Suicide and suicide attempts in children and adolescents in the child welfare system

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ABSTRACT

Background: Few population studies have examined the psychiatric outcomes of children and adolescents in the child welfare system, and no studies have compared outcomes before and after entry into care. Our objective was to assess the relative rate (RR) of suicide, attempted suicide, admission to hospital and visits to physicians' offices among children and adolescents in care compared with those not in care. We also examined these outcomes within the child welfare population before and after entry into care.

Methods: We used population-level data to identify children and adolescents 5 to 17 years of age who were in care in Manitoba for the first time between Apr. 1, 1997, and Mar. 31, 2006, and a comparison cohort not in care. We compared the two cohorts to obtain RRs for the specified outcomes. We also determined RRs within the child welfare popula-tion relative to the same population two years before entry into care.

Results: We identified 8279 children and adolescents in care for the first time and a comparison cohort of 353 050 children and adolescents not in care. Outcome rates were higher among those in care than in the comparison cohort for suicide (adjusted RR 3.54, 95% confidence interval [CI] 2.11–5.95), attempted suicide (adjusted RR 2.11, 95% CI 1.84–2.43) and all other outcomes. However, adjusted RRs for attempted suicide (RR 0.27, 95% CI 0.21–0.34), admissions to hospital and physician visits decreased after entry into care.

Interpretation: Children and adolescents in care were at greater risk of suicide and attempting suicide than those who were not in care. Rates of suicide attempts and hospital admissions within this population were highest before entry into care and decreased thereafter.

In Canada, about 76 000 children and adolescents are under the care of provincial child and family services.[1] In Manitoba, more than 7000 children and adolescents were in the care of child and family services in 2008. Many of them had experienced abuse and neglect, or death or conflict in their families, along with disability or emotional problems.[2–13] Concerns have been raised that the Canadian child welfare system does not provide adequate resources and supports to mitigate the effects of abuse and neglect.[14] Although the health outcomes of this population are a frequent topic of concern in the media, population-based research describing these outcomes is limited.

To our knowledge, only two studies of a population cohort of children and adolescents in care have been published to date, both describing the psychiatric morbidity and mortality of children and adolescents in care in Sweden.[4,6] These studies found greater rates of suicide, suicide attempts and psychiatric hospital admissions among children in care than in the general population. However, these studies had substantial limitations. Although they used the general population as a comparison group, they did not analyze for the presence of psychiatric morbidity in the period before entry into care. This omission limits the ability to draw conclusions about whether the poor outcomes of these children were associated with disruptions in their lives and families related to involvement in the child welfare system or whether they were a consequence of their life, health and psychological characteristics before they entered the care system.

The first objective of the current study was to assess the relative rates (RRs) of suicide and attempted suicide and the number of hospital admissions and visits to physicians' offices among children and adolescents with a history of being in the care of child and family services in Manitoba, relative to the general population of children and adolescents not in care. The second

objective was to assess the RR of attempting suicide and the number of hospital admissions and physician visits in the child welfare population before and after entry into care.

Methods

Data sources

For the analyses in this study, we used population-level de-identified administrative data from the Population Health Research Data Repository, housed at the Manitoba Centre for Health Policy within the University of Manitoba. Each record includes birth date, sex and geographic location. We obtained data from four electronic databases: registration files, physician reimbursement claims, hospital discharge abstracts, and the child and family services information system. The registry links to Manitoba's Vital Certificates mortality data, allowing identification of cause of death. The success of database linkage at the Manitoba Centre for Health Policy is very high, approaching 100%.[15] The reliability of the vital statistics data relative to that of other sources of information regarding suicide in the province is also very high.[16] The University of Manitoba's Health Research Ethics Board and Manitoba Health's Health Information Privacy Committee approved the study.

Study population

We used registry files to identify children and adolescents 5 to 17 years of age who were in the care of Manitoba's child and family services for the first time between Apr. 1, 1997, and Mar. 31, 2006, and a comparison cohort consisting of all children and adolescents who were 5 to 17 years of age during the same period and who were not in care. Children and adolescents were defined as being in care if they had been removed from their homes, had spent more than 30 days in care and were resident in the province, with coverage from Manitoba Health, for the duration of the assessment period.

Outcome variables

We analyzed the total number of suicides, suicide attempts, hospital admissions and physician visits between Apr. 1, 1997, and Mar. 31, 2008. We chose the closing date of Mar. 31, 2008, to provide two years of follow-up data for those who entered care on Mar. 31, 2006. All participants in both groups were followed to the end of the follow-up period. Suicide was defined as death due to suicide as recorded in the vital statistics database (International Statistical Classification of Diseases and Related Health Problems, 10th Revision [ICD-10] codes X40–X42, X46, X47, X60–X84). The number of suicide attempts

was defined in terms of admissions to hospital associated with any diagnosis of suicide attempt (ICD-9 codes E950–E959 or ICD-10-CA codes X60–X84). The number of hospital admissions was defined as all inpatient admissions. The number of physician visits was defined as all visits to a physician's office. We also determined the presence of diagnoses of unique psychiatric disorders, defined as office visits or admissions to hospital associated with ICD-9 diagnosis codes 293–302 or 306–319.[6]

Statistical analysis

We determined RRs for the outcome variables from a generalized linear model with either a negative binomial or Poisson distribution. The distribution selected was dependent on the model with the best fit to the data. We included the following as potential covariates in each of the models: in-care status (yes or no), age group (5–11 or 12–17 years), sex, socioeconomic status, presence of parental psychopathology and presence of a psychiatric disorder. In further analyses, we then tested whether length of time or number of placements in care was statistically different between levels of length of time in care or number of placements. Consistent with Vinnerljung and colleagues,[6] we treated parental psychopathology as a dichotomous variable, defined as one or both of the child's parents having an outpatient office visit or hospital admission (between 1984 and 2008) associated with a psychiatric diagnosis (based on ICD-9 codes). Also consistent with Vinnerljung and colleagues,[6] we defined length of time in care in three subgroups: short term (1–24 months), intermediate (25–60 months) and long term (> 60 months). We defined socioeconomic status according to income quintiles that were ranked from 1 (low) to 5 (high) on the basis of ranges of mean household income and grouped into five categories, with each quintile assigned to about 20% of the population.[17] For each outcome of interest, we ran a model to test for statistical differences between the various levels of the covariate.

To model the rate of events in comparisons of children and adolescents in care with those note in care, we produced a summarized data set for the total number of events (e.g., total number of suicide attempts) for unique strata, and the total number of person-years at risk for the strata (for an example of results, see Appendix 1, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.110749/-/DC1). We included the log of the total number of person-years at risk as an offset in the model, to produce an analysis of rates of events, rather than simple counts, and to generate estimates of adjusted RRs of events. For each

outcome of interest, we ran two sets of models. With the first model, we tested for a statistical difference between being in care and not being in care. With the second model, which was applied only to children who were in care, we tested for statistical differences between groups of individuals according to length of time in care or number of placements.

For modelling of the rate of events for children in care before and after their entry into care, the "before" period examined events that occurred in the two years before the date of first placement into care and the "after" period examined events that occurred on and after the date when the child was placed into care to the end of the follow-up period. Similar to the method described above, we used parameter estimates generated from generalized linear models to calculate and compare the adjusted RRs of events between the period before entry into care and all years after entering care.

Results

We identified 8279 children and adolescents who had been in care in Manitoba for the first time during our defined study period. In addition, we identified 353 050 children not in care, who formed the comparison cohort. All RRs reported here were adjusted for the other covariates included in the model.

Demographically, the two cohorts were similar in terms of age and sex ratio, but socioeconomic status differed markedly (Table 1).

Children and adolescents with a history of being in care had higher rates of suicide (RR 3.54, 95% confidence interval [CI] 2.11–5.95), attempted suicide (RR 2.11, 95% CI 1.84–2.43), admission to hospital (RR 1.96, 95% CI 1.74–2.20) and outpatient visits to a physician (RR 1.14, 95% CI 1.10–1.19), as compared with those having no history of being in care (Table 2). Increasing length of time in care and increasing number of placements were not significantly associated with increases in the rates of suicide, attempted suicide or admissions to hospital, and parental psychopathology did not affect rates of suicide or attempted suicide.

In the cohort of children and adolescents who were in the care of child and family services, the rate of attempted suicide was significantly lower in the years after entry into care than in the two years before entry into care (RR 0.27, 95% CI 0.21–0.34) (Table 3). This was also the case for admissions to hospital (RR 0.68, 95% CI 0.58–0.80) and physician visits (RR 0.89, 95% CI 0.84–0.94). There was no change in the rate of psychiatric diagnosis after entry into care (RR 1.07, 95% CI 0.93–1.24). Upon adding an interaction factor for "in care status" and "psychiatric disorder" into the model, we found that after entry into care, children and adolescents who had a diagnosed psychiatric disorder had a significantly greater decrease in rate of attempted suicide (RR 0.22, 95% CI 0.17–0.29) relative to those without a psychiatric disorder (RR 0.57, 95% CI 0.33–0.99) ($p = 0.002$). We found a similar result for hospital admissions, whereby those with a psychiatric disorder had a significant decrease after entry into care (RR 0.53, 95% CI 0.44–0.65) and those without a psychiatric disorder did not (RR 0.88, 95% CI 0.74–1.06). This interaction was also significant ($p < 0.001$).

Interpretation

Among children and adolescents who were placed into the care of child and family services in Manitoba, rates of suicide, attempting suicide, hospital admission and physicians visits were greater than among the general population of children and adolescents who were never in care. The length of time in care and the number of placements largely did not affect these outcomes. Although the rates of these outcomes were elevated above those of the general population, we also found that for the "in care population," RRs for suicide attempts, admissions to hospital and visits to physicians' offices decreased after entry into care relative to the two-year period before entry into care. Furthermore, the largest decrease

Table 1: Demographic characteristics of children and adolescents in Manitoba

Characteristic	Study cohort; no. (%) of cohort*	
	In care $n = 8\ 279$	Not in care $n = 353\ 050$
Sex		
Male	3 936 (47.5)	181 005 (51.3)
Female	4 343 (52.5)	172 045 (48.7)
Age, yr, mean (SD)	11.2 (3.7)	11.0 (3.7)
Household income†		
Not found	53 (0.6)	1 253 (0.4)
Q1	4 221 (51.0)	72 844 (20.6)
Q2	1 487 (18.0)	66 814 (18.9)
Q3	1 281 (15.5)	67 042 (19.0)
Q4	730 (8.8)	71 633 (20.3)
Q5	507 (6.1)	73 464 (20.8)

Note: SD = standard deviation.
*Except where indicated otherwise.
†Income quintiles (based on income of the birth family, for those in care): Q1 = lowest, Q5 = highest.

in the rates of these outcomes occurred in the population with a psychiatric disorder.

Our findings comparing outcomes for children and adolescents in care with the general population are generally consistent with Swedish data.[4,6] The RR for suicide in our adjusted model was somewhat higher than in the previous studies (3.54 v. 2.2), but the RR for attempted suicide was almost identical (2.11 v. 2.2). The RR for admissions to hospital was somewhat lower in our study (1.96 v. 3.5), a difference that may result from differences in health care systems between the two countries or a genuine difference in the populations. Interestingly, admissions to hospital and/or physician visits are often a routine part of the process of entry into care. Thus, the decrease in hospital admissions is particularly meaningful, given an expected initial increase in rates due to this process.

The findings of the present study combined with the Swedish data[4,6] describe a population of children and adolescents who are clearly at risk. The findings are also consistent with numerous other studies.[2,5,7–10] The findings of the present study, showing a decrease in rates of suicide attempts, hospital admissions and physician office visits in the period after entry into care as compared with the two years before, are new. It is possible that outcomes might be better with interventions other than out-of-home placement.[7] However, this study did document that the rates of the evaluated adverse outcomes did not increase.

The finding of an interaction between having a psychiatric disorder and a decrease in rates of suicide attempts and hospital admissions was also novel. It is possible that children and adolescents with a psychiatric disorder are particularly vulnerable to the effects of an environment that results in out-of-home placement, or that the caregivers are particularly vulnerable to the stressful effects of caring for a psychiatrically ill child or adolescent, which results in out-of-home placement.

Limitations

The results of this study must be interpreted with caution. First, this population-level observational

Table 2: Rates of evaluated outcomes in children and adolescents with and without a history of care

Outcome	Study cohort; no. of cohort (crude rate per 1000 person-years)		Adjusted RR* (95% CI)†
	In care n = 8 279	Not in care n = 353 050	
Suicide	22 (0.44)	226 (0.08)	3.54 (2.11–5.95)
Attempted suicide	225 (4.53)	2 245 (0.75)	2.11 (1.84–2.43)
Admission to hospital	6 692 (134.91)	128 954 (34.42)	1.96 (1.74–2.20)
Outpatient visits to physician	190 112 (3832.74)	8 413 214 (2832.28)	1.14 (1.10–1.19)

Note: CI = confidence interval, RR = relative rate.
*Adjusted for care status, age, sex, socioeconomic status, presence of parental psychopathology and presence of a psychiatric disorder; RR displayed for those involved with child and family services relative to those with no history of care.
†p < 0.001.

Table 3: Rates of evaluated outcomes in children and adolescents with a history of care before and after entry into care

Outcome	Time frame; no. of cohort (crude rate per 1000 person-years)		Adjusted RR* (95% CI)
	2 yr before entry into care n = 8 109	After entry into care n = 8 279	
Attempted suicide	106 (6.81)	225 (4.53)	0.27 (0.21–0.34)†
Admission to hospital	1 720 (110.46)	6 692 (134.91)	0.68 (0.58–0.80)†
Outpatient visits to physician	63 243 (4 061.39)	190 112 (3832.74)	0.89 (0.84–0.94)†
Diagnosis of psychiatric disorder	4 025 (258.48)	16 847 (339.64)	1.07 (0.93-1.24)

Note: CI = confidence interval, RR = relative rate.
*Adjusted for care status, age, sex, socioeconomic status, presence of parental psychopathology and presence of a psychiatric disorder; RR displayed for all years after entry into care compared with the 2 years before entry into care.
†p < 0.001.

study does not allow causal conclusions. In addition, the study used the provincial child and family services registry, which contains records for the majority of children and adolescents in care. Although this database has essentially complete data capture for urban children and adolescents who enter into care, it is not as complete for rural agencies, because not all children who enter care with these agencies are recorded in the database. Thus, our results are more generalizable to urban populations than to rural ones. Furthermore, this study did not allow us to determine if out-of-home placement is an optimal intervention, nor did it allow comparison of public versus private models of child welfare services.[7]

As in all epidemiologic studies using administrative databases, the diagnostic data relied upon physician coding. In addition, as in all studies evaluating suicide, there is debate about the completeness and accuracy of administrative data on this outcome. However, as described above, the data of the Manitoba Centre for Health Policy have been found to be reliable in comparisons with other data in the province.[16]

Although we adjusted the analyses by age group, future research could further delineate the role of age in these outcomes. Finally, we do not have data on the exact nature of the adversity that led to entry into care in individual cases and as such were unable to evaluate that variable.

Conclusion

Although children and adolescents in care are at greater risk of serious psychiatric morbidity and mortality than the general population, it appears that the rates of these outcomes are highest before entry into care and then decrease. Interestingly, the length of time in care and the number of placements generally did not affect the outcomes that we examined. These findings indicate the need for further research in this area, the results of which have important policy implications for governments and agencies with the responsibility to optimize services for this vulnerable population of children and adolescents.

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