Brief Report

Changes in community and hospital-based health care use during the COVID-19 pandemic for adults with and without intellectual and developmental disabilities

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Abstract

Background  Due to the functional, cognitive and communication impairments associated with intellectual and/or developmental disabilities (IDD), adaptations to service delivery during the COVID-19 pandemic may impact people with IDD differently than others. For community and hospital-based services, this study describes the proportion of adults with and without IDD who used health care in the year pre-COVID-19 and the first year of the pandemic.

Methods  This retrospective cohort study used linked health administrative databases to identify adults aged 18–105 years with and without IDD using unique encoded identifiers. Counts and proportions of adults who used health care services were reported for the pre-COVID-19 year (16 March 2019 to 14 March 2020) and the first COVID-19 year (15 March 2020 to 15 March 2021).

Results  Across services, the proportion of adults who used services was lower during the first COVID-19 year compared with the year prior, except for virtual physician visits that increased markedly for people with and without IDD. While the proportion of adults who used services was higher for those with IDD compared with those without IDD for both years, differences were greatest for mental health emergency visits and hospitalisations; adults with IDD were 6.3 to 10.9 times more likely to use these services than others with no IDD during the pandemic.

Conclusions  During the first COVID-19 year in Ontario, Canada, service use decreased for all service types, except for virtual physician visits. In both years, adults with IDD remained more likely to use services than other adults, with the largest differences in use of mental health hospitalisations and mental health emergency department visits.

Keywords  COVID-19, hospitalisations, intellectual and developmental disabilities, physician visits, service use
Introduction

COVID-19 studies from the USA (Gleason et al. 2021), the UK (Williamson et al. 2021) and Canada (Lunsky et al. 2021a) have shown greater positivity rates, hospitalisations and mortality in adults with intellectual and developmental disabilities (IDD) compared with other adults. At the same time, pandemic-related restrictions have greatly impacted the mental and physical health of people with IDD, according to both self-report and informant-based ratings (McCarron et al. 2020; Flynn et al. 2021).

Rapid changes in health care delivery designed to follow public health restrictions and limit virus spread may pose additional risks to people with IDD, who already experienced challenges accessing appropriate health care prior to the pandemic.

Adults with IDD have more co-occurring health issues (Cooper et al. 2015), take more medications (Stortz et al. 2014), use more health care (Lunsky et al. 2019) and have higher rates of premature mortality than individuals without IDD (O’Leary et al. 2018). While shifts in health care mode of delivery and availability could be very problematic for this group, little is known about how the pandemic has impacted their health care use patterns, both overall and relative to the general population. One UK-based study reported a similar number of hospital admissions for adults with IDD during the first wave of the pandemic compared with early 2020 but a lower number of psychiatric referrals. Referrals for adults without IDD were also lower in this time, as were inpatient psychiatric admissions (Tromans et al. 2020).

During the COVID-19 pandemic that was declared in March 2020, hospital inpatient units and emergency departments (EDs) in Ontario, Canada, remained open. However, they could only accommodate reduced volumes of patients, and there were several periods when non-emergent and non-urgent surgeries and procedures were paused. Home care services (e.g. nursing, assistance with daily activities and occupational or physical therapy) that can be provided on a short-stay or long-stay basis (Mondor et al. 2017) to help people to stay out of hospital continued during the pandemic. However, potential recipients may have declined provider visits due to fears that the care provider might transmit COVID-19 to them. Similarly, in-office visits became less common. During the initial wave, the majority of in-office visits were cancelled.

In contrast, virtual visits delivered via phone or video by primary care or specialist physicians increased. An earlier study demonstrated that in Ontario, during the first 4 months of the COVID pandemic, there was a dramatic increase in use of virtual primary care physicians (56-fold) and a decrease in in-office physician visits by 79.1% (Glazier et al. 2021). However, data on adults with IDD were not reported. Adults with IDD can experience barriers related to technological literacy, understanding virtual interactions, navigating varied platforms for video visits and advocating for their needs to be met (Selick et al. 2021). This group may also have less access to reliable internet service and technological devices given their lower incomes (Velasquez & Mehrotra 2020). Phone-based visits, especially without video, may not offer this group the level of support that is needed and may be difficult for them to actively participate in. Although several studies in the IDD field have described shifts to virtual care during the pandemic (Zaagsma et al. 2020; Krysta et al. 2021; Lunsky et al. 2021b), they have mostly come from the user’s perspective and have not quantified use at the population level.

It is important to examine how use of health care has changed for adults with IDD during COVID-19 compared with the year prior and relative to adults without IDD in those 2 years. Consequently, our study had two main objectives:

1 to describe the numbers and proportions of individuals with and without IDD who used community-based (home care, in person and virtual outpatient care) and hospital-based health services (ED visits and admissions) and

2 to compare the probability of having used community-based services and hospital-based services in adults with and without IDD.

Methods

Study design and setting

This is a population-based retrospective cohort study of adults 18 years and older in Ontario, Canada, with and without IDD identified using health
administrative databases. All citizens and legal residents of Ontario are eligible for the provincial health insurance plan, which provides universal coverage for basic and emergency health services, including physician, ED and hospital care.

All-cause and mental health-related health care use for adults with IDD from 16 March 2019 to 14 March 2020 (pre-COVID-19 year) and 15 March 2020 to 15 March 2021 (first COVID-19 year) were examined.

Data sources and linkage

Primary data sources were provincial administrative data sets (Appendix A) linked using unique, encoded identifiers and analysed at ICES. ICES is an independent, non-profit research institute authorised under Ontario’s privacy legislation to collect and analyse health care and demographic data, without consent, for health system evaluation and improvement. The use of data in this project was authorised under section 45 of Ontario’s Personal Health Information Protection Act, which does not require review by a research ethics board, and ICES is a prescribed entity according to this act. For more information on how ICES uses health administrative data for research and protects the privacy of individuals, please see https://www.ices.on.ca/Data-and-Privacy/Privacy-at-ICES.

Study cohort

Consistent with earlier research (Lin et al. 2013), adults 18 to 105 years of age were considered to have IDD if they had received a diagnosis of intellectual disability, fetal alcohol syndrome, autism and/or chromosomal and autosomal anomalies (e.g. Down syndrome) recorded during at least two physician visits or at least one ED visit or one hospitalisation since the date of their birth or database inception until 16 March 2019 and were alive and living in Ontario and eligible for Ontario Health Insurance Plan (OHIP) coverage as of 16 March 2019 (Appendix B). Those without IDD were adults 18–105 years old who were alive and living in Ontario and eligible for OHIP coverage as of 16 March 2019 and are not found in the cohort of adults with IDD.

Outcomes

This study examined several types of community-based and hospital-based health care (Table A1).

Analyses

For Ontario adults with and without IDD, we described their sociodemographic characteristics as of 16 March 2019 and the proportion of adults who used health services (virtual and in-office outpatient visits, home care, ED visits, mental health ED visits, hospitalisations and mental health hospitalisations) during the first COVID-19 year and in the year prior. We also provided means with standard deviations (SDs) and medians with interquartile ranges for the number of in-office and virtual (phone-based or video-based) outpatient visits made by individuals. Ratios comparing the proportions of those who used services for adults with and without IDD were calculated. All statistical analyses were performed using SAS Version 9.4.

Results

At the start of the year that preceded COVID-19, adults with IDD, compared with adults with no IDD, were much younger, less likely to be female and more likely to live in residences in the lowest income quintile (Table 1).
virtual health care. Adults without IDD also were much more likely to use virtual care during COVID-19 than prior (58.7% vs. 3.4%).

In-office visits

In total, 44,993 adults with IDD (51.7%) had at least one in-office visit during the first COVID-19 year. This proportion was lower than the year prior to COVID-19, in which 70,740 adults with IDD (81.2%) had at least one visit. Adults without IDD were also less likely to have in-office visits during the first COVID-19 year than the prior year (50.4% vs. 74.6%).

Home care

A total of 4,337 adults with IDD (5.0%) used home care at least once during the first COVID-19 year (Fig. 1). In the year prior to COVID-19, 5,127 adults with IDD (5.9%) utilised home care services. The proportion of adults without IDD who were using home care during the first COVID-19 year was 2.3% compared with 2.6% in the year prior.

Hospital-based health care

Emergency department visits (all cause)

A total of 23,460 adults with IDD (26.9%) visited the ED during the first COVID-19 year, whereas in the year prior, 29,088 adults with IDD (33.4%) visited the ED (Fig. 2). Similarly, adults without IDD were less likely to visit the ED during the first COVID-19 year than the year prior (17.6% vs. 21.3%).

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**Table 1** Sociodemographic characteristics of adults with and without intellectual and developmental disabilities (IDD) in Ontario, Canada, at the start of the year prior to the COVID-19 pandemic as of 16 March 2019, n (%)

|                      | Adults with IDD | Adults without IDD |
|----------------------|-----------------|--------------------|
|                      | n = 87,070      | n = 12,459,056     |
| Age group (years)    |                 |                    |
| 18–29                | 39,858 (45.8%)  | 2,418,082 (19.4%)  |
| 30–39                | 14,678 (16.9%)  | 2,165,389 (17.4%)  |
| 40–49                | 10,063 (11.6%)  | 2,061,340 (16.5%)  |
| 50–59                | 10,574 (12.1%)  | 2,220,057 (17.8%)  |
| 60–69                | 7,251 (8.3%)    | 1,788,664 (14.4%)  |
| 70–79                | 3,199 (3.7%)    | 1,122,145 (9.0%)   |
| 80–89                | 1,146 (1.3%)    | 538,213 (4.3%)     |
| 90+                  | 301 (0.3%)      | 145,166 (1.2%)     |
| Sex                  |                 |                    |
| Female               | 32,878 (37.8%)  | 6,356,266 (51.0%)  |
| Rurality             |                 |                    |
| Missing              | 533 (0.6%)      | 35,096 (0.3%)      |
| Rural                | 10,292 (11.8%)  | 1,223,894 (9.8%)   |
| Urban                | 76,245 (87.6%)  | 11,200,066 (89.9%) |
| Residence income quintile |           |                    |
| Missing              | 566 (0.7%)      | 39,348 (0.3%)      |
| 1 (lowest)           | 24,596 (28.2%)  | 2,332,459 (20.3%)  |
| 2                    | 18,408 (21.1%)  | 2,501,260 (20.1%)  |
| 3                    | 15,657 (18.0%)  | 2,484,967 (19.9%)  |
| 4                    | 13,956 (16.0%)  | 2,443,918 (19.6%)  |
| 5 (highest)          | 13,887 (15.9%)  | 2,457,104 (19.7%)  |

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Emergency department visits (mental health related)

A total of 5336 adults with IDD (6.1%) had at least one ED visit, mental health related, between 15 March 2020 and 15 March 2021. This was slightly lower than what occurred in the year prior to COVID-19, in which 6465 adults with IDD (7.4%) had a mental health-related emergency visit.

Among adults without IDD, the proportion who had mental health-related ED visits was quite low and very similar both years (1.0% pandemic year and 1.1% pre-pandemic).

Hospitalisations (all cause)

During the first COVID-19 year, 8366 adults with IDD (9.6%) were hospitalised at least once, which was slightly lower than in the year prior to COVID-19, during which 9502 adults with IDD (10.9%) were hospitalised. For adults without IDD, 5.2% had an all-cause hospitalisation during the first COVID-19 year while 5.8% had all-cause hospitalisation during the year prior.

Hospitalisations (mental health related)

During the first COVID-19 year, 3155 adults with IDD (3.6%) had at least one admission compared with the year prior to COVID-19, in which 3597 adults with IDD (4.1%) had at least one admission.

The proportion of adults without IDD who had these admissions was similar during the first COVID-19 year and the prior year (0.3%).

Frequency of outpatient visits

For adults with IDD and adults without IDD with in-office physician visits, the mean and median number of visits decreased from the pre-COVID-19 year to the first COVID-19 year. For both groups, the opposite patterns occurred for virtual physician visits, which increased markedly from the pre-COVID-19 year to the first COVID-19 year. During both years, mean numbers of visits for in-office and virtual physician visits were greater for people with IDD, compared with those with no IDD.

Among those who had in-office physician visits, the mean number of visits for adults with IDD during the first COVID-19 year was 5.1 (SD 8.2), a decrease from the year prior to COVID-19 (mean 7.7, SD 9.1). For those with no IDD, these numbers were 4.0 (SD 5.2) and 6.8 (SD 7.1) visits, respectively.

For those who had a virtual visit, the mean number of visits during the first COVID-19 year for adults with IDD was 5.7 (SD 7.4), an increase from 3.3 (SD 6.0). For adults with no IDD, there was also an increase in mean number of virtual visits, from 2.8 (SD 5.0) in the pre-COVID-19 year to 4.9 (SD 5.7) in the first COVID-19 year.

Objective 2

For all health care service types, the proportion of people who used services was greater before and during the pandemic for adults with IDD compared with adults without IDD (Fig. 3).
Ratios comparing the likelihood of service use for adults with IDD to adults without IDD were generally similar in the pre-COVID-19 and the first COVID-19 years. However, there was notable variation in the ratios by type of service. Specifically, ratios were below 2.5 for home care, virtual care, in-office care, ED visits and any hospitalisations, meaning that in the 2 years studied, adults with IDD were less than 2.5 times as likely to use those types of health care. In contrast, the ratios for mental health ED visits (6.5 pre-COVID-19, 6.3 during COVID-19) and mental health hospitalisations (11.7 pre-COVID-19, 10.9 during COVID-19) were markedly greater, indicating that mental health-related hospital services were much more commonly used by people with IDD during the pre-COVID-19 and first COVID-19 years.

Understanding health care patterns at the population level may reflect needs during COVID-19 but can also inform us about the unique needs of this population (e.g. mental health care), which will remain and likely be exacerbated after this public health emergency.

Increases in proportions of those using virtual care (by phone or video) for adults with IDD from 5.1% during the preceding year to 61.8% during the first COVID-19 year echoed changes observed among adults with no IDD from 3.4% to 58.7%. Despite being more likely to live in the poorest neighbourhoods, people with IDD had extensive use of virtual care, similar to their non-disabled counterparts. Because people with IDD have higher care needs that require more health care visits, it is hard to estimate the health care use patterns that we would observe if digital poverty disproportionately affected adults with IDD relative to their non-disabled counterparts. In addition, ‘digital poverty’ may more strongly affect use of video-based care than phone-based care, but the current study

**Discussion**

During the first COVID-19 year, there were consistent reductions in health care use across service types compared with the year prior for both adults with and without IDD. The only service type in which there was an increase in use during the pandemic was virtual care, aligning with the government making such visits eligible for public health insurance coverage in March 2020 (Glazier et al. 2021). This study also showed that while adults with IDD were more likely to use every type of health care than adults without IDD, the extent of this difference varied by service type in both years studied. The difference was smallest for in-office and virtual care, but closer to twice as common for hospital-based and home care. ED visits for mental health reasons and hospitalisations for mental health reasons were much more common among adults with IDD during the pre-COVID-19 and first COVID-19 years.

Understanding health care patterns at the population level may reflect needs during COVID-19 but can also inform us about the unique needs of this population (e.g. mental health care), which will remain and likely be exacerbated after this public health emergency.
cannot distinguish which modality of virtual care was used. In addition, whether either of these types of virtual care is suitable for people with IDD is beyond the current study scope. Investigating this issue would likely require drawing on additional data sources as Ontario’s administrative health care data do not capture quality of the care provided. It has been argued for the general population that decisions regarding virtual care should be patient driven based on the health issue and the patient’s capacity to engage virtually (Kiran 2021), and the same is true for those with IDD (Shaw et al. 2022). Future research should examine if, and how, some of these barriers to using virtual care have been mitigated for people with IDD relative to people with no IDD. In addition, further investigation is needed to determine how access to and satisfaction with virtual care, in particular, video-based care, varies within the IDD population. In this regard, exploration of contributing factors such as living situation and access to family members or professional support personnel to help with virtual navigation would be important.

The long-term impact of virtual care as a substitute for in-person care with the IDD population is not known, although based on existing research, we and other researchers offer some preliminary recommendations to optimise virtual care delivery. To optimise video-based care, people with IDD and their carers need universal access to stable high-speed internet and internet-enabled devices (Chadwick et al. 2022; Shaw et al. 2022). Digital liaison/support persons should be available to help patients use technological platforms to connect with their health care providers, given that for many individuals with IDD, phone-based care is insufficient (Lunsky et al. 2021b). This can be done at the person’s home, at a disability-based agency or even in a health care setting. When the video works properly, it is easier to engage than the phone and allows the patient with IDD to see and be more involved in the interaction with their provider. It also allows the provider to see the person’s context better. Practice sessions before appointments and guidance for patients with IDD, families and health care providers to prepare for appointments can help optimise access to virtual care and determine when additional alternatives should be used (Santorò et al. 2021; Chadwick et al. 2022). For those who have difficulty with uncertainty, preparation would be easier by providing a specific time for the virtual appointment rather than giving a large window of time, and longer appointments time may also be required (Shaw et al. 2022). Allowing patients with IDD to request the most accessible type of appointment is a key way of reducing health access barriers (Shaw et al. 2022).

As proportions of mental health-related ED visits and hospitalisations remained notably higher for adults with IDD compared with other adults during the COVID-19 pandemic, it is important to consider how the changes in ED and inpatient service delivery in response to public health restrictions may impact people with IDD specifically. For example, requirements that all staff and patients wear masks, restrictions related to visitors or support people and a greater reliance on technology may have disproportionately negative impacts on people with IDD while in hospital, given their functional and communicative challenges (Alexander et al. 2020; NHS England 2021; Strydom et al. 2021). This is especially relevant to the mental well-being of individuals who seek emergency and hospital care for mental health issues. We recommend having health passports prepared by patients and families, before going to hospital, to be shared with hospital staff and making technological support accessible to patients during their hospital stays. Ensuring access to essential care partners, such as family or workers, is critical for adults with IDD when in hospital. Additionally, employing hospital staff who are more familiar with patients with IDD during these very stressful encounters would also be beneficial, similar to learning disability liaison nurse role in the UK (Tuffrey-Wijne et al. 2013; NHS England 2021).

Strengths and limitations

This study analysed different population-based groups drawn from the same geopolitical area and assessed them using multiple, identically defined outcomes with a full year of data from the start of the pandemic. However, interpretation of these findings should consider several limitations. First, this study looked at service use during a year-long period, even though COVID-19 spread in multiple waves and restrictions were typically greatest during the peak of each wave. Second, approximately one-third of adults with IDD in Ontario’s administrative databases can only be identified with disability income support
records (Lin et al. 2014), which were not available for the current study. As well, residential setting (e.g. congregate care), quality of care received, the nature of provider–patient interactions, patient preference and need were not assessed. Finally, these data could not differentiate between phone-based and video-based virtual care.

This paper reports a reduction in use of most health care services during the first COVID-19 year and a dramatic shift to virtual instead of in-office physician visits for adults with IDD and those without. Given that people with IDD are included in those whose use of virtual care has increased dramatically during the pandemic, it is important that delivery of this care accommodate the needs of people with IDD. Conversely, lower use of other types of services among those with IDD accentuates the need for monitoring the long-term effects of the reduced use of services, especially among a group with elevated health care needs. Future studies should assess patterns within subgroups and explore whether some subgroups with IDD are especially likely to use hospital services. It would also be advantageous to examine this issue with longer timeframes as the COVID-19 pandemic has now lasted for almost 2 years; there could be a lag in effects of reduced access to many types of care including hospital procedures, especially as the effects accumulate (see also Hatton 2021). Another suggestion for future work is to account for age differences across groups as the IDD group was younger than the group with no IDD. Future research could also disaggregate visits to physicians by physician specialty and by type of virtual care as people with IDD may be more likely than others to use phone rather than video services. Finally, research combining care quantity with care quality would be important.

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This study was supported by ICES through the Applied Health Research Question programme, which is funded by MOH and MLTC. The opinions, results and conclusions are those of the authors and are independent from the funding source. No endorsement by ICES, the Ontario MOH or the Ontario MLTC is intended or should be inferred. Parts of this material are based on data and/or information compiled and provided by Canadian Institutes of Health Information (CIHI). However, the analyses, conclusions, opinions and statements expressed in the material are those of the author(s) and not necessarily those of CIHI. These data sets were linked using unique encoded identifiers and analysed at ICES.

This study was also supported by the Ontario Health Data Platform (OHDP), a Province of Ontario initiative to support Ontario’s ongoing response to COVID-19 and its related impacts. The opinions, results and conclusions reported in this paper are those of the authors and are independent from the funding sources. No endorsement by the OHDP, its partners or the Province of Ontario is intended or should be inferred.

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Conflict of interest

None to disclose.

Ethics approval

The use of the data in this project is authorised under section 45 of Ontario’s Personal Health Information Protection Act (PHIPA) and does not require review by a research ethics board.
Data availability statement

The data set from this study is held securely in coded form at ICES. The authors accessed the data set used for this study in a manner that is different from the manner by which individuals who are external to ICES would access the data set. The authors are affiliated with ICES, either directly or as collaborating agents of ICES, and conducted the study in fulfilment of ICES’ mandate as a prescribed entity under Ontario’s Personal Health Information Protection Act. As a result, the authors were authorised, both legally and contractually, to access the data set in a more granular form than individuals who are external to ICES would be permitted to access the data set. External individuals must apply for access to the minimal data to das@ices.on.ca through ICES’ Data and Analytic Services, a division of ICES established specifically to provide data and analytic services to third-party researchers. The data set that approved third-party researchers would be permitted to access will be adjusted to ensure the risk of re-identification of any underlying individuals is low. The analytic code is not necessary to replicate the study results because the specific diagnostic codes and definitions of study groups are listed in the appendix, and other necessary details are provided in the Methods section. However, third-party researchers who wish to replicate the results may still request the analytic code from the authors.

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### Appendix A

#### Table A1  Data types and data sources for Ontario's linked administrative health databases used in this study

| Data type                                | Database name (name acronym) | Data use                                                                 | Changes to delivery during the COVID-19 pandemic |
|------------------------------------------|------------------------------|--------------------------------------------------------------------------|-----------------------------------------------|
| Health care registry (demographic and mortality information) | Registered Person's Database (RPDB) | Propositional people eligible with Ontario health card numbers (i.e. had provincial universal health insurance coverage) who were eligible for the study. | n/a |
| Physician claims (virtual visits, in-office visits) | Ontario Health Insurance Plan (OHIP) | To determine membership in the group with or without intellectual and/or development disabilities. | |<br>| To determine service use from 16 March 2019 to 14 March 2020 (pre-COVID-19 year) and 15 March 2020 to 15 March 2021 (first COVID-19 year). | |
| Home care services                       | Home Care Database (HCD)     | To determine service use from 16 March 2019 to 14 March 2020 (pre-COVID-19 year) and 15 March 2020 to 15 March 2021 (first COVID-19 year). | |
| Data type                                      | Database name (name acronym)                                                | Data use                                                                 | Changes to delivery during the COVID-19 pandemic |
|-----------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------|
| Census geographic identifier                  | Postal Code Conversion File (PCCF)                                          | To classify the level of rurality of the person’s residential neighbourhood. | Individuals experiencing urgent health issues can present to the emergency department (ED), some of whom are admitted. Individuals’ decisions to make ED visits and to be admitted to hospital during the pandemic were likely impacted by their concerns of about exposure to COVID-19 in hospitals, about having to quarantine in their hospital room from 1 to 14 days after admission, of non-urgent procedures being postponed and/or restrictions on numbers and times for hospital visitor restrictions. |
| Emergency department visits                   | National Ambulatory Care Reporting System (NACRS)                           | To determine service use from 16 March 2019 to 14 March 2020 (pre-COVID-19 year) and 15 March 2020 to 15 March 2021 (first COVID-19 year). |                                                  |
| General hospital admissions                   | Canadian Institutes of Health Information Discharge Abstract Database (CIHI-DAD) |                                                                           |                                                  |
| Mental illness and addiction hospital admissions | Ontario Mental Health Reporting System (OMHRS)                             |                                                                           |                                                  |
Appendix B: Definition of developmental disability diagnosis

https://www.ices.on.ca/Publications/Atlases-and-Reports/2013/Atlas-on-Developmental-Disabilities

Table B1  Diagnostic codes used to identify individuals with developmental disabilities in the administrative health data (from Atlas on the Primary Care of Adults with Developmental Disabilities in Ontario)

| Database                          | Year of inception | Diagnoses                                      | Criteria                                                                 |
|----------------------------------|-------------------|------------------------------------------------|-------------------------------------------------------------------------|
| Discharge Abstract Database      | 1988              | Discharges with any diagnosis listed in Table B2| • In any diagnostic field                                               |
| Same Day Surgery Database        | 1991              |                                                 | • For all facilities submitting to DAD, SDS and NACRS                   |
| National Ambulatory Care Reporting System | 2002       |                                                 | • From inception of database to 15 March 2021                            |
| Ontario Mental Health Reporting System | 2005          | 299 to 299.80, 317 to 319.99                   | • For all facilities submitting to OMHRS                                |
| Ontario Health Insurance Plan    | 1991              | 299, 319                                        | • From inception of database to 15 March 2021                            |
|                                  |                   |                                                 | • For all providers submitting to OHIP                                  |
|                                  |                   |                                                 | • From June 1991 to 15 March 2021                                      |

Table B2  Developmental disabilities and related codes included in the International Classification of Diseases, 9th and 10th editions

| Code   | Label                                                                 |
|--------|-----------------------------------------------------------------------|
| ICD-9  |                                                                        |
| 299–299.99 | Pervasive developmental disorders (e.g. autism)                        |
| 317–317.99 | Mental retardation                                                   |
| 318–318.99 | Mental retardation                                                   |
| 319–319.99 | Mental retardation                                                   |
| 758.0–758.39 | Chromosomal anomalies for which a developmental disability is typically present |
| 758.5 | Other conditions due to autosomal anomalies                           |
| 758.8, 758.89 | Other conditions due to chromosome anomalies (do not include 758.81) |
| 758.9 | Conditions due to anomaly of unspecified chromosome                   |
| 759.5 | Tuberous sclerosis                                                   |
| 759.81 | Other and unspecified congenital anomalies: Prader—Willi syndrome     |
| 759.821 | Other and unspecified congenital anomalies: de Lange syndrome (include only if 6 digits exist; i.e. do not include 759.82) |
| 759.827 | Other and unspecified congenital anomalies: Seckel syndrome (include only if 6 digits exist) |
| 759.828 | Other and unspecified congenital anomalies: Smith—Lemli—Opitz syndrome (include only if 6 digits exist) |
| 759.83 | Other and unspecified congenital anomalies: Fragile X syndrome        |
| 759.874 | Other and unspecified congenital anomalies: Beckwith–Wiedemann syndrome (include only if 6 digits exist) |
| 759.875 | Other and unspecified congenital anomalies: Zellweger syndrome (include only if 6 digits exist) |
| 759.89 | Other and unspecified congenital anomalies: other (e.g. Menkes disease, Laurence–Moon–Biedl syndrome and Rubinstein–Taybi syndrome) |
| 760.71 | Fetal alcohol syndrome                                               |
| 760.77 | Fetal hydantoin syndrome                                             |

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| Code | Label |
|------|-------|
| F700 | Mild mental retardation with the statement of no, or minimal, impairment of behaviour |
| F701 | Mild mental retardation, significant impairment of behaviour requiring attention or treatment |
| F708 | Mild mental retardation, other impairments of behaviour |
| F709 | Mild mental retardation without mention of impairment of behaviour |
| F710 | Moderate mental retardation with the statement of no, or minimal, impairment of behaviour |
| F711 | Moderate mental retardation, significant impairment of behaviour requiring attention or treatment |
| F718 | Moderate mental retardation, other impairments of behaviour |
| F719 | Moderate mental retardation without mention of impairment of behaviour |
| F720 | Severe mental retardation with the statement of no, or minimal, impairment of behaviour |
| F721 | Severe mental retardation, significant impairment of behaviour requiring attention or treatment |
| F728 | Severe mental retardation, other impairments of behaviour |
| F729 | Severe mental retardation without mention of impairment of behaviour |
| F730 | Profound mental retardation with the statement of no, or minimal, impairment of behaviour |
| F731 | Profound mental retardation, significant impairment of behaviour requiring attention or treatment |
| F738 | Profound mental retardation, other impairments of behaviour |
| F739 | Profound mental retardation without mention of impairment of behaviour |
| F780 | Other mental retardation with the statement of no, or minimal, impairment of behaviour |
| F781 | Other mental retardation, significant impairment of behaviour requiring attention or treatment |
| F788 | Other mental retardation, other impairments of behaviour |
| F789 | Other mental retardation without mention of impairment of behaviour |
| F790 | Unspecified mental retardation with the statement of no, or minimal, impairment of behaviour |
| F791 | Unspecified mental retardation, significant impairment of behaviour requiring attention or treatment |
| F798 | Unspecified mental retardation, other impairments of behaviour |
| F799 | Unspecified mental retardation without mention of impairment of behaviour |
| F840 | Childhood autism |
| F841 | Atypical autism |
| F843 | Other childhood disintegrative disorder |
| F844 | Overactive disorder associated with mental retardation and stereotyped movements |
| F845 | Asperger’s syndrome |
| F848 | Other pervasive developmental disorders |
| F849 | Pervasive developmental disorder, unspecified |
| Q851 | Tuberous sclerosis |
| Q860 | Fetal alcohol syndrome |
| Q861 | Fetal hydantoin syndrome |
| Q871 | Aarskog, Prader–Willi, de Lange, Seckel etc. |
| Q8723 | Rubinstein–Taybi syndrome (include only if all 5 digits) |
| Q8731 | Sotos syndrome (include only if all 5 digits) |
| Q878 | Other |
| Q900–Q939 except Q926 | All Down syndrome types, cri du chat etc., except extra marker chromosomes |
| Q971 | Female with more than three X chromosomes |
| Q992 | Fragile X syndrome |
| Q998 | Other specified chromosome abnormalities |