Emergency Department Utilization by Patients with Fetal Alcohol Spectrum Disorder: A Population-Based Retrospective Analysis

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ABSTRACT

Background Fetal Alcohol Spectrum Disorder (FASD) remains markedly under-diagnosed, yet its multisystem pathology, pervasive language deficits, and high psychiatric co-morbidity drive disproportionate reliance on emergency departments (EDs). Canadian data describing this utilization are absent. This study provides the first province-level baseline by analyzing all electronically coded ED encounters for confirmed FASD cases in Saskatoon from 2012 to 2017, the final five-year span preceding Saskatchewan's health system amalgamation, when coding and service structures were still uniform.

Methods: A retrospective chart review identified patients with a documented FASD diagnosis across Saskatoon's three hospitals. All ED presentations from January 1, 2012, to December 31, 2017, were extracted from the unified electronic health record (ICD-10-CA) database and verified against paper charts. Demographic, clinical, and utilization variables were summarized descriptively; repeat-visit patterns were explored with inferential statistics.

Results: Forty-five patients generated 740 discrete ED encounters. The cohort consisted of 20 (44.4%) females, with ages ranging from 3 to 56 years (mean = 23). Mental-health and socially related complaints dominated both presenting problems and discharge diagnoses. Nearly one-third of visits recurred within 48 hours of an initial visit, and two "super-utilizers" accounted for 297 encounters (40% of the total). ED length of stay times were prolonged despite low clinical acuity in most cases.

Conclusions: A small, identifiable subgroup of patients with FASD accounted for a striking share of low-acuity, high-frequency ED use during the pre-reform period. These findings underscore the importance of recognizing FASD earlier and implementing integrated community pathways that can divert non-urgent cases from acute care. The 2012–2017 baseline offers a critical reference point for evaluating the impact of subsequent provincial system restructuring and targeted intervention strategies.

Keywords: Fetal alcohol spectrum disorder, emergency department, resource utilization, healthcare utilization

BACKGROUND:

Fetal Alcohol Spectrum Disorder (FASD) presents with wide clinical heterogeneity, making it one of the most under-recognized and under-diagnosed neurodevelopmental conditions in Canada. Even when a conservative prevalence of 1–4% is applied, the disorder costs the Canadian economy an estimated $1.8 billion each year, of which roughly 10% is borne by the health-care sector.1 Because prenatal alcohol exposure can affect virtually every organ system, FASD manifests as a "whole-body" disorder that drives high rates of acute-care use.[2]

Communication difficulties are especially common: receptive and expressive language disorders occur far more frequently than in the general population,[3,4] and together with executive-function deficits, memory problems, and poor impulse control can impede patients' ability both to articulate their symptoms and to follow discharge instructions. Up to 90% of patients with FASD also meet criteria for at least one comorbid mental-health condition,[5] layering additional complexity onto emergency presentations.[6] When needs are not fully addressed at the first visit, patients may return in short succession; these "bounce-back" encounters have been associated with diagnostic error, suboptimal outpatient follow-up, or misunderstandings of discharge plans.[7-9] Limited provider familiarity with FASD-specific health complications further exacerbates the cycle of repeat utilization.[8,9]

Despite the clinical and financial stakes, there are no Canadian data describing emergency department (ED) use by patients with confirmed FASD. The few international studies available indicate a substantial burden. For example, an Alaskan analysis of Medicaid claims showed that adults with FASD filed 305% more annual claims than matched controls, with physician and outpatient visits dominating service use.[10,11] Whether similar patterns exist in Canadian jurisdictions remains unknown.

To address this gap, we conducted a retrospective review of all electronically recorded ED visits by patients with a documented FASD diagnosis in Saskatoon between January 1, 2012, and December 31, 2017. This six-year span captures the final period in which all three urban hospitals operated under a unified electronic-health-record platform and the pre-amalgamation governance structure that existed before Saskatchewan's regional health authorities were consolidated into the Saskatchewan Health Authority in late 2017. Analyzing a single, stable administrative era ensures internally consistent data definitions and provides a clean baseline against which the impact of subsequent system reforms can be measured. Our objectives were to characterize demographic features, chief complaints, discharge diagnoses, and outcomes of FASD-related ED encounters, and to identify opportunities for more targeted, community-based intervention.

METHODS:

We performed a retrospective review of health records for patients with a known diagnosis of FASD over a six-year period (2012-2017) who visited an urban academic ED in Saskatoon, SK, Canada. We confined our analysis to 1 January 2012 – 31 December 2017 because this six-year window represents the last stretch in which ED data in Saskatchewan were generated under a single, internally consistent administrative context. By 2012, all Saskatoon hospitals had completed their migration to the provincial electronic health record and were coding ED abstracts exclusively with ICD-10-CA, eliminating the hybrid paper/electronic gaps and variable diagnostic vocabularies that characterized earlier years. In December 2017, the province amalgamated its 12 regional health authorities into the Saskatchewan Health Authority, an organizational overhaul that altered data warehouses, triage workflows, and discharge-abstract submission pipelines; stopping the study at the merger avoids heterogeneity introduced by this structural change.

The interval also precedes the launch of large-scale mental health and addictions reforms following the 2014 *Working Together for Change* action plan recommendations, providing an uncontaminated baseline against which later initiatives can be evaluated. Limiting our dataset to records already archived in the Department of Psychiatry research database was essential for feasibility, as extending the period would have required new data-sharing agreements and manual chart linkage beyond current resources. The 740 encounters captured within 2012-2017 yielded adequate power for multivariable modelling. It is noteworthy that, for the 2017 fiscal year, Saskatchewan EDs recorded 317,499 visits, Canada's fourth-highest number of visits.[11] Of those, 30.5% were frequent users, with four or more ED visits in the same fiscal year[11]. Ethics approval was obtained from the University of Saskatchewan Research Ethics Board, and operational approval was obtained from Saskatoon Health Region, now Saskatchewan Health Authority (SHA).

Patients with documented International Classification of Diseases-10th edition (ICD-10) diagnostic code for FASD (Q86.0) were identified from the psychiatric database maintained by the Department of Psychiatry, University of Saskatchewan. We then searched the patients' pre-existing medical records, both electronic and paper, for documented ED visits within the six-year study period from the former Saskatoon Health Region. We included all patients with a documented FASD diagnosis and at least one ED visit for any reason.

Data Collection and Outcomes

A single trained reviewer (BW) was responsible for data extraction using a standardized, pilot-tested form. A second senior investigator independently re-abstracted a random 25 % sample of charts; discrepancies were discussed in weekly consensus meetings, yielding > 95 % agreement. All remaining ambiguous entries were adjudicated by consensus. The main outcome measures were frequency of ED visits and 48-hour revisits; patient's chief complaint; investigations and treatments; discharge diagnosis; and final disposition (home, consulted, admitted, left against medical advice (AMA), or left without being seen (LWBS). The Canadian Triage Acuity Scale (CTAS - a five-point severity measure used in Canadian EDs to prioritize care for urgent patients) score, disposition (admission, AMA/LWBS), ancillary-service use, length of stay (LOS; i.e. ED length of stay time - from triage to final disposition), and availability of a family physician or other primary healthcare provider on record to follow up, and patient demographics were prespecified secondary outcomes.

Analysis:

Data was analyzed using descriptive statistics reporting mean (Standard Deviation). We reported frequency and percentages for categorical variables. Studied groups were compared (e.g., youth compared to an adult or patients with repeat visits versus those without) using t-tests or chi-square analysis. For non-normally distributed data, the Wilcoxon rank test methods were employed. Univariate and multivariate Generalized Equation Estimate (GEE) modelling identified predictor variables associated with the number of visits as the dependent variable.

RESULTS

We identified 45 patients diagnosed with FASD who visited the ED during our specified study period. These participants contributed to a total of 740 unique ED visits over six years. The 740 emergency-department encounters recorded from 2012 to 2017 constitute the complete set of electronically documented visits by patients with a confirmed FASD diagnosis in Saskatoon before the formation of the Saskatchewan Health Authority, ensuring comprehensive case capture within a stable service-delivery framework. While males comprised just over half of the sample (25/45, 55.6%), females accounted for 70% of all visits (527/740). The average age at presentation was 23 years (12.95), with no significant difference between males and females.

CTAS 4–5 levels accounted for 51% of visits. Following triage, 77.4% of patients were discharged home; 40 visits (5.7%) resulted in hospital admission, while 119 (16.9%) visits resulted in patients leaving AMA or LWBS. Work-up was performed at 34% of the visits; 66% of females received treatment and had a longer LOS (4.96h), though not significantly different when compared to males (3.82h). Repeat ED visits within 48 hours were common. Of the 657 visits examined, 25% were patients who revisited the ED within 48 hours of a previous presentation for the same or similar issue. [Table 1].

Table 1: Demographics and clinical profile of the patient sample

Variables	ED visits n (%)	**Mean (SD), IQ range**
Age at initial visit		23.3 (13.5), 15–30
Male (n=20)		22.9 (12.14), 3–59
Female (n=25)		23.8 (12.95), 9–51
Gender		
Female	527 (71.22%)	
Hospital (N=740)		
RUH	450 (60.81%)	
SCH	41 (5.54%)	
SPH	249 (33.65%)	
Mode of arrival (N=682)		
Ambulance	141 (20.67%)	
Family or friends	70 (10.26%)	
Police or PACT team	92 (13.49%)	
Self or private	379 (55.57%)	
CTAS (N=737)		
1	1 (<1%)	
2	54 (7%)	
3	226 (31%)	
4	258 (35%)	
5	196 (27%)	
Under the care of a family physicians (N=638)		
Yes	445 (70%)	
No	193 (30%)	

Variables	ED visits n (%)	Mean (SD), IQ range
Disposition (N=735)		
Discharged	544 (77.38%)	
AMA/LWBS	119 (16.93%)	
Admitted	40 (5.69%)	
Length of stay (hours)		
Females (N=419)	4.96 (2.33), 0.25–26.25	
Males (N=187)	3.82 (3.81), 0.25–18.5	
Return to ED within 48 hours (N=657)		
No	490 (75%)	
Yes	167 (25%)	
Use of ancillary services (N=627)		
No	572 (91.23%)	
Yes	55 (8.77%)	
Work up (N=662)		
No	414 (65.71%)	
Yes	216 (34.29%)	
Treatment (N=629)		
No	334 (53.10%)	
Yes	295 (46.90%)	
Referrals (N=708)		
No referrals	677 (95.62%)	
Others	31 (4.38%)	

- **LWBS/AMS: Left without being seen/Against Medical Advice,**
- **RUH: Royal University Hospital, SCH: Saskatoon City Hospital, SPH: St. Paul Hospital,**
- **CTAS- Canadian Triage Acuity Scale (1= Resuscitation, 2= Emergent, 3= Urgent, 4 = Less urgent, 5 = Non-urgent)**

The percentages for the various chief complaints and discharge diagnoses were comparable. Mental health was most cited for chief complaints and discharged diagnosis, accounting for 27% and 35%, respectively. Substance abuse accounted for 12% of both complaints and discharge diagnoses. Overall, in 60% of visits, the chief complaints and the diagnoses were the same [Table 2].

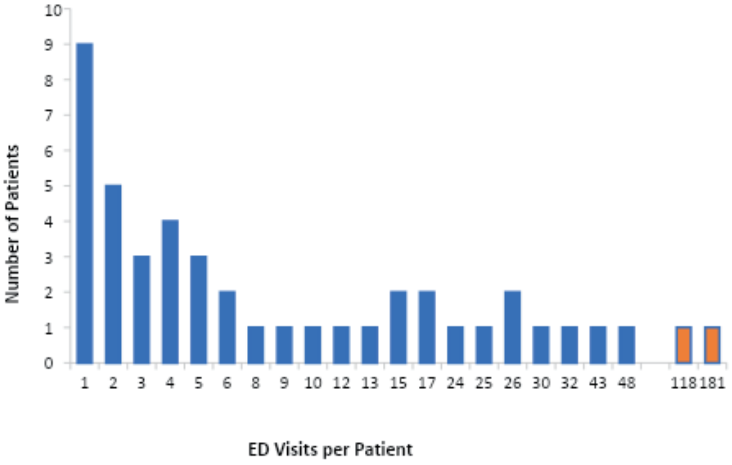
Table 2: Chief complaints and discharge diagnoses of patients in the sample

Medical Condition	Chief Complaint N = 730 n(%)	Discharge Diagnosis N = 449 n (%)
Mental Health	202 (27.7%)	154 (34.0%)
Toxicology	89 (12.2%)	56 (12.5%)
Gastrointestinal	64 (8.8%)	30 (6.7%)
Social	64 (8.8%)	28 (6.2%)
Trauma	48 (6.6%)	23 (5.0%)
Musculoskeletal	33 (4.5%)	24 (5.4%)
Neurological	29 (4.0%)	10 (2.2%)
Dermatology	31 (4.3%)	18 (4.0%)
Respiratory	25 (3.4%)	15 (3.3%)
Cardiac	22 (3.0%)	8 (1.8%)
Head and Neck	16 (2.2%)	13 (3.0%)
Genitourinary	13 (1.8%)	22 (5.0%)
Obstetric/Gynecological	11 (1.5%)	10 (2.2%)
Other*	83 (11.4%)	38 (8.5%)

***Other includes Prescription request, dental problem, red eye, blood and body fluid exposure, ear-ache, nosebleed, medical device problem**

The median frequency of visits was five, and the range was from 1 to 181. Two study participants accounted for 181 and 116 of the total visits. Together they accounted for 40% of all visits. Of the 45 patients, only 9 patients had single visits within the study period. [Figure 1].

Figure 1: The frequency of the number of visits for patients in the sample.



Univariate Generalized Estimating Equations (GEE) were used to model the outcomes of investigations, treatment, ancillary services use, consultation, admission, discharge; discharge diagnoses related to trauma, internal medicine, mental health, or substance abuse; leaving AMA/LWBS, documentation of a family physician, and patient return within 48 hours, against the number of visits using the predictors of sex. Of these, only three outcomes were significant: discharge diagnosis of "substance abuse" (p=0.02), dispositions "consulted" (p=0.04), and disposition "discharged" (p=0.05). [Table 3].

Table 3. Univariable repeated measures (generalized estimating equations)

Outcome: showing odds of outcome, 'yes' for female compared to male	**Odds ratio (95% confidence interval)**	**P-value**
Ancillary Services (Y)	1.96 (0.83–4.66)	0.12
Discharge Diagnosis: Trauma (Y)	0.89 (0.30–2.63)	0.83
Discharge Diagnosis: Medical (Y)	1.59 (0.72–3.52)	0.25
Discharge Diagnosis: Mental Health (Y)	0.58 (0.27–1.24)	0.16
Discharge Diagnosis: Substance Abuse (Y)	0.25 (0.08–0.83)	0.02*
Disposition: AMA /LWBS	1.18 (0.48–2.90)	0.71
Disposition: Admitted (Y)	0.42 (0.17–1.10)	0.07
Disposition: Consulted (Y)	0.47 (0.23–0.99)	0.04*
Disposition: Discharged (Y)	1.57 (0.99–2.50)	0.05*
Family Doctor Identified on Chart	2.77 (0.76–10.04)	0.12
Return to ED Within 48 hours (Y)	2.63 (0.74–9.35)	0.13
Treatment (Y)	0.78 (0.40–1.54)	0.47
Work Up: Laboratory, Imaging, or ECG (Y)	1.56 (0.83–2.95)	0.16

***Level of significance p≤ 0.05**

In the adjusted model, females had significantly lower odds (73% lower) for discharge diagnosis for substance use and significantly higher odds (51% higher) for disposition for discharge. There was significant evidence that if age increased, the odds of using substances decreased (p=0.05). [Table 4]

Table 4. Multivariable/adjusted repeated measures (GEE) model

Outcome	**Covariates**	**Odds ratio (95% confidence interval)**	**P-value**
Substance use (Y)	Gender (F)	0.27 (0.08–0.86)	0.02*
	Age	0.96 (0.91–1.00)	0.05*
Disposition consulted (Y)	Gender (F)	0.48 (0.23–1.01)	0.05*
	Age	0.97 (0.93–1.00)	0.08
Disposition discharge (Y)	Gender (F)	1.51 (1.01–2.29)	0.04*
	Age	1.01 (0.98–1.05)	0.39

***Level of significance p≤ 0.05**

DISCUSSION:

This study aimed to understand ED utilization by patients diagnosed with FASD and the profile of their ED visits, including the chief complaints, investigation rates, consultation rates, and disposition outcomes for this population. To the best of our knowledge, this study is the first Canadian investigation of ED use among patients with Fetal Alcohol Spectrum Disorder (FASD), describing chief complaints, investigation and consultation rates, and dispositions during the pre-Saskatchewan Health Authority (SHA) years of2012–2017. Focusing on this six-year window strengthened internal validity as CTAS scores were uniformly time-stamped in the electronic health record; documentation and workflow practices were consistent across the province in the years just before system consolidation; national studies of high ED utilization use the same period, enabling direct comparison with national baselines; and the interval was long enough to provide adequate statistical power while still preceding secular shifts such as cannabis legalization-related presentations.

Demographics

The mean age recorded in our sample was 23 years old mirroring Ontario data showing peak utilization among 15–29-year-olds with FASD, after which attendance falls sharply from 24 to 0 visits after age 45.1 In contrast, high-frequency ED use in the general population, follows a bimodal distribution pattern, peaking at 25-44 and 65 years.[12] This notable difference in the age range of patients with FASD in our sample is likely due to early diagnosis of FASD and multiple associated comorbidities. Although sex differences were not statistically significant, women accounted for 70% of all presentations—a pattern consistent with Canadian and international reports that female sex is a predictor of repeat attendance.[13-15] Our findings are broadly in line with Canadian studies of general high-user ED populations. In British Columbia, frequent users were predominantly female (53 %) with a median age of 45 years (IQR 34–57)[13], and in Ontario and Alberta, female predominance (62 %) and a median age of 47 years (IQR 36–59) were reported[14]. While our cohort similarly demonstrated female predominance (70 %), the median age was younger at 32 years (IQR 25–40), reflecting the distinct demographic profile of individuals with FASD. CTAS category distributions were also comparable, although our cohort had a slightly higher proportion of lower-acuity (CTAS 4–5) presentations, underscoring unique clinical patterns in this population.

Frequency of visits

The sample's median frequency of visits was five over the six-year study span. Using the commonly accepted threshold of ≥ 4 visits per year to denote "frequent use", 19 participants (42%) met this criterion, accounting for 601 encounters, with an average of five visits per frequent user annually. As Saskatchewan remains one of the highest per-visit ED costs for FASD patients,1 repeated attendance presents a substantial economic burden and underscores the importance of strengthening community-based care. Notably, 25 % of all ED visits by patients with FASD were bouncebacks. Sub-analysis revealed that 72% of all bounceback visits were from two patients who visited the ED 118 and 181 times, respectively. The most prominent complaints among these two patients were mental health issues such as suicidal ideations, depression, and insomnia.

Drivers of repeat attendance

Repetitive ED visits for similar chief complaints may indicate poor access to primary healthcare. Given that FASD is a complex neurodevelopmental condition resulting in permanent disabilities and a high need for medical and social services across the lifespan, accessible, compassionate, and consistent primary care is important. Personal challenges encountered by patients with FASD, such as language and communication disorders, poor planning and organizing due to executive dysfunction,[16] potentially compounded with several other social determinants of health, may contribute to less effective utilization of healthcare services[17] and may help explain frequent ED visits and prolonged stays found in this study. Patients with psychiatric and developmental disorders, such as FASD, are also 1.1 times more likely to have repeat ED visits than those without a psychiatric disorder.[18] Furthermore, individuals with FASD often manifest significant deficits in impulse control and poor inhibition [16,17] which may contribute to repeated ED presentations and LWBS or AMA when faced with ED wait times.

Additionally, based on the findings in this study, the low admission and referral rate after ED physician assessment suggests that patients with FASD likely struggle with unmet primary and mental health needs and social needs within the community. Considering this, the second phase of this study is underway to determine patient reasons for frequent bouncebacks.

Acuity and Length of Stay

Almost two-thirds of ED visits by FASD patients have low acuity complaints and were triaged as semi-urgent or non-urgent (CTAS 4 or 5 levels, respectively).[16] Lower scores may reflect staff familiarity with "known" frequent users and discontinuity of care.[16] The mean LOS from triage to final disposition was 4.6 hours, with a 1-hour mean difference favoring those with a CTAS of 1-3. At the time of our study, according to the Canadian Institute for Health Information (CIHI), the median LOS in Saskatchewan EDs was 3.4 hours, regardless of CTAS score, the second-longest wait time in Canada.[11] In one Alberta ED study, comparing 22.33ED presentations among groups of frequent and non-frequent users. Frequent users (≥ 5 and < 8 presentations) recorded a longer mean LOS of 8 hours compared to 5.5 hours for the non-frequent user group.[21] This study reported an increased LOS by increasing age, with frequent users aged 18-30 recording a mean LOS of 5 hours. Contrarily, other studies have reported shorter LOS for frequent users.[22] Noticeably, frequent users with a CTAS 4-5 had a consistent LOS of less than 2 hours over the same fiscal periods.[23] Such lengthened stays in ED for FASD patients may be due to potential misunderstandings of discharge plans and follow-up instructions, inadequate access to outpatient services, or poor understanding of the diagnosis on the part of the patient.[23]

Chief Complaint and Discharge Diagnosis

Mental-health, substance-use, and social problems predominated our findings, congruent with previous FASD research.[5, 24] High rates of childhood adversity (e.g. exposure to substance use, family violence, parental death, neglect, mental illness, criminal sentences, as well as physical and sexual abuse) compound neurodevelopmental vulnerabilities[25] and escalate lifetime risk for psychiatric morbidity and addiction. [26, 27] System-level barriers such as long waits for primary care, scarce social supports, and providers' limited familiarity with FASD further drive ED reliance[28]. Reports of dissatisfaction with outpatient services[29] emphasize the need for trusting, longitudinal therapeutic relationships, which the episodic ED environment is ill-equipped to deliver

Implications for Policy and Practice

Prolonged wait times for primary care and limited social support to navigate the health system[29] may drive frequent ED use among patients with FASD. Many report being unable to access outpatient services despite chronic health needs,[29] or experiencing dissatisfaction and negative interactions with providers unfamiliar with FASD.[29] Establishing trusting, therapeutic relationships with a consistent care team is essential to reducing long-term morbidity in this vulnerable population. However, the ED's rotating staff and episodic nature make it a challenging venue for routine, patient-centred care. Given their reliance on emergency services, an Integrated Care Model featuring FASD care navigators, multidisciplinary case management, social workers, and primary-care partners could better address patients' complex medical and social needs

As FASD remains underdiagnosed, enhanced education on FASD and neurodevelopmental disorders for all allied healthcare workers is crucial. Targeted training would help professionals recognize unique presentations and barriers, reducing systemic roadblocks to care. Although the ED is not ideal for routine primary care, it may serve as a point of intervention for presumptive or confirmed FASD diagnosis if staff receive FASD-specific training. Support staff should accompany FASD patients, helping ED clinicians understand each patients' distinct challenges and ensuring the delivery of cost-effective, tailored services. Enhanced triage training could further mitigate long waits and minimize patients leaving without being seen [20, 30, 31]. Ultimately, upstream investment in integrated social and health services is required to improve care continuity for patients with FASD.

Limitations:

Our study findings must be interpreted within the context of its limitations. The study involved a small sample size of 45 patients with FASD, which is less than the 1-4% estimated prevalence of FASD previously stated; hence, the findings may not be generalizable. The retrospective design of the study also limits the researchers' ability to control for confounders and infer causality for those discharged without being seen, bounceback, and other variables. Future research should include a qualitative component to determine why FASD patients leave EDs without being seen. Our study data also relied heavily on the data from two outlier patients (accounting for roughly half the visits). This may have introduced some bias in the study findings and interpretations. Although our use of mean (SD) for visit frequency and ED LOS is sensitive to extreme values, we reported median (IQR) alongside—measures that remain unchanged by the two super-utilizers (who represent only 2.6% of individuals). Thus, while exclusion of those outliers would likely lower our means and narrow our SDs, the core findings based on median (IQR) are robust.

Our study did not include a comparison group to identify similarities and differences between the general population and FASD patients, and it warrants further research. Lastly, restricting analysis to 2012-2017 means that post-SHA trends and COVID-19-era utilization patterns are not captured. However, the benefits of a homogeneous administrative context outweigh the loss of recency as the findings establish a much-needed baseline for future longitudinal work and avoid artifacts introduced by the 2017 system overhaul. Extension beyond 2017 would require re-validation of case-finding algorithms and cross-walking of diverging database structures—an exercise that was infeasible within the available time and funding. Future studies should replicate the methodology on the SHA-era data to quantify the impact of ongoing reforms.

CONCLUSION

This study establishes a province-specific baseline for service use and care pathways. The patterns of a small cohort of patients with predominantly low-acuity physical or psychiatric presentations generating a disproportionately high number of ED visits and experiencing extended lengths of stay signal missed opportunities for early identification, targeted assessment, and rapid linkage to community-based supports that could mitigate repeat utilization.

The results underscore the need for integrated, FASD-informed triage protocols and stronger interdisciplinary referral networks to address the complex, overlapping medical and psychosocial needs of this population. They also provide a baseline reference point against which the impact of the Saskatchewan Health Authority's restructuring and subsequent mental health reforms can be measured. Ultimately, translating these findings into patient-centred policies and practice will be essential for improving health outcomes and enhancing the overall quality of care delivered to this underserved group.

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