**Health care costs of individuals with chronic psychotic disorders who experience imprisonment in Ontario, Canada**

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**Highlights:**

* Little is known on the total health care costs among individuals with chronic psychotic disorders who experience imprisonment.
* In this population-based study, 3,197 adults with chronic psychotic disorders who experienced imprisonment for up to two years in the provincial correctional system had total mean 1-year health care costs of $15,727.90 prior to imprisonment, compared to $11,587.60 for 6,393 matched controls who did not experience imprisonment.
* Higher health care costs among individuals with chronic psychotic disorders may signal the need for interventions/policies geared towards avoiding and/or managing future criminal justice system involvement.

**Abstract**

**Background:** Little is known about total health care costs of individuals with chronic psychotic disorders who experience imprisonment. This study sought to address this knowledge gap.

**Methods:** Linked correctional and administrative health care data on 1:2 sex- and age-matched individuals with chronic psychotic disorders with known imprisonment up to two years in the provincial correctional system and those without, from 2007 to 2010, were employed to undertake this analysis. Total mean one-year health care costs (overall and by sex) in the year prior to imprisonment (where release occurred in 2010) were estimated from the third-party payer perspective and compared between both groups.

**Results:** Individuals who experienced imprisonment (n=3,197) had total mean one-year costs of $15,727.90 in the year prior to imprisonment while those who did not (n=6,393) had one-year costs of $11,587.60. The difference in costs was mostly due to psychiatric hospitalizations, emergency department visits and physician services. Females who experienced imprisonment had higher costs than males ($20,648.30 vs. $14,763.30). The main cost drivers were imprisonment (marginal effect = $4,827.32; P<0.001), being aged 18-29 compared to those aged 30-39 and 40-49 (marginal effects = -$4,447.56 and -$4,218.40, respectively; P<0.001), and duration of chronic psychotic disorder 1-2 years compared to duration of <= 1 year ($6,812.29; P=0.004).

**Conclusions:** Individuals with chronic psychotic disorders who experience imprisonment have higher health care costs than comparable individuals who do not. Higher health care costs among these individuals may signal the need for interventions/policies geared towards avoiding and/or managing future criminal justice system involvement.

**Background**

Chronic psychotic disorders, such as schizophrenia, are severe and disabling mental disorders (1) associated with poor health, social and economic outcomes (2). For example, individuals with chronic psychotic disorders are at increased risk of criminal justice involvement, such as arrests and imprisonment, and are overrepresented in correctional settings (3). Moreover, they are more likely to experience re-incarceration after release from correctional facilities (3). Although individuals with schizophrenia have a higher risk of arrest and imprisonment compared to the general population, many other related interactions result from being victimized by others rather than from unlawful behaviour on their part (4).

Individuals with schizophrenia and criminal justice system involvement are more likely to engage in substance use and less likely to adhere to antipsychotic treatment compared to those without such involvement (5), which may impact health care costs. Furthermore, they have poorer levels of mental health functioning, and are more likely to be hospitalised and use emergency services.5 Thus, while health care costs for all individuals with chronic psychotic disorders are substantial (6), costs are likely higher for justice-involved individuals specifically compared with those who are not. One US study found that individuals with schizophrenia or bipolar disorder with justice involvement had higher total mean costs for mental health and substance use services than those without by 26% (7). However, it did not examine costs of non-mental health/substance use-related care, which can also be substantial for this population (6).

It is hypothesised that individuals with chronic psychotic disorders who experience imprisonment have higher total health care costs than comparable individuals who do not. If true, higher health care costs among individuals with chronic psychotic disorders may signal the need for interventions/policies geared towards avoiding and/or managing future criminal justice system involvement. Using administrative correctional and health care data, this study estimated one-year health care costs among individuals with chronic psychotic disorders who experienced imprisonment and comparable individuals who did not in the year prior to imprisonment.

**Methods**

**Setting and study design**

The Ontario provincial correctional system is responsible for the detention of people on remand (i.e., those arrested prior to trial or sentencing) and people with a custodial sentence of less than 2 years. This study employed a matched case-control design, where cases were defined as those experiencing imprisonment and controls as those who did not. Cases included all individuals released from Ontario’s provincial correctional facilities between January 1, 2010 and December 31, 2010 (8,9). The index release date was defined as the date of first release in 2010; the index admission was defined as the incarceration leading to the index release. The look back period was defined as the three years prior to the admission date of the index release (i.e., from 2007 to 2009) to ensure the same observation period for correctional and health care cost data for each subject regardless of the duration of the index correctional event. Health care costs were examined in the year prior to the index admission to understand how cases differed from controls. Given Ontario’s public health care system, where access to care is not dependent on ability to pay, health care costs and experiencing imprisonment can be assumed to be independent from one another. The study was approved by the Hamilton Integrated Research Ethics Board (study 4575).

**Data**

The Ontario Ministry of the Solicitor General provided data on individuals released from provincial correctional facilities in 2010. This included information on sex, age, address on correctional entry, number of prior incarcerations, dates of admission to and of release from, and reasons for release from provincial correctional facilities.

Health services utilisation data were obtained from ICES (formerly known as the Institute for Clinical Evaluative Sciences), an independent, non-profit research institute located in Toronto, Ontario. Health care databases capture administrative, clinical, and demographic data on all health care encounters covered by the public health care system. Data on hospital-based care are captured in the Discharge Abstract Database (all acute medical hospitalisations and psychiatric hospitalisations in non-psychiatric designated beds), the Ontario Mental Health Reporting System (all psychiatric hospitalisations in psychiatric designated beds), the Continuing Care Reporting System (continuing and long-term care), and the National Rehabilitation Reporting System (rehabilitation); data on ambulatory care, such as emergency department visits, are recorded in the National Ambulatory Care Reporting System. The Ontario Health Insurance Plan claims database captures data on physician visits and laboratory and diagnostic claims. The Ontario Drug Benefit Program database includes information on outpatient prescription drugs dispensed to individuals covered by the public provincial drug plan (i.e., individuals aged 65 years and older, and those under the age of 65 years living in a long-term care home, a home for special care or a Community Home for Opportunity, receiving professional home and community care services, enrolled in the Trillium Drug Program, or on social assistance). The Home Care Database records all visits provided by home care professionals. See Table A1 in the Appendix for additional details.

The Registered Persons Database, a population-based registry maintained by the Ministry of Health, was used to obtain population and demographic data on residents who use the health care system, such as date of birth, sex, address, date of death, Ontario Health Insurance Plan eligibility and status changes, and postal code of residence, which was used to obtain data on neighbourhood-level income quintile and rurality of residence (where missing, Ministry of the Solicitor General data were used).

The corrections data were linked to ICES data through deterministic and probabilistic linkage using health card numbers (linkage rate of 97%) (9). Data were analysed at ICES whose legal status under Ontario’s health information privacy law allows it to collect and analyse demographic and health care data, without consent, for health system evaluation and improvement. The use of health care data in this project was authorised under section 45 of Ontario’s Personal Health Information Protection Act.

**Population**

All individuals released from provincial correctional facilities between January 1, 2010 and December 31, 2010 were identified. Among these, individuals ever diagnosed with a chronic psychotic disorder prior to imprisonment (i.e., cases) were selected using a validated algorithm (10). Individuals whose data could not be linked to a valid identifier in the data, with missing sex and/or age, under the age of 18 or older than 105 at time of first correctional facility release date in 2010, who died prior to correctional release, with missing postal code, and not residing in Ontario during the three years prior to the admission date of the index imprisonment were excluded.

Cases were matched 1:2 on sex (male, female) and age (+/- 6 months from birth date) to controls, as commonly done in case-control studies but also to understand how both groups differed on variables of interest, such as neighbourhood-level income and illness duration. Matched controls were obtained from the Registered Persons Database from a pool of individuals diagnosed with a chronic psychotic disorder, using the same inclusion/exclusion criteria applied to cases, and their 2007-2009 data was extracted for analysis.

The following socio-demographic and clinical characteristics were produced for each group: sex, age at index imprisonment, neighbourhood-level income quintile, urban/rural residence, and duration of chronic psychotic disorder, measured as the difference between admission date of the index release date and date of first diagnosis of chronic psychotic disorder in the administrative data for cases, and the difference between January 1, 2010 (i.e., index date for controls since they did not have a release date) and date of first diagnosis of chronic psychotic disorder in the administrative data for controls. These descriptive summaries were replicated for each group by sex. Between-group differences were examined using standardised mean differences (SMD), where SMD > 0.10 is considered large (11). Data on average length of imprisonment, number of prior imprisonments, and reason for release (released on bail, released at court, satisfied sentence, release to hospital and other) were also examined for cases.

**Analysis**

A cost algorithm was employed to estimate all direct patient-level health care costs from the third-party payer perspective (i.e., the Ontario Ministries of Health and Long-term Care) (12). The costing methodology defined in the algorithm uses a bottom-up/micro-costing approach to cost services at the individual patient level, which identifies individual episodes of care or utilisation in the health care system and attaches prices/costs paid to each one. Given Ontario’s public health insurance system, prices are rarely set by providers in a private marketplace; therefore, costs/amounts paid by the Ministry of Health were used. In cases where individual unit costs were not available (e.g., long-term care), a top-down approach, which allocates corporate aggregate costs to individual visits or cases/episodes of care, was employed. Further details on the costing methodology can be found elsewhere (12). Costs captured by the algorithm account for over 90% of all government paid health care services (13). Total mean one-year costs for the year prior to the admission date of the index imprisonment in 2010 were estimated for cases and for the same time period for controls. Costs by sex and health service for both groups and by mental health- and non-mental health-related care (using a previously defined algorithm(14)) were also estimated. Costs were expressed in 2018 Canadian dollars.

A generalised linear model with a gamma distribution and a log link was estimated to model total costs (15). Variables identified in previous research to have an impact on health care utilisation and costs were included in the model (16). The main independent variable was imprisonment (no versus yes); control variables included sex (female versus male), age group (18-29 versus 30-39, 40-49, 50-59, 60-69 and 70+), neighbourhood income quintile (5 – high versus 1 – low, 2 – medium low, 3 – medium, 4 – medium high), rurality of residence (no versus yes), and duration of chronic psychotic disorder (<= 1 year versus 1-2 years, 3 years, 4 to 5 years and 6-10 years, > 10 years). Individuals with missing data on neighbourhood income quintile and rurality (n = 216) were excluded from this analysis. Model output was presented as marginal effects for ease of interpretation; robust standard errors were estimated. All analyses were done using SAS, version 9.4.

**Results**

At the date of release (i.e., in 2010), individuals with a chronic psychotic disorder who experienced imprisonment (i.e., cases) (n = 3,197) were mostly comprised of males (84%), had a mean age of 37, and lived mainly in urban settings (92%) (Table 1). All cases, except one, were matched 1:2 to controls (n = 6,393). Individuals from low-income neighbourhoods were over-represented among cases (42% versus 32%, SMD = 0.20) (Table 1). Cases also had a shorter duration of a chronic psychotic disorder (2,800.82 days versus 3,236.19 days, SMD = 0.21).

Among cases, females were slightly older than males (mean age 39 versus 37, SMD = 0.16) but generally similar in terms of neighbourhood-level income quintile, urban residence, and duration of chronic psychotic disorder (Table 2). Females had a shorter mean length of imprisonment stay (33.38 days versus 71.11, SMD = 0.32) and fewer prior imprisonments (mean 4.04 versus 4.76, SMD = 0.15). The reasons for release also varied by sex: for females, the most common reason was released at court (65%); for males, it was released at court (35%) and satisfied sentence (33%).

Cases had total mean one-year costs of $15,727.90 prior to imprisonment; costs of psychiatric hospitalisations ($8,796.90) and physician services ($2,302.30) accounted for 56% and 15%, respectively (Table 3). Controls had total mean one-year costs of $11,587.60; costs of psychiatric hospitalisations ($6,031.90) accounted for 52%, while physician services ($1,546.70) and outpatient prescription drugs ($1,556.90) accounted for roughly 13% each (Table 3). Among those who experienced imprisonment, 68% had public drug coverage, compared to 54% of those who did not. Median and maximum costs also differed between groups ($2,407.00 and $652,519.00 for cases versus $4,474.00 and $382,696.00 for controls), indicating differences in cost distributions. Most costs were due to mental health-related care (76 % and 72% for cases and controls, respectively) (results available upon request). The between-group one-year cost difference was $4,140.30, mostly due to psychiatric hospitalisations, emergency department visits, and physician services.

Costs for female cases were $20,648.30, while for male cases they were $14,763.30 (difference of $5,885.00) (Table 4); furthermore, female cases had almost double the costs of female controls ($11,337.60) (Table 4). The difference between male cases and controls was smaller ($14,763.30 versus $11,636.60). The cost break down was qualitatively the same across sub-groups compared to the full sample.

In the regression analysis (Table 5), imprisonment, being female, and living in an urban area were positively associated with costs. Individuals in age groups 30-39 and 40-49 had lower costs compared to those 18-29; those with duration of a chronic psychotic disorder between one and two years had higher costs than those with duration of <= one year. All other variables were not statistically significant. The main cost drivers included imprisonment, being between 18 and 29 years old at index imprisonment admission date, and duration of chronic of chronic psychotic disorder between one and two years. In particular, cases had $4,827.32 higher costs than controls (p-value < 0.001), while individuals ages 30-39 and 40-49 had $4,447.56 and $4,218.40 lower costs than those 18-29, respectively (p-value < 0.001). Individuals with duration of a chronic psychotic disorder between one and two years had $6,812.29 higher annual costs than those with duration of <= one year (p-value = 0.004).

**Discussion**

As hypothesised, individuals with chronic psychotic disorders who experienced imprisonment had higher one-year total health care costs than those who did not. The between-group mean cost difference was $4,140.30, mostly driven by higher costs of psychiatric hospitalisations and, to a lesser extent, costs of ED visits and physician services. Among those who experienced imprisonment, females had higher costs than males by almost $6,000; furthermore, females who experienced imprisonment had substantially higher costs than those who did not, by just over $9,000. The regression analysis confirmed these findings.

Few studies have examined the costs of individuals diagnosed with chronic psychotic disorders who experience imprisonment (5,7). Swanson et al. (2013) examined costs of criminal justice involvement among adults with severe mental illness who received services across public agencies within Connecticut, where criminal justice involvement was defined as having an arrest that resulted in a criminal conviction, any period of imprisonment, time spent on probation or parole, participation in a jail diversion program, and/or forensic mental health involvement (7). The authors found that the justice-involved group was significantly younger, more likely to be male, and more likely to be African American than their non-justice system involved counterparts, and that justice-involved individuals had total mean costs of mental health and substance use services of $31,196 USD (2007), $6,468 USD higher than the costs of those without justice involvement ($24,728 USD). This present study also found that individuals who experienced imprisonment were younger (mean age of 37 versus 49) and more likely to be male (84% versus 53%) compared to a prevalence cohort of Ontarians with chronic psychotic disorders (6). Furthermore, despite only examining imprisonment, those who experienced imprisonment had higher health care costs by just over $4,000. The Swanson et al. (2013) study also examined criminal justice system costs (except forensic care). With the addition of these costs ($17,784 USD), the justice-involved group incurred costs approximately double those of the group without justice involvement – $48,980 versus $24,728 per person. Although this was not examined in the present study, based on the average length of imprisonment of 65 days in the sample, and an overall average incarceration cost of $233 per day (17),the total average cost of imprisonment per individual would be $15,145.00 (though likely higher for individuals with chronic psychotic disorders), for a combined cost of $30,872.90.

Related work has also shown there is increased re-incarceration risk for people with schizophrenia in part due to poor service utilisation (3). In a study of remand individuals with psychotic illness, re-incarceration risk was associated with poor service and housing availability in the community upon release (18). Although these risk factors were not examined, these findings, combined with the current results, suggest that high costs of care and subsequent criminal justice involvement could be seen as a marker of disease severity and complexity, highlighting the need for enhanced clinical services. Moreover, females who experienced imprisonment had substantially higher costs than males with and females without imprisonment, suggesting the need for sex-tailored approaches for individuals with chronic psychotic disorders who experience imprisonment.

This study employed a unique data linkage between the Ministry of the Solicitor General and ICES, which enabled the identification of a population-based sample of individuals who experienced imprisonment. This study accounted for most costs covered under a universal health care system and adds to the literature by estimating cost differences by sex. However, there are limitations. The diagnosis of chronic psychotic disorders relied on clinical codes in the administrative data rather than a comprehensive clinical assessment; thus, some individuals may have been misclassified as having a chronic psychotic disorder when in fact they did not, and vice-versa. Nonetheless, the algorithm employed has been validated using population-based administrative databases in Ontario. Individuals who experienced imprisonment in the three years prior to the index imprisonment admission date may have been captured in the study; their inclusion would likely have biased costs downwards. Furthermore, the difference in drug coverage between groups likely contributed to higher average costs among individuals who experienced imprisonment. This study used data from Ontario’s provincial correctional facilities but did not examine data on federal correctional involvement including health care utilisation in federal prisons, which is paid by the federal government and not included in provincial data. However, only a small percentage of people would have experienced federal incarceration during the study period. Finally, this study was not able to account for costs of specialised community-based drug and alcohol services, as these data are currently unavailable for research purposes at ICES.

**Conclusions**

The health care costs of individuals with chronic psychotic disorders who experience imprisonment are higher than those of comparable individuals who do not. Females had substantially higher costs than males and higher costs than females who did not experience imprisonment. Higher health care costs may signal the need for interventions/policies geared towards avoiding and/or managing future criminal justice system involvement. As such, future research should seek to determine cost-effective interventions for justice-involved individuals with chronic psychotic disorders. Moreover, future work should estimate the health care costs of individuals who experience other aspects of criminal justice involvement such as arrests or forensic hospitalisations.

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**Table 1.** Socio-demographic and clinical characteristics of individuals with chronic psychotic disorders who experience imprisonment (cases) matched to those who do not (controls).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Individuals who experience imprisonment (cases)** | **Individuals who do not experience imprisonment (controls)** | **Total** | **Standardized mean difference** | **p-value** |
|  | N = 3,197 | % | N = 6,393 | % | N = 9,590 | % |  |  |
| **Socio-demographic characteristics** |  |  |  |  |  |  |  |  |
| **Sex**  |  |  |  |  |  |  |  |   |
| Female | 524 | 16 | 1,048 | 16 | 1,572 | 16 | N/A |
| Male | 2,673 | 84 | 5,345 | 84 | 8,018 |  84 |
| **Age at index imprisonment date** |  |  |  |  |  |  |  |   |
| Mean ± SD | 37.05  | 11.28 | 37.05 | 11.28 | 37.05 | 11.28 | N/A |
| Median (IQR) | 36  | (28-45) | 36  | (28-45) | 36  | (28-45) |
| 18-29 | 959  | 30 | 1,917  | 30 | 2,876 | 30 |
| 30-39 | 941 | 29 | 1,882 | 29 | 2,823  | 29 |
| 40-49 | 853 | 27 | 1,706 | 27 | 2,559 | 27 |
| 50-59 | 343 | 11 | 686 | 11 | 1,029 | 11 |
| 60-69 | 86  | 3 | 172 | 3 | 258 | 3 |
| 70+ | 15  | 1 | 30  | 1 | 45 | 1 |
| **Neighbourhood income quintile** |  |  |  |  |  |  |  |   |
| Missing | 89  | 3 | 127 | 2.0 | 216 | 2.3 | 0.05 | <0.001 |
| 1 (Lowest) | 1,332  | 42 | 2,048 | 32.0 | 3,380 | 35.2 | 0.20 |   |
| 2 | 659  | 21 | 1,387 | 21.7 | 2,046 | 21.3 | 0.03 |   |
| 3 | 490  | 15 | 1,122 | 17.6 | 1,612 | 16.8 | 0.06 |   |
| 4 | 343 | 11 | 915 | 14.3 | 1,258 | 13.1 | 0.11 |   |
| 5 (Highest) | 284  | 9 | 794  | 12.4 | 1,078 | 11.2 | 0.11 |   |
| **Rural residence** |  |  |  |  |  |  |  |   |
| No | 2,935  | 92 | 5,808 | 91 | 8,743 | 91 | 0.01 |   |
| Yes | 262  | 8 | 585 | 9 | 847 | 9 | 0.03 |   |
| **Duration of chronic psychotic disorder** |  |  |  |  |  |  |  |   |
| Mean ± SD | 2,800.82  | 1,974.82 | 3,236.19  | 2,132.97 | 3,091.05  | 2,091.58 | 0.21 | <0.001 |
| Median (IQR) | 2,325  | (1,138-4,253) | 2,945  | (1,397-4,960) | 2,712  | (1,303-4,719) | 0.20 | <0.001 |
| 01 to 365 days | 190  | 6 | 376 | 6 | 566  | 6 | 0 | <0.001 |
| 366 to 730 days | 283  | 9 | 407  | 6 | 690 | 7 | 0.09 |   |
| 731 to 1,096 days | 295 | 9 | 440 | 7 | 735 | 8 | 0.09 |   |
| 1,097 to 1,825 days | 512  | 16 | 891  | 14 | 1,403 | 15 | 0.06 |   |
| 1,826 to 3,650 days | 898 | 28 | 1,713 | 27 | 2,611 | 27 | 0.03 |   |
| 3,651+ days | 1,019 | 32 | 2,566  | 40 | 3,585 | 37 | 0.17 |   |

**Source:** administrative data from the Ontario Ministry of the Solicitor General and ICES

**Note:** some percentages may not add up to 100% due to rounding and/or small cell numbers

**Legend:** SD – standard deviation; IQR – interquartile range

**Table 2.** Socio-demographic and clinical characteristics of individuals with chronic psychotic disorders who experience imprisonment by sex

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Female** | **Male** | **Total** | **Standardized mean difference** | **p-value** |
|   | N = 524 | % | N = 2,673 | % | N = 3,197 | % |   |   |
| **Socio-demographic characteristics** |  |  |  |  |  |  |  |  |
| **Age at index imprisonment admission date** |  |  |  |  |  |  |  |   |
| Mean ± SD | 38.54  | 10.35 | 36.76 | 11.43 | 37.05  | 11.28 | 0.16 | <0.001 |
| Median (IQR) | 39  | (31-45) | 36  | (27-45) | 36  | (28-45) | 0.20 | <0.001 |
| 18-29 | 111 | 21 | 848 | 32 | 959 | 30 | 0.24 | <0.001 |
| 30-39 | 161 | 31 | 780 | 29 | 941 | 29 | 0.03 |   |
| 40-49 | 179 | 34 | 674 | 25 | 853 | 27 | 0.20 |   |
| 50-59 | 64 | 12 | 279 | 10 | 343 | 11 | 0.06 |   |
| 60+ | 9 | 2 | 92 | 3 | 101 | 3 | 0.11 |   |
| **Neighbourhood income quintile** |  |  |  |  |  |  |  |  |
| Missing | 10 | 2 | 79  | 3 | 89 | 3 | 0.07 | 0.696 |
| 1 (Lowest) | 228 | 44 | 1,104 | 41 | 1,332 | 42 | 0.04 |   |
| 2 | 107  | 20 | 552 | 21 | 659 | 21 | 0.01 |   |
| 3 | 78 | 15 | 412 | 15 | 490 | 15 | 0.01 |   |
| 4 | 59  | 11 | 284 | 11 | 343 | 11 | 0.02 |   |
| 5 (Highest) | 42 | 8 | 242 | 9 | 284 | 9 | 0.04 |   |
| **Rural Residence** |  |  |  |  |  |  |  |   |
| No | 486 | 93 | 2,449 | 92 | 2,935 | 92 | 0.05 |   |
| Yes | 38 | 7 | 224 | 8 | 262 | 8 | 0.04 |   |
| **Duration of chronic psychotic disorder** |  |  |  |  |  |  |  |  |
| Mean ± SD | 2,842.46 ± 1,961.12 |  | 2,792.66 ± 1,977.75 |  | 2,800.82 ± 1,974.82 |  | 0.03 | 0.598 |
| Median (IQR) | 2,461 (1,116-4,460) |  | 2,306 (1,145-4,227) |  | 2,325 (1,138-4,253) |  | 0.03 | 0.565 |
| 01 to 30 days | \* |  | \* |  | 26 | 1 | 0.10 | 0.123 |
| 31 to 120 days | \* |  | \* |  | 33 | 1 | 0.09 |   |
| 121 to 180 days | \* |  | \* |  | 26 | 1 | 0.01 |   |
| 181 to 365 days | 12 | 2 | 93 | 4 | 105 | 3 | 0.07 |   |
| 366 to 730 days | 53 | 10 | 230 | 9 | 283 | 9 | 0.05 |   |
| 731+ days | 452 | 86 | 2,272 | 85 | 2,724 | 85 | 0.04 |   |
| **Length of stay for index imprisonment** |  |  |  |  |  |  |  |  |
| Mean ± SD | 33.38 | 91.12 | 71.11 | 139.73 | 64.93  | 133.70 | 0.32 | <0.001 |
| Median (IQR) | 7  | (2-29) | 18  | (4-73) | 14  | (4-65) | 0.40 | <0.001 |
| 01 to 06 days | 251 | 48 | 916 | 34 | 1,167 | 37 | 0.28 | <0.001 |
| 07 to 29 | 143 | 27 | 650 | 24 | 793 | 25 | 0.07 |   |
| 30 to 89 | 85 | 16 | 538 | 20 | 623 | 20 | 0.10 |   |
| 90 to 119 | 6 | 1 | 129 | 5 | 135 | 4 | 0.22 |   |
| 120 to 364 | 36 | 7 | 324 | 12 | 360 | 11 | 0.18 |   |
| 365 to 729 | \* |  | \* |  | 92 | 3 | 0.24 |   |
| 730+ | \* |  | \* |  | 27 | 1 | 0.07 |   |
| **Number of prior imprisonment(s)** |  |  |  |  |  |  |  |  |
| Mean ± SD | 4.04  | 4.67 | 4.76  | 4.72 | 4.64 | 4.72 | 0.15 | 0.002 |
| Median (IQR) | 2  | (1-5) | 3  | (1-6) | 3  | (1-6) | 0.27 | <0.001 |
| 1 | 222 | 42 | 739 | 28 | 961 | 30 | 0.31 | <0.001 |
| 2 | 73 | 14 | 388 | 15 | 461 | 14 | 0.02 |   |
| 3 | 41 | 8 | 298  | 11 | 339 | 11 | 0.11 |   |
| 4 | 39  | 7 | 246 | 9 | 285 | 9 | 0.06 |   |
| 5 | 25 | 5 | 197 | 7 | 222  | 7 | 0.11 |   |
| 6 | 16 | 3 | 150 | 6 | 166 | 5 | 0.13 |   |
| 7 | 18 | 3 | 138 | 5 | 156 | 5 | 0.09 |   |
| 8 | 18 | 3 | 84 | 3 | 102 | 3 | 0.02 |   |
| 9 | 19  | 4 | 85 | 3 | 104 | 3 | 0.02 |   |
| 10+ | 53 | 10 | 348 | 13 | 401 | 13 | 0.09 |   |
| **Reason for Release** |  |  |  |  |  |  |  |  |
| Released on bail | 46 | 9 | 593 | 22 | 639 | 20 | 0.38 | <0.001 |
| Released at court | 341  | 65 | 946 | 35 | 1,287 | 40 | 0.62 |   |
| Satisfied sentence | 107 | 20 | 886 | 33 | 993 | 31 | 0.29 |   |
| Release to hospital | 13 | 3 | 76 | 3 | 89 | 3 | 0.02 |   |
| Other | 17 | 3 | 172 | 6 | 189 | 6 | 0.14 |   |

**Source:** administrative data from the Ontario Ministry of the Solicitor General and ICES

**Note:** \* suppressed due to small cells; released on bail includes bail at court and bail prior to trial; other includes admitted in error, outside jurisdiction, expiry of a holding document, immigration bond or release, and national parole release; some percentages may not add up to 100% due to rounding and/or small cell numbers

**Legend:** SD – standard deviation; IQR – interquartile range

**Table 3.** Health care costs (in 2018 CAD) for individuals with chronic psychotic disorders who experience imprisonment (cases) and those who do not (controls) by health service

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Individuals who do not experience imprisonment (controls)** | **Individuals who experience imprisonment (cases)** | **Total** |
|  | N = 6,393 | N = 3,197 | N = 9,590 |
| **Health service** | **Mean** | **Median** | **Min-Max** | **Mean** | **Median** | **Min-Max** | **Mean** | **Median** | **Min-Max** |
| Psychiatric hospitalisations | 6,031.90 | 0 | 0-358,085.00 | 8,796.90 | 0 | 0-374,925.00 | 6,953.60 | 0 | 0-374,925.00 |
| Acute medical care hospitalisations | 922.90 | 0 | 0-560,125.00 | 1,052.10 | 0 | 0-162,163.00 | 965.90 | 0 | 0-560,125.00 |
| Other hospital /institution-based care\* | 295.60 | 0 | 0-131,335.00 | 55.20 | 0 | 0-38,901.00 | 215.40 | 0 | 0-131,335.00 |
| Hospital outpatient clinic visits | 511.10 | 0 | 0-27,335.00 | 635.50 | 0 | 0-22,866.00 | 552.60 | 0 | 0-27,335.00 |
| Emergency department visits | 330.10 | 0 | 0-20,232.00 | 1,240.10 | 467.00 | 0-25,720.00 | 633.50 | 0 | 0-25,720.00 |
| Other ambulatory care\*\* | 197.40 | 0 | 0-122,862.00 | 63.20 | 0 | 0-27,187.00 | 152.70 | 0 | 122,862.00 |
| Physician services | 1,546.70 | 696.00 | 0-71,018.00 | 2,302.30 | 1,138.00 | 0-34,789.00 | 1,798.60 | 815.50 | 0-71,018.00 |
| Outpatient prescription drugs\*\*\* | 1,556.90 | 50.00 | 0-44,628.00 | 1,463.70 | 270.00 | 0-46,795.00 | 1,525.80 | 141.50 | 0-46,795.00 |
| Home care | 195.10 | 0 | 0-150,078.00 | 118.9 | 0 | 0-31,556.00 | 169.70 | 0 | 0-150,078.00 |
| **Total cost** | **11,587.60** | **2,407.00** | **0-652,519.00** | **15,727.90** | 4,474.00 | **382,696.00** | **12,967.80** | **2,913.00** | **0-652,519.00** |

**Source:** administrative data from the Ontario Ministry of the Solicitor General and ICES

**Notes:** \* Includes inpatient rehabilitation, complex continuing care and long-term care; \*\* includes same-day surgery, dialysis clinic visits and cancer clinic visits; \*\*\* includes outpatient prescriptions drugs for individuals covered under the public provincial drug plan (i.e., individuals 65 and older and those on social assistance); among those who experienced imprisonment, 68% had public drug coverage, compared to 54% of those who did not.

**Legend:** min – minimum; max – maximum

**Table 4.** Health care costs (in 2018 CAD) for individuals with chronic psychotic disorders who experience imprisonment (cases) and those who do not (controls) by sex (A – Females and B – Males) and health service

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Individuals who do not experience imprisonment (controls)** | **Individuals who experience imprisonment (cases)** | **Total** |
| **A – Females** | N = 1,048 | N = 524 | N = 1,572 |
| **Health service** | **Mean** | **Median** | **Min-Max** | **Mean** | **Median** | **Min-Max** | **Mean** | **Median** | **Min-Max** |
| Psychiatric hospitalisations | 4,989.30 | 0 | 0-318,944.00 | 11,545.30 | 0 | 0-273,331.00 | 7,174.60 | 0 | 0-318,944.00 |
| Acute care hospitalisations | 1,181.00 | 0 | 0-523,286.00 | 1,403.70 | 0 | 0-64,910.00 | 1,255.20 | 0 | 0-523,286.00 |
| Other hospital /institution-based care\* | 324.70 | 0 | 0-62,787.00 | 117.50 | 0 | 0-32,326.00 | 255.60 | 0 | 0-62,787.00 |
| Hospital outpatient clinic visits | 589.90 | 0 | 0-27,335.00 | 813.80 | 375.00 | 0-11,168.00 | 664.50 | 0 | 0-27,335.00 |
| Emergency department visits | 390.20 | 0 | 0-14,996.00 | 1,675.20 | 753.00 | 0-25,720.00 | 818.50 | 179.00 | 0-25,720.00 |
| Other ambulatory care\*\* | 155.80 | 0 | 0-32,106.00 | 68.60 | 0 | 0-2,773.00 | 126.70 | 0 | 0-32,106.00 |
| Physician services | 2,037.90 | 1,061.50 | 0-71,018.00 | 3,085.40 | 1,771.50 | 0-24,058.00 | 2,387.10 | 1,237.50 | 0-71,018.00 |
| Outpatient prescription drugs\*\*\* | 1,383.40 | 19.50 | 0-27,637.00 | 1,769.30 | 552.00 | 0-36,342.00 | 1,512.00 | 164.00 | 0-36,342.00 |
| Home care | 285.50 | 0 | 49,825.00 | 169.50 | 0 | 0-10,567.00 | 246.80 | 0 | 0-49,825.00 |
| **Total cost** | **11,337.60** | **2,953.50** | **652,519.00** | **20,648.30** | **8,139.00** | **275,395.00** | **14,441.20** | **4,174.00** | **0-652,519.00** |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Individuals who do not experience imprisonment (controls)** | **Individuals who experience imprisonment (cases)** | **Total** |
| **B – Males** | N = 5,345 | N = 2,673 | N = 8,018 |
| **Health service** | **Mean** | **Median** |  **Min-Max** | **Mean** | **Median** | **Min-Max** | **Mean** | **Median** | **Min-Max** |
| Psychiatric hospitalisations | 6,236.30 | 0 | 0-358,085.00 | 8,258.10 | 0 | 0-374,925.00 | 6,910.30 | 0 | 0-374,925.00 |
| Acute care hospitalisations | 872.30 | 0 | 0-560,125.00 | 983.10 | 0 | 0-162,163.00 | 909.20 | 0 | 0-560,125.00 |
| Other hospital /institution-based care\* | 289.90 | 0 | 0-131,335.00 | 42.90 | 0 | 0-38,901.00 | 207.60 | 0 | 0-131,335.00 |
| Hospital outpatient clinic visits | 495.60 | 0 | 0-23,919.00 | 600.60 | 0 | 0-22,866.00 | 530.60 | 0 | 0-23,919.00 |
| Emergency department visits | 318.30 | 0 | 0-20,232.00 | 1,154.80 | 422.00 | 0-25,507.00 | 597.20 | 0 | 0-25,507.00 |
| Other ambulatory care\*\* | 205.60 | 0 | 0-122,862.00 | 62.10 | 0 | 0-27,187.00 | 157.80 | 0 | 0-122,862.00 |
| Physician services | 1,450.30 | 622.00 | 0-50,739.00 | 2,148.80 | 1,026.00 | 0-34,789.00 | 1,683.20 | 744.00 | 0-50,739.00 |
| Outpatient prescription drugs\*\*\* | 1,590.90 | 60.00 | 0-44,628.00 | 1,403.80 | 228.00 | 0-46,795.00 | 1,528.50 | 136.00 | 0-46,795.00 |
| Home care | 177.40 | 0 | 0-150,078.00 | 109 | 0 | 0-31,556.00 | 154.6 | 0 | 0-150,078.00 |
| **Total cost** | **11,636.60** | **2,310.00** | 0-**573,875.00** | **14,763.30** | **3,957.00** | **0-382,696.00** | **12,679.00** | **2,734.00** | **0-573,875.00** |

**Source:** administrative data from the Ontario Ministry of the Solicitor General and ICES

**Notes:** \* includes inpatient rehabilitation, complex continuing care, and long-term care; \*\* includes same-day surgery, dialysis clinic visits and cancer clinic visits; \*\*\* includes outpatient prescriptions drugs for individuals covered under the public provincial drug plan (i.e., individuals 65 and older and those on social assistance); some percentages may not add up to 100% due to rounding and/or small cell numbers

**Legend:** min – minimum; max – maximum

**Table 5.** Average marginal effects of the generalised linear model with a gamma distribution and a log link, where the dependent variable is health care costs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Marginal effect** | **Standard error** | **z** | **P>z** | **95% CI** |
| **Main independent variable** |  |   |   |   |   |   |
| **Imprisonment** (reference category = no) |  |  |  |  |  |  |
| Yes | 4,827.32 | 878.05 | 5.50 | < 0.001 | 3,106.37 | 6,548.27 |
|  |  |   |   |   |   |   |
| **Control variables** |  |  |  |  |  |  |
| **Sex** (reference category = female) |  |   |   |   |   |   |
| Male  | -2,197.43 | 1,084.83 | -2.03 | 0.043 | -4,323.67 | -71.20 |
|  |  |   |   |   |   |   |
| **Age group** (reference category = age category 18-29) |  |   |   |   |   |   |
| 30-39 | -4,447.56 | 1005.40 | -4.42 | < 0.001 | -6,418.11 | -2,477.00 |
| 40-49 | -4,218.40 | 1064.34 | -3.96 | < 0.001 | -6304.46 | -2,132.34 |
| 50-59 | -1,864.78 | 1457.48 | -1.28 | 0.201 | -4721.38 | 991.82 |
| 60-69 | 7,748.92 | 4009.19 | 1.93 | 0.053 | -108.95 | 15,606.78 |
| 70+ | 17,888.34 | 13,422.93 | 1.33 | 0.183 | -8420.11 | 44,196.79 |
|  |  |   |   |   |   |   |
| **Neighbourhood income quintile** (reference category = 5 – high) |  |   |   |   |   |   |
| 1 – low | -1,312.71 | 1,234.84 | -1.06 | 0.288 | -3,732.94 | 1,107.53 |
| 2 – medium low | -1,637.97 | 1,303.59 | -1.26 | 0.209 | -4,192.96 | 917.03 |
| 3 – medium  | -431.27 | 1,399.18 | -0.31 | 0.758 | -3,173.62 | 2,311.08 |
| 4 – medium high | 3,118.80 | 1,665.76 | 1.87 | 0.061 | -146.018 | 6,383.63 |
|  |  |   |   |   |   |   |
| **Rural residence** (reference category = no) |  |   |   |   |   |   |
| Yes | -2,707.25 | 1,061.99 | -2.55 | 0.011 | -4,788.72 | -625.79 |
|  |  |   |   |   |   |   |
| **Duration of chronic psychotic disorder** (reference category >= 365 days) |  |   |   |   |   |   |
| 366 to 730 days | 6,812.29 | 2,379.20 | 2.86 | 0.004 | 2,149.15 | 1,1475.43 |
| 731 to 1,096 days | 2,269.24 | 1,725.97 | 1.31 | 0.189 | -1,113.59 | 5,652.07 |
| 1,097 to 1,825 days | -2,387.52 | 1,251.63 | -1.91 | 0.056 | -4,840.67 | 65.62 |
| 1,826 to 3,650 days | -713.12 | 1,124.74 | -0.63 | 0.526 | -2,917.56 | 1,491.32 |
| 3,651+ days | -1,328.09 | 918.06 | -1.45 | 0.148 | -3,127.45 | 471.28 |

**Source:** administrative data from the Ontario Ministry of the Solicitor General and ICES

**Notes:** the summary statistics for the regression are as follows: N = 9,374; Log-likelihood = -97,575.96; AIC = 20.82; BIC = -60,719.91.

**Legend:** CI – confidence interval; AIC – Akaike information criterion; BIC – Bayesian Information Criterion