

Effects of Outpatient Aftercare on Psychiatric Rehospitalization Among Children and Emerging Adults in Alberta, Canada

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Objective: The one-year readmission rates for children and youths hospitalized for a psychiatric condition is estimated at 38%. Studies suggest that these high readmission rates result from a lack of aftercare, but evidence is mixed. This study further explored the relationship between aftercare and readmission among children and youths ages five to 24 in Alberta, Canada, by using the same study sample to identify predictors of both outcomes.

Methods: A retrospective analysis using linked administrative data was performed. Records of the index inpatient stay and any subsequent readmissions for a mental health reason between July 1, 2007, and December 31, 2012, were obtained from the Discharge Abstract Database. Data on outpatient aftercare for this sample were obtained from ambulatory care records and a patient-level physician billing database. Rates of aftercare and readmission were calculated. A Cox proportional

hazards regression model was used to identify predictors of both outcomes.

Results: Overall, 15,628 hospitalizations were identified for 12,728 unique individuals. For these hospitalizations, aftercare services were recorded for 29.4% within one week of discharge and for 54.5% within 30 days. Fourteen percent of hospitalizations resulted in readmission within 90 days. Aftercare was associated with a 32% reduction in readmission. Prior service use, longer hospital stays, higher income, specific diagnoses, female sex, and comorbid mental health conditions were associated with a greater likelihood of aftercare receipt.

Conclusions: Access to community mental health services for children and youths remains a priority. The significant role of aftercare in reducing readmission risk demonstrates the need to improve these services.

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Outpatient treatment of children and youths with mental disorders is generally preferred because of the high costs and restrictiveness of hospitalization. The shift toward recovery-oriented care by the Mental Health Commission of Canada has also placed greater emphasis on community care (1). Evidence supports the effectiveness of outpatient treatment in this population (2,3). In contrast, psychiatric hospitalization is indicated only for crisis stabilization or where monitoring in a restrictive environment is needed, with the purpose of returning individuals to the community as soon as possible (3,4). Once a patient is discharged, treatment is expected to continue in the outpatient setting to ease transition to the community, maintain gains achieved during hospitalization, and reduce the likelihood of readmission (5).

Although only a small proportion of children and youths require psychiatric hospitalization, readmissions for mental disorders in this population are common. In Canada, 409 per 100,000 persons ages five to 24 were hospitalized in 2013 (6). One-year readmission rates have been estimated at 38% for this population (7), and 11% have three or more psychiatric

hospitalizations in one year (6). For children with a diagnosis other than a mental disorder, only 4% have three or more hospitalizations within one year (6).

According to the community-based mental health treatment model, high readmission rates may be explained by inadequate posthospitalization treatment. Prior studies have found that 25% to 50% of children and youths do not receive aftercare (5,8,9). Furthermore, there is some evidence that those least likely to receive aftercare, including males, older children, those with lower socioeconomic status, and those living in rural areas, are most likely to be readmitted (7–16).

However, evidence supporting the effectiveness of post-discharge care in reducing readmissions is mixed. One study found that outpatient aftercare reduced psychiatric readmissions (13), but other studies indicated that postdischarge services were either not significantly associated (11) or were positively associated (7,14,15,17) with readmission. The mixed results of these studies reflect differences in access to care across study samples (15). However, because no study determined aftercare and readmission outcomes by using

the same sample, conclusions between the receipt of aftercare and the risk of readmission cannot be drawn directly.

Therefore, the purpose of this study was to further elucidate the relationship between receipt of postdischarge services and readmission for individuals ages five to 24 hospitalized for a mental disorder in Alberta, Canada, and to identify predictors of both outcomes. Unlike prior studies, this study used a single sample to explore this relationship. Factors associated with both outcomes warrant further investigation given the limited literature identifying predictors of aftercare and readmission.

METHODS

This study was a retrospective analysis of linked administrative data from Alberta, Canada, between 2007 and 2012 from the Canadian Institute for Health Information. Ethics review was not required for this study because it was an analysis of administrative data.

Setting

A quarter of Alberta's four million residents are ages five to 24 (18). As in other Canadian provinces, health care in Alberta is publicly funded and administered. Residents of Alberta have access to universal hospital and medically necessary services through the Alberta Health Care Insurance Plan (AHCIP). For psychiatric hospitalizations, care includes assessment and short-term stabilization by counselors, nurses, occupational therapists, psychiatrists, social workers, and teachers. After discharge, physician services are covered by AHCIP, as are services provided in hospital-based outpatient clinics and partial hospitalization programs. AHCIP coverage does not extend to medication and nonphysician counseling services, however, and some families may pay out of pocket for these services.

Sample

Patients ages five to 24 at the time of admission who were admitted after June 30, 2007, and discharged before January 1, 2013, were selected from the Discharge Abstract Database (DAD). In Alberta, the DAD includes administrative, clinical, and demographic information (including age and sex, but not race) for all hospital discharges from acute and psychiatric facilities. A sample of index hospitalizations was created by selecting patients' first psychiatric hospitalization ending with a community discharge in each fiscal year. Psychiatric hospitalizations were those with a primary *ICD-10-CA* code F00–F99 or O99.3.

As in previous studies, a 90-day period preceding hospital admission and following discharge was chosen as the study period. Because most aftercare services and readmissions occur within 30 days, we chose a 90-day follow-up period to fully capture the effect of aftercare while limiting the possibility that readmission represented a new episode. A 90-day period preceding the index admission was chosen for the same reasons.

Outcomes

Outpatient aftercare. Clinic aftercare was identified from the Alberta Ambulatory Care Reporting System for fiscal years 2007 to 2009 and the National Ambulatory Care Reporting System for fiscal years 2010 to 2012 by linking encrypted health card numbers from the index hospitalization record with those in these databases. Clinic visits for mental health services were those occurring in a mental health outpatient clinic.

Through linkage of encrypted health card numbers, the Alberta Patient Level Physician Billing database (PLPB) for fiscal years 2007 to 2012 was used to identify mental health services provided by physicians. This database includes all physician submissions for fee-for-service payment; however, for psychiatrists the only submissions selected were those for counseling or psychotherapy provided in an outpatient setting or for patients with a psychiatric diagnosis identified by *ICD-9* codes 290–319. Other aftercare services, such as home assessments, referrals to high-intensity outpatient programs, and discharge to residential treatment facilities, were identified from the index hospitalization record indicating discharge to home with support services. On the basis of these data sources, outpatient aftercare included any assessment, referral, treatment in a residential treatment facility, and clinic or physician service provided within 90 days of the index discharge or prior to readmission as identified below.

Early readmission. Readmission was documented when a psychiatric hospitalization occurred after the index admission. This outcome was identified by linking index records to all DAD records in the study period and selecting records with an admission date within 90 days of the index discharge that included a primary psychiatric diagnosis.

Predictors of Outcomes

Predictor variables retrieved from the index hospitalization record included age (grouped as five to nine, ten to 14, 15–17, and 18–24), sex, neighborhood income quintile, and area of residence (urban or rural) based on the patient's postal code in conjunction with the Postal Code Conversion File Plus, version 6A (19). Other factors relevant to the index hospitalization included primary diagnosis categorized by *ICD-10-CA* subsection (organic, psychotic, substance, anxiety, mood, personality, and other disorders), psychiatric comorbidity, length of stay (zero to seven days, eight to 30 days, and 30 or more days), hospital type (general or psychiatric), and discharge disposition (home with support, including residential care; home without support; and did not return from a pass). [A table in an online supplement to this article lists the *ICD-10-CA* diagnostic subsection groupings.] Variables for past psychiatric hospitalization or outpatient service use were also created by using the same methodology as used for aftercare and readmission but looking instead within 90 days of index admission.

For the readmission analysis, aftercare was included as a predictor variable. Specific outpatient aftercare types included

TABLE 1. Characteristics of children and youths hospitalized for a mental health reason^a

Characteristic	N	%	Characteristic	N	%
Age			Outpatient service use in prior 90 days		
5–9	585	3.7	No	7,231	46.3
10–14	2,880	18.4	Yes	8,397	53.7
15–17	3,970	25.4	Hospital length of stay (days)		
18–24	8,193	52.4	0–7	7,770	49.7
Gender			8–30	5,671	36.3
Female	7,660	49.0	≥30	2,187	14.0
Male	7,968	51.0	Hospital type		
Income			General	13,983	89.5
Low	3,907	25.0	Psychiatric	1,645	10.5
Low-medium	3,233	20.7	Discharge disposition		
Medium	3,009	19.3	Home without support	418	2.7
Medium-high	2,909	18.6	Residence with support (including residential care)	14,297	91.5
High	2,570	16.4	Did not return from a pass	913	5.8
Area of residence			7-day aftercare		
Rural	3,772	24.1	No	11,040	91.5
Urban	11,856	75.9	Yes	4,588	29.4
Diagnosis			30-day aftercare		
Organic disorder	97	.6	No	7,108	45.5
Substance use disorder	2,202	14.1	Yes	8,520	54.5
Schizophrenic or psychotic disorder	2,067	13.2	Any aftercare		
Mood disorder	4,156	26.6	No	5,167	33.1
Anxiety disorder	1,269	8.1	Yes	10,461	67.0
Personality disorder	380	2.4	Readmission		
Other disorder	5,457	34.9	No	13,446	86.0
Mental health comorbidity			Yes	2,182	14.0
Yes	7,380	47.2			
No	8,248	52.8			
Psychiatric hospitalization in prior 90 days					
Yes	15,014	96.1			
No	614	3.9			

^a Data are for 15,628 hospitalizations.

as covariates were timely aftercare within seven days and within 30 days—measures based on HEDIS quality indicators (20)—aftercare provided by a psychiatrist, and aftercare provided by a general practitioner (GP). Aftercare with a physician who was seen in the 90 days prior to admission was also included as a measure of continuity of care and was identified by using unique physician identifiers in the PLPB data.

Statistical Analyses

All statistical analyses were conducted with SAS, version 9.4 (21). Aftercare and readmission rates were calculated. Descriptive statistics were generated to characterize the sample. Cox proportional hazard models were used to identify factors associated with receipt of aftercare and with readmission to account for differences in risk associated with follow-up time. One model was fit to identify factors associated with aftercare; this model excluded patients discharged home with support services, because all such patients were categorized as receiving aftercare. For the aftercare models, a study period was constructed on the basis of the first outpatient service date postdischarge for each service

type. An aftercare service was considered present when the service was obtained prior to readmission or within 90 days of discharge. Discharges from hospitalization where readmission did not occur or occurred prior to aftercare were censored.

Three readmission models were fit to test the association of any aftercare (within 90 days), seven-day aftercare, and 30-day aftercare with readmission. Psychiatrist, GP, and same-provider aftercare were included in each of these three readmission models. The study period for these models was the number of days between discharge and first inpatient stay postdischarge, regardless of primary diagnosis. However, if a nonpsychiatric hospitalization occurred prior to a readmission or prior to the end of the study period, the record was excluded by the model.

RESULTS

In total, 16,169 index hospitalizations were identified. Because of missing demographic information, 541 were excluded from the study resulting in a study sample of 15,628 index hospitalizations, representing 12,728 unique patients.

TABLE 2. Characteristics of children and youths hospitalized for a mental health reason, by receipt of aftercare and readmission within 90 days of discharge^a

Characteristic	Any aftercare and readmission (N=1,190)		No aftercare and readmission (N=992)		Any aftercare and no readmission (N=9,139)		No aftercare and no readmission (N=4,307)		p
	N	%	N	%	N	%	N	%	
Age									<.001
5–9	29	2.4	35	3.6	401	4.3	120	2.9	
10–14	196	16.1	155	16.1	1,761	19.1	768	18.3	
15–17	267	21.9	195	20.3	2,415	26.1	1,093	26.0	
18–24	729	59.7	576	59.9	4,663	50.5	2,225	52.9	
Gender									.046
Female	624	51.1	455	47.4	4,581	49.6	2,000	47.6	
Male	597	48.9	506	52.7	4,659	50.4	2,206	52.5	
Income									<.001
Low	294	24.7	285	28.7	2,054	22.5	1,274	29.6	
Low-medium	242	20.3	216	21.8	1,868	20.4	907	21.1	
Medium	222	18.7	174	17.5	1,825	20.0	788	18.3	
Medium-high	236	19.8	156	15.7	1,781	19.5	736	17.1	
High	196	16.5	161	16.2	1,611	17.6	602	14.0	
Area of residence									<.001
Rural	244	20.0	249	25.9	1,788	19.4	1,491	35.5	
Urban	977	80.0	712	74.1	7,452	80.7	2,715	64.6	
Diagnosis									<.001
Organic disorder	7	.6	7	.7	43	.5	40	1.0	
Substance use disorder	138	11.3	168	17.5	949	10.3	947	22.5	
Schizophrenic or psychotic disorder	264	21.6	181	18.8	1,297	14.0	325	7.7	
Mood disorder	339	27.8	258	26.9	2,648	28.7	911	21.7	
Anxiety disorder	99	8.1	57	5.9	808	8.7	305	7.3	
Personality disorder	44	3.6	30	3.1	233	2.5	73	1.7	
Other disorder	330	27.0	260	27.1	3,262	35.3	1,605	38.2	
Mental health comorbidity	652	53.4	539	56.1	5,116	55.4	1,941	46.2	<.001
Psychiatric hospitalization in prior 90 days	96	7.9	83	8.6	332	3.6	103	2.5	<.001
Outpatient service use in prior 90 days	858	70.3	507	52.8	5,828	63.1	1,204	28.6	<.001
Hospital length of stay (days) ^b									<.001
0–7	513	42.0	440	45.8	4,038	43.7	2,779	66.1	
8–30	473	38.7	406	42.3	3,668	39.7	1,124	26.7	
≥30	235	19.3	115	12.0	1,534	16.6	303	7.2	
Hospital type ^b									.006
General	1093	89.5	843	87.7	8,340	90.3	3,707	88.1	
Psychiatric	128	10.5	118	12.3	900	9.7	499	11.9	
Discharge disposition									<.001
Home without support	72	5.9	0	—	346	3.7	0	—	
Home with support (including residential care)	1,079	88.4	851	88.6	8,498	92.0	3,869	92.0	
Did not return from a pass	70	5.7	110	11.5	396	4.3	337	8.0	

^a Data are for 15,628 hospitalizations.^b During index hospitalization

Data on demographic and clinical characteristics of the sample are presented in Table 1. Over half (52.4%) of the index hospitalizations were for patients ages 18 to 24. The median age of the sample was 18. A slightly larger proportion of the sample was male (51.0%).

More than one-quarter (29.4%) of hospitalizations were followed by aftercare service within seven days of discharge, and over half (54.5%) were followed by aftercare service within 30 days. In total, 14.0% of the hospitalizations were followed by readmission within 90 days; the median time to

readmission was 24 days. Characteristics of individuals who did and did not receive aftercare and were and were not readmitted are summarized in Table 2.

Table 3 presents the results of the Cox proportional hazards model of the likelihood of aftercare. With the exception of prior psychiatric hospitalization, all factors were significant predictors of receipt of aftercare. Prior use of outpatient services, longer hospital stays, higher income, and female sex were associated with a greater likelihood of aftercare receipt. Receipt of aftercare was also more likely for

TABLE 3. Multivariate model of probability of receipt of aftercare within 90 days of discharge by children and youths hospitalized for a mental health reason

Variable	HR ^a	95% CI	χ^2 ^b	p
Age (reference: 18–24)				
5–9	.74	.76–.82	31.47	<.001
10–14	.75	.71–.80	89.55	<.001
15–17	.89	.85–.93	21.32	<.001
Female (reference: male)	1.10	1.05–1.14	19.05	<.001
Income (reference: low)				
Low-medium	1.08	1.02–1.15	6.78	.009
Medium	1.11	1.04–1.17	10.47	.001
Medium-high	1.14	1.07–1.21	17.62	<.001
High	1.21	1.14–1.29	37.04	<.001
Rural residence (reference: urban)	.70	.66–.73	193.77	<.001
Diagnosis (reference: other disorder)				
Organic disorder	.71	.53–.96	5.11	.024
Substance use disorder	.76	.71–.82	53.23	<.001
Schizophrenic or psychotic disorder	1.10	1.03–1.18	6.99	.008
Mood disorder	1.14	1.08–1.20	23.44	<.001
Anxiety disorder	1.10	1.02–1.18	6.18	.013
Personality disorder	1.21	1.06–1.37	8.37	.004
Mental health comorbidity (reference: no)	1.09	1.05–1.14	16.97	<.001
Psychiatric hospitalization in prior 90 days (reference: no)	.94	.85–1.04	1.36	.244
Outpatient service use in prior 90 days (reference: no)	1.97	1.89–2.06	956.46	<.001
Hospital length of stay (days) (reference: 0–7) ^c				
8–30	1.23	1.17–1.28	73.80	<.001
≥30	1.60	1.50–1.71	208.56	<.001
Psychiatric hospital (reference: general hospital) ^c	.63	.58–.68	142.87	<.001
Discharge disposition (reference: home)				
Did not return from a pass	.80	.72–.88	22.15	<.001

^a Hazard ratio^b df=1^c During index hospitalization

those admitted with comorbid psychiatric disorders, compared with those without comorbid psychiatric disorders, and for those with personality, mood, schizophrenic and psychotic, and anxiety disorders, compared with those admitted with other psychiatric disorders. Patients with substance-related disorders or organic disorders were less likely to receive aftercare than those without these disorders, as were rural residents compared with urban residents, those treated at psychiatric hospitals compared with general hospitals, and those who left against medical advice compared with those discharged to home.

The results of the analysis of the association of aftercare and readmission are presented in Table 4. Overall, receipt of aftercare was associated with a reduced likelihood of readmission, although aftercare within seven days was not significantly associated with this outcome. Across models, psychiatric hospitalizations and use of outpatient services prior to the index admission were strongly predictive of readmission risk. The aftercare-specific readmission models found that receipt of aftercare had the strongest effect on

reducing readmission risk. Income quintile was not significant in predicting readmission and area of residence was significant at seven days only.

DISCUSSION

Our sample of children and youths hospitalized for a mental disorder included a wider age range than in previous studies to capture data for patients from younger age groups and for those in the transition period from youth to young adulthood, when individuals are highly vulnerable to more severe mental disorders (22). Therefore, the distribution of diagnoses and the proportion of males and females differed from those in prior studies. Compared with another Canadian study, our study found a higher proportion of persons residing in low-income neighborhoods and rural areas (8), which can be explained by demographic differences between Alberta and Ontario. Of interest, our sample also had much longer average hospital stays than those found in prior studies, which may be attributable to differences in patient case mix, care practices, or the availability of care in Alberta. Despite these differences, both aftercare and readmission rates were consistent with the ranges identified in prior studies (7,8,15,23). In our study, the 30-day aftercare rate was 54.5%, and 14.0% were readmitted within 90 days, indicating continued need for improvement in both outcomes.

The current community-centered mental health treatment model relies on timely aftercare to prevent readmission. Although the role of aftercare in preventing readmission appears equivocal in the literature (5,11,13–15,17), our readmission models support the prevention of readmission through aftercare. In this context, our aftercare model provides some direction for improving aftercare rates. As in other studies, female sex, urban residence, and high neighborhood income significantly increased the likelihood of aftercare (5,8,9). These patient characteristics generally reflect general medical and mental health service utilization patterns, but neighborhood income and area of residence could indicate inequalities resulting from barriers to access (24–26). In rural areas, barriers may include distance from treatment providers and limited treatment options, whereas parental stressors, such as single parenthood, may present challenges for children in lower-income neighborhoods (25,27,28). Structural barriers related to low availability of specialized pediatric services may also explain the reduced likelihood of aftercare for children under age 18 (29). Addressing these inequalities in access to mental health care requires changes to the supply

TABLE 4. Multivariate models of readmission risk among children and youths hospitalized for a mental health reason, by receipt of aftercare within 90, seven, and 30 days of discharge

Variable	Aftercare within 90 days				Aftercare within 7 days				Aftercare within 30 days			
	HR ^a	95% CI	χ^{2b}	p	HR ^a	95% CI	χ^{2b}	p	HR ^a	95% CI	χ^{2b}	p
Age (reference: 18–24)												
5–9	.76	.58–10.99	4.14	.042	.82	.63–1.07	2.20	.138	.76	.58–1.00	3.99	.046
10–14	.80	.71–.92	10.75	.001	.86	.76–.98	4.88	.027	.82	.72–.93	9.01	.003
Female (reference: male)	1.13	1.04–1.24	7.75	.005	1.09	1.00–1.19	3.86	.050	1.11	1.02–1.21	5.20	.023
Income (reference: low)												
Low-medium	1.01	.89–1.14	.01	.932	.96	.85–1.08	.48	.489	.97	.86–1.10	.20	.656
Medium	.92	.81–1.05	1.65	.199	.88	.78–1.00	3.71	.054	.89	.79–1.02	3.00	.083
Medium-high	.85	.85–1.11	.19	.662	.92	.81–1.05	1.61	.204	.94	.82–1.06	1.02	.312
High	1.00	.88–1.14	0	.995	.92	.81–1.05	1.42	.233	.95	.83–1.09	.54	.464
Rural residence (reference: urban)	.90	.81–1.00	3.90	.048	1.00	.90–1.11	.01	.938	.95	.86–1.06	.92	.339
Diagnosis (reference: other disorder)												
Organic disorder	1.28	.75–2.17	.81	.368	1.42	.84–2.42	1.69	.194	1.36	.80–2.31	1.26	.262
Substance use disorder	1.21	1.04–1.40	6.31	.012	1.32	1.14–1.53	13.38	.003	1.28	1.10–1.48	10.25	.001
Schizophrenic or psychotic disorder	1.89	1.64–2.18	77.24	<.001	1.83	1.58–2.10	69.46	<.001	1.85	1.61–2.14	73.06	<.001
Mood disorder	1.40	1.24–1.57	30.10	<.001	1.34	1.19–1.50	22.97	<.001	1.36	1.21–1.53	25.71	<.001
Anxiety disorder	1.17	1.98–1.40	2.92	.088	1.13	.95–1.35	1.84	.175	1.15	.96–1.37	2.35	.125
Personality disorder	1.81	1.41–2.33	22.00	<.001	1.66	1.29–2.12	15.78	<.001	1.71	1.33–2.20	17.90	<.001
Mental health comorbidity (reference: no)	1.11	1.01–1.21	5.01	.025	1.08	.99–1.18	3.02	.082	1.09	1.00–1.19	3.67	.055
Psychiatric hospitalization in prior 90 days (reference: no)	1.84	1.57–2.15	56.48	<.001	1.96	1.67–2.30	69.45	<.001	1.93	1.64–2.26	65.49	<.001
Outpatient service use in prior 90 days (reference: no)	1.92	1.74–2.12	170.30	<.001	1.41	1.28–1.55	51.81	<.001	1.58	1.43–1.74	84.82	<.001
Hospital length of stay (days) (reference: 0–7) ^c												
8–30	1.31	1.18–1.44	27.18	<.001	1.21	1.10–1.34	14.64	.001	1.24	1.12–1.37	17.47	<.001
≥30	1.17	1.01–1.35	4.66	.031	1.04	.90–1.20	.30	.584	1.09	.94–1.25	1.29	.256
Psychiatric hospital (reference: general hospital) ^c	.77	.66–.89	12.51	.004	.85	.73–.99	4.71	.030	.80	.69–.93	8.30	.004
Discharge disposition (reference: home)												
Home with support (including residential care)	1.24	.97–1.60	2.89	.089	1.12	.84–1.48	.59	.442	1.26	.98–1.63	3.13	.077
Did not return from a pass	1.32	1.13–1.55	12.05	.001	1.47	1.26–1.72	23.20	<.001	1.42	1.21–1.66	18.99	<.001
Aftercare during specified period (reference: no)	.68	.58–.80	21.86	<.001	.93	.77–1.13	.54	.464	.69	.59–.82	18.80	<.001
Aftercare with a psychiatrist (reference: no)	.72	.62–.83	19.98	<.001	1.15	.95–1.40	1.95	.163	1.05	.90–1.23	.36	.547
Aftercare with a general practitioner (reference: no)	.72	.63–.82	23.00	<.001	1.16	.94–1.43	1.87	.171	1.00	.86–1.16	0	.993
Aftercare with physician seen prior to admission (reference: no)	.75	.66–.85	20.87	<.001	.94	.79–1.11	.60	.439	.88	.77–1.00	4.07	.044

^a Hazard ratio^b df=1^c During index hospitalization

and distribution of service providers and to the delivery of care.

As in other studies, clinical characteristics were also significantly predictive of aftercare receipt (8,9,16). Most psychiatric diagnoses were associated with an increased likelihood of aftercare, compared with the category of “other” psychiatric diagnoses; however, individuals with substance use disorders were significantly less likely to

receive aftercare. The reduced likelihood of aftercare for those with substance use disorders could reflect poor treatment engagement (8,9). Increasing the engagement of children and youths with these disorders may increase aftercare rates. For example, peer or family support in the treatment of substance use disorders appears to improve outcomes (30) and may also improve adherence to treatment.

Our study also looked at service use prior to the index hospitalization and found that although prior psychiatric hospitalization was not a significant predictor of aftercare, prior use of outpatient mental health services almost doubled the likelihood of aftercare. Although this finding is not surprising and is indicative of good continuity of care, it raises concerns about access for children and youths not already receiving mental health services. One study found that more marginalized groups were less likely to have received outpatient mental health services prior to hospitalization (16). In this study, the finding could suggest that lower income and rural residence represent substantial barriers to service entry.

Characteristics of the index hospitalization, including length of stay, hospital type, and discharge disposition, were predictive of aftercare. Not surprisingly, patients who left against medical advice were less likely to receive aftercare, probably because of limited treatment gains, the absence of discharge planning, and low treatment engagement. Of interest, index hospitalization at a psychiatric facility was significantly associated with a reduced likelihood of aftercare and represented the strongest negative predictor of aftercare in our model. Furthermore, this covariate was also negatively associated with readmission across all readmission models. Explanations for these results are uncertain, and the results may be attributable to limitations discussed below. Regardless, future work should look at how facility type affects aftercare and readmission.

Most factors associated with aftercare were also associated with readmission. The significance and direction of associations between age, gender, and rural residence were the same in the readmission models as in the aftercare model, although neighborhood was not predictive of readmission. Appropriately, factors indicative of illness severity were predictive of a greater likelihood of readmission, with the strongest positive associations for psychotic disorders, personality disorders, prior psychiatric hospitalization, and prior mental health service use.

As discussed above, aftercare was a significant predictor of reduced likelihood of readmission in our study. However, over our 90-day follow-up period, we did not find strong evidence to support the current use of seven and 30 days as quality indicators for timely aftercare. Receipt of aftercare was not significant in the seven-day model, although it has been suggested that the nonsignificance of aftercare within seven days as a predictor of readmission may be confounded by illness severity (15). Even in the 30- and 90-day models, the differences in hazard ratios for receipt of any aftercare were unlikely to be clinically meaningful.

More notable were the similar hazard ratios for both psychiatrist and GP aftercare in the 90-day model and for aftercare provided by the same physician in the 30- and 90-day models. These results suggest that receipt of aftercare of various types can reduce the likelihood of readmission in the three months posthospitalization. The scope of discharge planning might therefore be widened to ensure

the availability of aftercare, rather than emphasizing a need for specific services or timelines. There are indications, such as discharge after hospitalization for a suicide attempt, where timeliness is a priority.

The study had some limitations. Our sample population included residents from Alberta exclusively, and thus the generalizability of these findings may be limited for other provinces and territories. For our outcome measures, it was not possible to identify reasons for the absence of aftercare or whether readmissions were preventable. Our definition of aftercare was also narrow because of limitations of administrative data and was restricted to fee-for-service physician services and services provided in outpatient clinics covered by AHCIP. As such, privately paid psychotherapy and counseling or community supports that may also affect aftercare and readmission rates were not included in this study. Our study sample also included individuals ages 18 to 24, a group that is developmentally distinct from those ages five to 17. Finally, severity of illness and variations in treatment, such as service type, presence of psychopharmacotherapy, treatment intensity, and quality of services, were not controlled for in this study.

CONCLUSIONS

Access to community mental health services for the child and youth population needs to be improved in Alberta. After discharge from a psychiatric hospitalization, roughly one-third of individuals did not receive aftercare. For those residing in rural and lower-income areas, the need for aftercare was particularly pronounced. Aftercare played a significant role in reducing the risk of readmission, which further demonstrates the need to improve these services. Policy changes to address access issues should be considered, and further studies to examine findings across Canada are needed.

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