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Submitted To: Early Intervention in Psychiatry

The Prevalence and Impact of Adolescent Hospitalization to Adult Psychiatric Units

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Running Head: Adolescent Admission to Adult Psychiatry Units

Word Count: 3,378 words, 1 figure, 2 tables

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Abstract

Background: With increasing psychiatric hospitalizations among adolescents and constrained hospital resources, there are times when youth are hospitalized in adult inpatient psychiatry units. Evidence on the prevalence of this practice and associated impacts is lacking. We sought to explore the prevalence, determinants, and outcomes related to the hospitalization of adolescents aged 12 to 17 years on adult inpatient psychiatry units in Ontario.

Methods: Using health administrative data, we constructed a cohort of adolescents with an inpatient psychiatric admission in Ontario (2007-2011). We classified adolescents as having an admission to an adult psychiatry unit or to other inpatient units. Multivariable regression models were used to examine factors associated with adult admission, as well as the impact of adult admission on length of stay, discharge against medical advice, and 30-day readmission.

Results: Over the study period, 22.6% of adolescents with a psychiatric hospitalization (n=16,998) had an admission to an adult psychiatry unit. Older age (16 years vs. 15 years: PR=2.27, 95%CI=2.07-2.48; 17 years vs. 15 years: PR=2.91, 95%CI=2.66-3.18), rural residence (PR=1.46, 95%CI=1.38-1.55), psychotic (PR=1.25, 95%CI=1.15-1.36) or personality disorder (PR=1.59, 95%CI=1.41-1.80) diagnoses, and involuntary status (PR=2.18, 95%CI=2.05-2.31) were associated with adult admission. Adolescents admitted to adult units were more likely to be discharged against medical advice (RR=1.77, 95%CI=1.45-2.17).

Conclusions: Nearly one in four adolescent psychiatric admissions occurs on an adult psychiatric unit. These findings help to fill gaps in the prior literature, and highlight the need for further research to inform policy decisions and resource allocation for adolescent inpatient psychiatric care.

Keywords: mental disorders, adolescent, inpatient psychiatry, adult inpatient psychiatry unit

Introduction

Nearly 75% of lifetime mental disorders have their first onset during adolescence or early adulthood,¹ with substantial public health and health system impacts.²⁻⁴ Without appropriate treatment, children and adolescents with mental disorders may become “more vulnerable and less resilient” over time,⁵ leading to social, educational, and vocational consequences. In recognition of the importance of early intervention and prevention, many systems have prioritized mental health services for adolescents and young adults.⁶

Recent North American evidence suggests that both psychiatric hospitalizations and emergency department visits for mental health reasons have been increasing over time in this age group,⁷⁻⁹ which places a burden on constrained hospitals that are over-capacity, meaning that adolescents may consequently be admitted to adult inpatient psychiatry units. Specialized child and adolescent inpatient units often take a developmental approach to providing care, with greater family involvement in treatment or decision making and the provision of a more nurturing environment, whereas adult inpatient units may have a more biomedical approach to providing care, emphasizing patient autonomy and individual responsibility.^{10,11} The differences between these models of care may pose a problem if adolescents rely heavily on their family during appointments and feel unprepared to make treatment decisions on their own.^{10,11}

Prior studies report that when adolescents were admitted to adult units, they were fearful for their safety, felt isolated, were uninvolved in decision making, and in some cases felt that their condition worsened.¹¹⁻¹³ A survey of adult psychiatric inpatient staff found that these clinicians expressed concerns over admitting a teenager to their unit due to safety issues, heightened vulnerability of youth, the psychological impact of being around many unwell adults, and the potential for maladaptive behaviours

to develop.¹⁴ There are also concerns when mixing adolescents with recent-onset mental disorders with adults with more persistent and recurring psychiatric conditions, potentially exacerbating symptoms and leading to avoidance of health services in the future.¹⁵ Conversely, there may be situations where an adult admission may be more appropriate for an adolescent, including: (i) the adolescent is living an adult lifestyle; (ii) the adolescent may be aggressive with other patients; (iii) the facility with an adult bed is closer to their family than the facility with an adolescent bed; or (iv) the admission is brief.¹⁴

The issue of adolescent admission to adult psychiatric units is vastly underexplored, and there is a notable lack of information on the prevalence of this practice and the associated impacts. The present study aimed to examine the prevalence, determinants, and outcomes related to the hospitalization of adolescents aged 12 to 17 years on adult inpatient psychiatric units in Ontario. Specifically, we sought to: (1) estimate the proportion of inpatient psychiatric hospitalizations among adolescents that occurred in an adult psychiatric unit; (2) examine the patient- and institutional-level factors associated with adolescent admission to an adult psychiatric unit; and (3) compare length of stay, discharge against medical advice, and 30-day readmission for adolescents who are admitted to an adult psychiatric unit, relative to those admitted to other inpatient units.

Methods

The data for this study were obtained from the Canadian Institute for Health Information through the Graduate Student Data Access Program. Ethics approval was obtained from the Health Sciences Research Ethics Board at Western University (File #109350).

Study Design and Source of Data

We constructed a retrospective cohort of adolescents between the ages of 12 and 17 years who experienced an inpatient psychiatric admission in Ontario between 2007 and 2011. This was done using data from the Ontario Mental Health Reporting System (OMHRS) database and the Discharge Abstract Database (DAD). The OMHRS database captures data from all admissions to designated adult psychiatric beds in Ontario, and was used to identify adolescents admitted to adult psychiatric inpatient units. The DAD database includes information on all remaining hospitalizations not captured by OMHRS, which was used as our reference group of “other inpatient units”. This category includes adolescents who had an admission with a primary discharge diagnosis of a mental or substance use disorder, but where the admission occurred in a pediatric psychiatry unit, pediatric medical unit, or other adult medical unit. Due to limitations in the way that admissions are coded in DAD, we were unable to determine the exact unit where the patient was admitted within our reference category.

All acute care facilities in Ontario are required to report to the OMHRS and DAD databases, and hospitalizations are covered under the universal public health insurance plan. There is minimal overlap in the datasets, except for circumstances where a patient was admitted first to a non-psychiatric unit and then transferred to a psychiatric bed during the same episode of care, or vice versa. When the discharge date of a hospitalization matched the admission date of a subsequent hospitalization, we considered this part of the same episode of care.

A cross-sectional study design was used to examine the prevalence of adolescent admission to an adult inpatient unit, as well as associated patient and hospital-level factors. A retrospective cohort design was used to examine the impact of adolescent admission to an adult psychiatric unit on the

outcomes of length of stay, discharge against medical advice, and 30-day readmission, relative to adolescents who were admitted to other inpatient units.

Study Sample and Key Variables

Our study sample included adolescents between 12 and 17 years of age who were hospitalized with a primary discharge diagnosis of any mental disorder (i.e. ICD-10 F-codes or any DSM-IV diagnosis) in Ontario between 2007 and 2011. We chose to focus on adolescents (<18), as these young people can only be admitted to a pediatric inpatient unit until their 18th birthday. In 2010, there were 183 child and adolescent psychiatry beds across Ontario, representing a prevalence of 5.9 beds per 100,000 youth under the age of 19.¹⁶

As previously described, the cohort was divided into two separate groups: (i) adolescents admitted to an adult psychiatry unit (OMHRS admissions); and (ii) adolescents admitted to a pediatric psychiatry unit, pediatric medical unit, or other adult medical unit (DAD admissions), referred to as “other inpatient unit” and used as the comparison group. The unit of admission was assigned based on the database from which the adolescent’s hospitalization record was obtained. Where there were transfers across units within the same episode of care, the adolescent was considered to have had an adult admission if they were in an adult psychiatric bed at any point during the episode of care. For repeated admissions, we used the first hospitalization in the observation period as the index admission.

We were limited to the patient- and institutional-level factors available consistently across the two databases. Age at admission was derived by subtracting the admission date from the birthdate, and age 15 was used as the reference category given that it was the midpoint of the age range. Sex was recorded as male or female, and female was used as the reference category. Rural versus urban

residence was defined based on residential postal codes, where a second digit of “0” denotes a rural area, and urban was used as the reference category. The most responsible diagnosis – defined as the condition responsible for the greatest proportion of length of stay¹⁷ – was categorized based on the DSM-IV categories as: mood disorders, substance-related disorders, non-affective psychotic disorders, anxiety disorders (includes adjustment disorders, adjustment disorders, and trauma and stressor-related disorders), personality & behaviour disorders (includes impulse control disorders), disorders of childhood and adolescence, eating disorders, and other categories (includes factitious disorders, somatoform disorders, dissociative disorders, sleep disorders). Mood disorders was used as the reference category, as it was the largest subgroup. We also extracted information on whether the patient had previous psychiatric admissions, available as a binary variable, and also whether the admission was involuntary at any point during the episode of care. The institutional-level factors included psychiatric versus general hospital (reference), season of admission (winter - reference: December to February, spring: March to May, summer: June to August, fall: September to November), and year of admission (reference = 2007).

To assess the impact of youth admission to an adult psychiatric unit, we assessed three outcome indicators: i) length of stay; ii) discharge against medical advice; and iii) 30-day readmission. The variables length of stay and discharge against medical advice were chosen because we hypothesized that among adolescents admitted to adult psychiatric units, clinical staff and family members may aim for the briefest possible stay required to achieve therapeutic aims, and that parents may be more likely to remove their child when admitted to an adult unit due to concerns with care.^{18,19} The variable 30-day readmission is a quality of care indicator that reflects coordination of care between inpatient and outpatient services, and whether patients are being discharged too early.²⁰

Statistical Analyses

We calculated the proportion of adolescents with an admission to an adult psychiatric unit. We used modified Poisson regression models²¹ to estimate the effect of all patient- and institutional-level variables on the prevalence of admission to an adult psychiatric unit, quantified using a prevalence ratio (PR) and 95% CIs. We used a similar approach to assess the association between unit of admission and the outcomes of discharge against medical advice and 30-day readmission, quantified using risk ratios (RR) and 95% CIs. This approach has been recommended for estimating prevalence ratios or risk ratios for common binary outcomes.²² We used negative binomial regression models with robust variance estimators for the outcome variable length of stay, which was chosen for its strength in handling skewed outcome data.²³ The outcome models were again adjusted for all patient- and institutional-level variables, and the model for 30-day readmission was additionally adjusted for length of stay of the index admission. All analyses were conducted using Stata® software version 15.1.

Results

Between 2007 and 2011, 16,998 adolescents between the ages of 12 and 17 years in Ontario had a psychiatric hospitalization, of which 22.6% (n=3,837) occurred on an adult psychiatric unit. When examining the proportions by age at admission, the proportion of total admissions that occurred on an adult psychiatric unit was 5.4% for adolescents who were aged 12, and increased by year up to 43.1% for adolescents who were aged 17 (Figure 1).

Factors Associated with Adolescent Admission to Adult Psychiatric Units

Table 1 presents the characteristics of the sample, as well as the patient- and institutional-level factors associated with adolescent admission to an adult inpatient psychiatric unit.

In our adjusted model, 16-year-olds were more than twice as likely (PR=2.27, 95%CI=2.07-2.48), and 17-year-olds were nearly three times more likely (PR=2.91, 95%CI=2.66-3.18), to be admitted to an adult psychiatric unit, relative to those who were age 15 at the time of admission. Adolescents between the ages of 12 and 14 years had a lower prevalence of admission to an adult psychiatric unit (Age 12: PR=0.48, 95%CI=0.37-0.63; Age 13: PR=0.48, 95%CI=0.39-0.59; Age 14: PR=0.72, 95%CI=0.62-0.83). Adolescents who lived in a rural area were 46% more likely to be admitted to an adult psychiatric unit (PR=1.46, 95%CI=1.38-1.55), compared to those living in an urban area. When compared with adolescents with a most responsible diagnosis of mood disorder, those with a non-affective psychotic disorder were 25% more likely to be admitted to an adult psychiatric unit (PR=1.25, 95%CI=1.15-1.36), those with personality disorders were 59% more likely to be admitted to an adult psychiatric unit (PR=1.59, 95%CI=1.41-1.80), and those with other psychiatric conditions were 95% more likely to be admitted to an adult psychiatric unit (PR=1.95, 95%CI=1.80-2.12). The remaining diagnostic categories were associated with a lower prevalence of admission to an adult psychiatric unit, relative to mood disorders, with the exception of substance-related disorders which were not significantly associated with admission unit after multivariable adjustment (Table 1). Patients who had previous psychiatric admissions were less likely to be admitted to an adult psychiatric unit (PR=0.79, 95%CI=0.72-0.86), whereas those who had involuntary status were more than twice as likely to be admitted to an adult psychiatric unit (PR=2.18, 95%CI=2.05-2.31).

In terms of institution-level factors, the unadjusted analyses suggested that people who were admitted to a psychiatric hospital had a lower prevalence of admission to an adult psychiatric unit (PR=0.79, 95%CI=0.69,0.91), relative to those admitted to a general hospital, but this difference was no longer statistically significant in the adjusted model. Finally, our findings suggest that the prevalence of adolescent admission to adult psychiatric units was decreasing over time, and that admissions during the spring were slightly more likely to occur on an adult psychiatric unit (PR=1.11, 95%CI=1.03-1.18), relative to winter admissions, with no differences observed in the summer and fall (Table 1).

Impact of Adolescent Admission to Adult Psychiatric Units

The findings of our analyses on the impact of adolescent admission to an adult psychiatric unit on length of stay, discharge against medical advice, and 30-day readmission, relative to adolescents who are admitted to other inpatient units, are presented in Table 2.

The median length of stay for adolescents was 5 days (IQR=2,11). Adolescents who were admitted to an adult psychiatric unit had a similar length of stay as those admitted to other inpatient units (RR=0.95, 95%CI=0.88-1.02). The proportion of adolescents who were discharged against medical advice was 2.7% (n=457). When compared to adolescents admitted to other inpatient units, those who were admitted to an adult psychiatric unit were 77% more likely to be discharged against medical advice (RR=1.77, 95%CI=1.45-2.17). The proportion of adolescents who were readmitted within 30-days was 8.0% (n=1,355), and there was no association between admission to an adult psychiatric unit and risk of 30-day readmission (RR=1.01, 95%CI=0.88-1.16).

Discussion

Our findings suggest that nearly one in four adolescent admissions are occurring on an adult psychiatric unit. These youth are more likely to be older, come from rural areas, have psychotic or personality disorders, and to have involuntary status. When youth are admitted to adult inpatient units, they are also more likely to be discharged against medical advice. To our knowledge, this is the first study to compare service-related outcomes between adolescents admitted to adult psychiatric units and those admitted to other inpatient units.

The trends observed in the current study are concerning, given that barriers to help-seeking and disengagement from services are often shaped by adolescents' previous experiences within the mental health system.²⁴ Adolescents, parents, and staff all report concerns with admitting youth to adult psychiatric units, including fear for safety, increased stress and isolation, a lack of involvement in care, and absence of age appropriate resources.^{11,14,15,25,26} With already low service engagement from adolescents, having a negative experience during the first admission could lead to further avoidance of mental health services in the future.^{7,15}

There is a large degree of variation across institutions in Ontario in terms of available resources for adolescent psychiatric inpatient care, as well as in the policies and practices for triage and admission decisions.¹⁶ Despite this heterogeneity, we found a number of patient- and institution-level factors to be associated with the likelihood of adolescent admission to an adult psychiatric unit. It is particularly alarming to see that adolescents as young as 12 and 13 years were admitted to an adult unit. The Ontario Network of Child & Adolescent Inpatient Psychiatry's standard for child and adolescent inpatient mental health recommends that, where possible, adolescents should not receive care from adult psychiatric units, and that their care should be developmentally appropriate, including an opportunity to continue

their education and engage in age appropriate activities.²⁷ We also found that people living in a rural area were more likely to be admitted to an adult psychiatric unit, which may be indicative of a lack of access to a pediatric psychiatric unit, and therefore admission to an adult unit may be the only option.^{12,28} Although it may be possible for youth to be sent to a larger institution with a pediatric psychiatric unit, there is debate whether the benefit of a pediatric unit outweighs the risks of separating adolescents from their home and local support systems.²⁹

Our findings also suggest that when adolescents are admitted to adult units, there are implications for the quality of their care. Specifically, adolescents admitted to an adult psychiatric unit were more likely to leave hospital against medical advice. Although we anticipated this finding in the context of previous research,¹¹⁻¹³ our study provides clear evidence of the scale of the issue and draws attention to its consequences. Discharge against medical advice is considered an adverse outcome of inpatient hospitalization and may be associated with poorer outcomes.²⁹ Despite this, we found no evidence of a significant association between admission to an adult psychiatric unit and the risk of 30-day readmission, which could suggest that adolescents who were admitted to adult psychiatric units received the level of care they needed, or it could suggest that these adolescents avoided the hospital after a negative experience.

Our work also highlights the need for policy interventions in this area that should be informed by a strong evidence base. Additional research is needed to facilitate a deeper understanding of the issues highlighted by our findings, and improvements in data collection would help facilitate such research. Some important aspects to consider include the use of cross-sectoral data, using key patient identifiers to link data across community and hospital mental health care, as well as using one common system for admission and discharge reporting that allows for the identification of the unit of admission. Research is

needed to determine the extent to which admissions to an adult psychiatric unit impact on other outcomes such as symptom remission, functional recovery, and subsequent engagement and satisfaction with services. Data from large quantitative databases could be complemented with qualitative methods to explore the relationship of clinical outcomes with patient reported outcomes and a clinical evaluation of the appropriateness of admission. These avenues for future research would help provide a more complete picture of the adolescent experience during an admission to an adult psychiatric unit, and help to inform mental health policy and service planning.

Limitations

Based on the available data, we were unable to determine the exact unit that adolescents in our comparison group were admitted to – specifically, whether the adolescent was admitted to a pediatric psychiatric unit or received services in a pediatric or adult medical bed. This limits our interpretation of the estimates and our ability to identify the most suitable setting for adolescent psychiatric admission. We used data from the first admission during our study period, which may not necessarily represent the adolescent’s first ever psychiatric admission, and our binary variable for prior psychiatric admissions cannot account for adolescents experiencing multiple escalating admissions prior to the study period. The data used in the current study are from admissions that occurred between 2007 and 2011, and replication with more current data is warranted, especially given that we found evidence that the prevalence of adolescent admission to adult inpatient units may be decreasing over time. We were unable to examine the severity of symptoms or the presence of disruptive or aggressive behaviours, which could be important factors in determining whether an adolescent is admitted to an adult psychiatric unit. We also did not consider comorbidity between the diagnostic categories, which would

increase the complexity of the case and may have implications for admission decisions. Due to privacy considerations, we were not able to obtain full postal codes for adolescents or hospitals, which would give us a proxy measure for neighbourhood-level SES and the distance from a hospital, which are both potential explanatory factors. Finally, due to the nature of the study, we were unable to determine whether an adolescent's admission to an adult psychiatric unit was 'appropriate', as there are some circumstances where this would be the considered most suitable option, for example due to proximity to a support network.^{12,27,28,30}

Conclusions

Adolescent admission to adult inpatient psychiatric units has implications for quality of care and future engagement with psychiatric treatment; despite this, the topic is vastly understudied. Our findings suggest that one in four adolescents are admitted to an adult inpatient unit, and that older adolescents, those living in rural areas, those with psychotic or personality disorders, and those with involuntary status were more likely to be admitted to an adult psychiatric unit. Additionally, admission to an adult psychiatric unit increased the likelihood that they were discharged against medical advice. There is a need for improvements to data collection and further research on this topic to inform policy decisions and resource allocation for adolescent inpatient psychiatric care.

Acknowledgements

This study was funded by a New Investigator Fellowship from the Ontario Mental Health Association (KKA). The authors gratefully acknowledge the Graduate Student Data Access Program through the Canadian Institute for Health Information (CIHI). The analyses, conclusions, opinions and statements expressed herein are solely those of the authors and do not reflect those of the funding or data sources; no endorsement is intended or should be inferred.

Data Sharing Statement

The data that support the findings of this study are available from the Canadian Institute for Health Information (CIHI). Restrictions apply to the availability of these data, which were used under a data sharing agreement for the current study.

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Figure 1: Proportion of adolescent inpatient psychiatric admissions to an adult psychiatric unit from 2007 to 2011, by age at admission (n = 16,998).

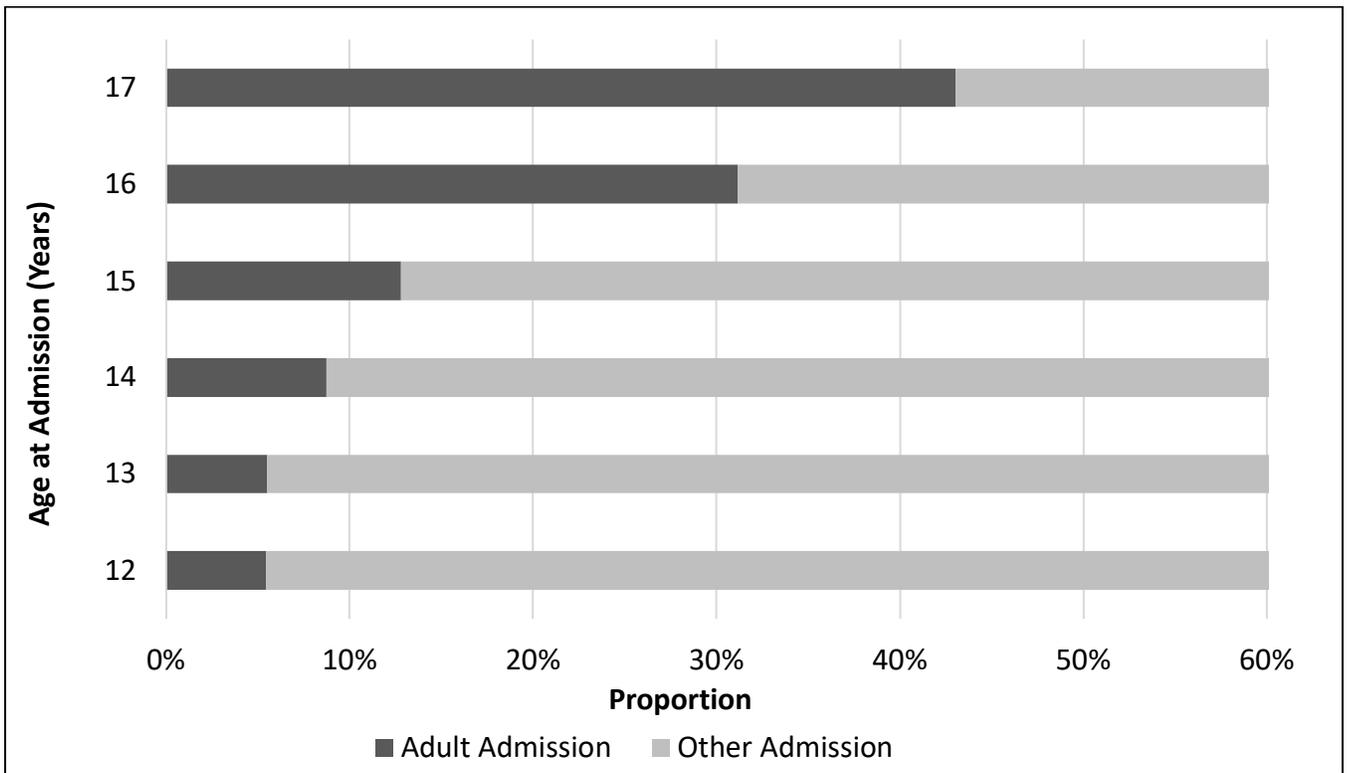


Table 1: Sample characteristics and factors associated with first admission to an adult psychiatric unit, relative to other inpatient units (n = 16,998).

		Adult Unit n (%)	Other Unit n (%)	Unadjusted PR (95% CI)	Adjusted PR (95% CI)
Patient-Level Factors					
Age	12 years	57 (1.5)	989 (7.5)	0.43 (0.33, 0.56)*	0.48 (0.37, 0.63)*
	13 years	88 (2.3)	1,515 (11.5)	0.43 (0.34, 0.53)*	0.48 (0.39, 0.59)*
	14 years	226 (5.9)	2,366 (18.0)	0.68 (0.59, 0.79)*	0.72 (0.62, 0.83)*
	15 years	472 (12.3)	3,219 (24.5)	Ref.	Ref.
	16 years	1,256 (32.7)	2,773 (21.1)	2.44 (2.21, 2.68)*	2.27 (2.07, 2.48)*
	17 years	1,738 (45.3)	2,299 (17.5)	3.37 (3.07 to 3.69)*	2.91 (2.66, 3.18)*
Sex	Female	2,024 (52.8)	8,038 (61.1)	Ref.	Ref.
	Male	1,813 (47.2)	5,123 (38.9)	1.30 (1.23, 1.37)*	1.00 (0.95, 1.05)
Residence	Urban	3,002 (78.2)	11,229 (85.3)	Ref.	Ref.
	Rural	835 (21.8)	1,932 (14.7)	1.43 (1.34, 1.53)*	1.46 (1.38, 1.55)*
Diagnostic Group	Mood	1,513 (39.4)	4,590 (34.9)	Ref.	Ref.
	Substance	374 (9.8)	788 (6.0)	1.30 (1.18, 1.43)*	1.06 (0.97, 1.15)
	Psychotic	372 (9.7)	528 (4.0)	1.67 (1.52, 1.82)*	1.25 (1.15, 1.36)*
	Anxiety	636 (16.6)	3,827 (29.1)	0.57 (0.53, 0.63)*	0.64 (0.59, 0.69)*
	Personality & Behavior	137 (3.6)	140 (1.1)	2.00 (1.76, 2.26)*	1.59 (1.41, 1.80)*
	Childhood	350 (9.1)	1,985 (15.1)	0.60 (0.54, 0.67)*	0.87 (0.79, 0.97)*
	Eating Disorder	35 (0.9)	877 (6.7)	0.15 (0.11, 0.21)*	0.26 (0.19, 0.36)*
	Other	420 (11.0)	426 (3.2)	2.00 (1.85, 2.17)*	1.95 (1.80, 2.12)*
Prior Hospitalization	No	3,491 (91.0)	11,932 (90.7)	Ref.	Ref.
	Yes	346 (9.0)	1,229 (9.3)	0.97 (0.88, 1.07)	0.79 (0.72, 0.86)*
Involuntary Status	No	1,213 (31.6)	7,936 (60.3)	Ref.	Ref.
	Yes	2,624 (68.4)	5,225 (39.7)	2.52 (2.37, 2.68)*	2.18 (2.05, 2.31)*
Institution-Level Factors					
Hospital Type	General	3,622 (94.4)	12,234 (93.0)	Ref.	Ref.
	Psychiatric	215 (5.6)	927 (7.0)	0.82 (0.73, 0.93)*	0.92 (0.83, 1.03)
Year of Admission	2007	936 (24.4)	2,483 (18.9)	Ref.	Ref.
	2008	750 (19.6)	2,327 (17.7)	0.89 (0.82, 0.97)*	0.99 (0.92, 1.07)
	2009	694 (18.1)	2,374 (18.0)	0.83 (0.76, 0.90)*	0.88 (0.81, 0.95)*
	2010	681 (17.8)	2,671 (20.3)	0.74 (0.68, 0.81)*	0.77 (0.71, 0.83)*
	2011	776 (20.2)	3,306 (25.1)	0.69 (0.64, 0.75)*	0.73 (0.67, 0.78)*
Season of Admission	Winter	930 (24.2)	3,433 (26.1)	Ref.	Ref.
	Spring	1,157 (30.2)	3,740 (28.4)	1.10 (1.03, 1.20)*	1.11 (1.03, 1.18)*
	Summer	746 (19.4)	2,561 (19.5)	1.06 (0.97, 1.15)	1.02 (0.94, 1.10)
	Fall	1,004 (26.2)	3,427 (26.0)	1.06 (0.98, 1.15)	1.02 (0.95, 1.09)

* Statistically significant at $p < 0.05$; PR = Prevalence Ratio; Ref. = Reference Category

Table 2: Impact of adolescent admission to an adult psychiatric unit on length of stay, discharge against medical advice, and 30-day readmission, relative to adolescents admitted to other inpatient units (n = 16,998).

Outcome Variable	Unadjusted RR (95% CI)	Adjusted RR** (95% CI)
Length of Stay	0.99 (0.85 to 1.14)	0.95 (0.88 to 1.02)
Discharge Against Medical Advice	2.35 (1.96 to 2.83)*	1.77 (1.45 to 2.17)*
30-Day Readmission	1.05 (0.93 to 1.19)	1.01 (0.88 to 1.16)

* Statistically significant at $p < 0.05$; ** Adjusted for age at admission, sex, rural residence, diagnosis, prior admissions, involuntary admission, hospital type, season, year, and length of stay (readmission model only).

RR = Relative Risk; CI = Confidence Interval