**,** e100291.

Markham, S. 2021. The omnipresence of risk and associated harms in secure and forensic mental health services in England and Wales. *Social Theory and Health***,** 1-17.

Moffitt, T. E. & Caspi, A. 2001. Childhood predictors differentiate life-course persistent and adolescence-limited antisocial pathways among males and females. *Development and Psychopathology,* 13**,** 355-375.

Natarajan, M., Srinivas, J., Briscoe, G. & Forsyth, S. 2012. Community forensic psychiatry and the forensic mental health liaison model. *Advances in Psychiatric Treatment,* 18**,** 408-415.

NHS England 2018. Service specification: low secure mental health services (Adult). *In:* SPECIFICATION, S. (ed.).

Penney, S., Prosser, A. & Simpson, A. 2018a. Age onset of offending and serious mental illness among forensic psychiatric patients: A latent profile analysis: Age onset of offending and serious mental illness. *Criminal Behaviour and Mental Health,* 28.

Penney, S. R., Marshall, L. & Simpson, A. I. F. 2018b. A prospective study of pathways to hospital readmission in Canadian forensic psychiatric patients. *The Journal of Forensic Psychiatry & Psychology,* 29**,** 368-386.

Penney, S. R., Morgan, A. & Simpson, A. I. F. 2019. Motivational Influences and Trajectories to Violence in the Context of Major Mental Illness. *Journal of Interpersonal Violence,* 36**,** NP10572-NP10593.

Ryland, H., Davies, L., Kenney-Herbert, J., Kingham, M. & Deshpande, M. 2021. Advancing research in adult secure mental health services in England. *Medicine, Science and the Law,* 62**,** 225-229.

Seppänen, A., Törmänen, I., Shaw, C. & Kennedy, H. 2018. Modern forensic psychiatric hospital design: clinical, legal and structural aspects. *International Journal of Mental Health Systems,* 12**,** 58.

Simpson, A. I., Grimbos, T., Chan, C. & Penney, S. R. 2015. Developmental typologies of serious mental illness and violence: Evidence from a forensic psychiatric setting. *Australian & New Zealand Journal of Psychiatry,* 49**,** 1048-1059.

Tärnhäll, A., Björk, J., Wallinius, M., Gustafsson, P. & Hofvander, B. 2022. Offending Trajectories in Violent Offenders: Criminal History and Early Life Risk Factors. *International Journal of Offender Therapy and Comparative Criminology***,** 67(2-3): 270–290.

Tengström, A., Hodgins, S. & Kullgren, G. 2001. Men with schizophrenia who behave violently: the usefulness of an early- versus late-start offender typology. *Schizophr Bull,* 27**,** 205-18.

Volavka, J. 2016. Triggering Violence in Psychosis. *JAMA Psychiatry,* 73**,** 769-770.

Völlm, B. A., Edworthy, R., Huband, N., Talbot, E., Majid, S., Holley, J., Furtado, V., Weaver, T., Mcdonald, R. & Duggan, C. 2018. Characteristics and Pathways of Long-Stay Patients in High and Medium Secure Settings in England; A Secondary Publication From a Large Mixed-Methods Study. *Frontiers in Psychiatry,* 9.

Appendix:

The categorisation checklist can be found in figure two. The initial inclusion criteria for allocation to each subgroup is the presence of a psychotic disorder. The allocation of an individual to the SZ+CD subgroup is associated with a previous diagnosis of CD, or evidence of a pattern of antisocial behaviour that was persistent through childhood and adolescence that would meet diagnostic criteria for CD. If the patient did not fit the criteria for CD, the onset of psychotic illness was examined in correlation with the onset and extent of antisocial behaviour. If the age of onset of antisocial behaviour was approximately in correlation with an onset of a diagnosis of a psychotic illness, the patient was categorised as the SZ+AS subgroup. If there was a substantial time lapse between onset of psychosis that preceded antisocial behaviour, the patient was allocated to the SZ subgroup.

	Service Use on LSU/MSU pathway		
	LSU (*n* = 111), *n* (%)	MSU (*n* = 87), *n* (%)	Total (*n* = 198), *n* (%)
Forensic Inpatient Services			
High Secure	3 (3)	10 (9)	13 (7)
Medium Secure	22 (20)	10 (9)	32 (16)
Low Secure	16 (14)	7 (8)	23 (12)
Step-down unit	5 (5)	2(2)	7 (3)
General Adult MH Services			
PICU	26 (23)	12 (14)	38 (19)
GA Inpatient ward	18 (16)	17 (20)	35 (18)
Community GA Services*	1 (1)	2 (2)	3 (2)
Rehabilitation Unit	8 (7)	0 (0)	8 (4)
Prison	12 (11)	27 (31)	39 (20)
Use of Independent Sector	19 (17)	17 (20)	21 (11)

Table One. Overall service use on the patient care pathway to LSU or MSU.

LSU/MSU Admission and Discharges						
	LSU (*n* = 32), *n* (%)		MSU (*n* = 41), *n* (%)		Total (*n* = 73), *n* (%)	
	Admission	Discharge	Admission	Discharge	Admission	Discharge
Forensic Inpatient Services						
High Secure	0 (0)	0 (0)	7 (17)	2 (5)	7 (10)	2 (3)
Medium Secure	12 (33)	2 (6)	4 (10)	6 (15)	16 (22)	8 (11)
Low Secure	4 (13)	6 (19)	3 (7)	6 (15)	7 (10)	12 (16)
Step-down unit	0 (0)	10 (31)	1 (2)	6 (15)	1 (1)	16 (22)
General Adult MH Services						
PICU	6 (19)	0 (0)	4 (10)	1 (2)	10 (14)	1 (1)
GA Inpatient ward	1 (3)	0 (0)	3 (7)	0 (0)	4 (5)	0 (0)
Community Services	1 (3)	4 (13)	3 (7)	11 (27)	4 (5)	15 (21)
Rehabilitation Unit	5 (16)	10 (31)	0 (0)	4 (10)	5 (7)	14 (19)
Prison	2 (6)	0 (0)	16 (39)	5 (12)	18 (25)	5 (7)

Table Two. Admission and Discharge placements for low secure and medium secure hospital care.

Subgroup LSU Pathway Service Use

	CD + SZ (*n* = 66), *n* (%)	AS + SZ (*n* = 36), *n* (%)	SZ (*n* = 9), *n* (%)	Total (*n* = 111), *n* (%)	*P*-value
Forensic Inpatient Services					
High Secure	3 (4)	0 (0)	0 (0)	3 (3)	0.12
Medium Secure	14 (21)	5 (14)	3 (33)	22 (20)	0.39
Low Secure	12 (18)	3 (8)	1 (11)	16 (14)	0.38
Step-down unit	3 (5)	2 (6)	0 (0)	5 (5)	0.77
General Adult MH Services					
PICU	10 (15)	13 (39)	2 (22)	25 (23)	0.05*
GA Inpatient ward	12 (18)	6 (17)	1 (11)	19 (17)	0.87
Community	0(0)	0 (0)	1 (11)	1(1)	0.25
Rehabilitation Unit	5 (8)	3 (8)	0 (0)	8 (7)	0.68
Prison	7 (11)	4 (11)	1 (11)	12 (11)	0.99
Use of Independent Sector	15 (21)	2 (6)	2 (22)	19 (17)	0.35

Table Three. LSU Pathway use per typology subgroup (*$p \leq 0.05$).

	Subgroup MSU Pathway Service Use				
	CD + SZ (*n* = 55), *n* (%)	AS + SZ (*n* = 20), *n* (%)	SZ (*n* = 12), *n* (%)	Total (*n* = 87), *n* (%)	*P*-value
Forensic Inpatient Services					
High Secure	7 (13)	1 (5)	2 (17)	10 (9)	0.54
Medium Secure	5 (9)	2 (10)	3 (25)	10 (9)	0.29
Low Secure	5 (9)	1 (5)	1 (8)	7 (8)	0.85
Step-down unit	1 (6)	1 (5)	0 (0)	2 (2)	0.61
General Adult MH Services					
PICU	10 (18)	2 (10)	0 (0)	12 (14)	0.22
GA Inpatient ward	12 (22)	3 (15)	2 (17)	17 (20)	0.78
Community GA Services	0 (0)	1 (5)	1 (8)	2 (2)	0.14
Rehabilitation Unit	0 (0)	0 (0)	0 (0)	0 (0)	-
Prison	15 (27)	9 (45)	3 (17)	27 (31)	0.35
Use of Independent Sector	15 (21)	1 (5)	1 (8)	17 (20)	0.05*

Table Four. MSU Pathway use per typology subgroup (*$p \leq 0.05$).