Effect of universal no-cost coverage on use of long-acting reversible contraception and all prescription contraception: population based, controlled, interrupted time series analysis

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ABSTRACT

OBJECTIVE

To estimate effects of a policy introducing universal, no-cost public coverage for prescription contraception on use in British Columbia, Canada.

DESIGN

Population based, controlled, interrupted time series analysis.

SETTING

10 Canadian provinces.

PARTICIPANTS

Prescription medications dispensed to reproductive aged (15-49 years) female individuals in British Columbia, Canada, compared with a synthetic control derived from the nine other Canadian provinces and a population based cohort of 859 845 female residents of British Columbia (age 15-49 years) between 1 April 2021 and 30 June 2024.

INTERVENTION

Introduction of a universal contraception coverage policy in April 2023, where the public insurer pays 100% of prescription costs.

OUTCOME MEASURES

Number of monthly dispensations for long-acting reversible contraception (LARC) and number of monthly dispensations for all forms of prescription contraception (including LARC), percentage of reproductive aged female residents using LARC and using all forms of prescription contraception, and the proportion of people using prescription contraception who use LARC (LARC market share). Segmented regression models were used to estimate policy effects by comparing the expected outcome values after 15 months of the policy (ie, the counterfactual, derived from trends before the policy and changes in the control) with the observed values, with 95% confidence intervals (CIs) estimated using bootstrapping.

RESULTS

In April 2021, 3249 (95% CI 3066 to 3391) LARC prescriptions were dispensed in British Columbia, with a declining slope trend of −17 (−30 to −7) fewer dispensed per month before the policy. Monthly LARC dispensations increased by 1050 (942 to 1487) immediately after British Columbia's policy change and saw a steady increasing trend after the policy introduction. An additional 1273 (963 to 1698) monthly LARC prescriptions were dispensed 15 months after policy implementation compared with the expected volume, representing an estimated 1.49-fold (1.34 to 1.77) increase. Dispensations for all prescription contraception (including LARC) increased by 1981 (356 to 3324) per month, representing a 1.04-fold (1.01 to 1.07) increase. Among the 859 845 female residents aged 15-49 years in the population, 9.1% were using LARC in April 2021. 15 months after the policy, 11 375 (10 273 to 13 013) more individuals were using LARC than expected without the policy, representing an additional 1.3% (1.2% to 1.5%) of the population. The policy led to an additional 1.7% (1.5% to 2.3%) of the population using any prescription contraception. 15 months after the policy, the LARC market share was 1.9% (1.2% to 2.3%) higher than expected.

CONCLUSIONS

Universal, no-cost public coverage in British Columbia increased prescription contraception use overall, driven by increased LARC use. As such, cost seems to be an important contributor to contraception use and method selection at the population level.

WHAT IS ALREADY KNOWN ON THIS TOPIC

The cost of prescription contraception presents an important access barrier, particularly for long-acting reversible contraception due to high costs up front

Removing cost related barriers for specific prescription contraception methods or for specific, highly selected populations increased use of prescription contraception, including long-acting reversible contraception

WHAT THIS STUDY ADDS

A policy providing universal, no-cost coverage in a large, diverse population significantly increased use of prescription contraception and prompted shifts to the most effective methods

When costs were eliminated for almost all forms of prescription contraception (allowing individuals to select their preferred method), use of long-acting reversible contraception methods increased markedly

Introduction

Over 40% of pregnancies worldwide are unintended, including 48% of pregnancies in North America and 43% in Europe.[1] Inadequate contraception access increases rates of unintended pregnancy, which results in poorer maternal-infant birth outcomes,[2] exacerbates health inequity,[3] increases poverty,[4-6] and limits educational and economic gender equity.[4-6] Thus,

access to effective contraception is essential to prevent unintended pregnancy and enable optimal timing of planned births.[7 8]

The most effective contraceptive methods are long-acting reversible contraception (LARC),[9] which include intrauterine contraceptive devices and subdermal contraceptive implants. Less than 1% of people who use LARC will become pregnant each year, compared with 4-7% of people who use oral contraceptive pills and 10-13% of condom users.[10 11] Although contraceptive effectiveness and failure rates vary across countries, LARC is consistently more effective for preventing pregnancy than short-acting contraception and condoms, with extremely low failure rates.[12] LARCs can be used for 3-10 years and their effectiveness is not user dependent.[10 11] Contraception method selection varies substantially by health system setting; LARC use remains lower than optimal in many high income settings, with survey based reports ranging from 8% to 15% of people who use contraception in Canada, the UK, the US, and western Europe.[8 13] The cost of contraception presents a substantial access barrier in many health systems, particularly for LARC, with costs (up to CAD$450; £240, €287) occurring upfront.[14-18]

Canada's provincial single payer health systems universally cover most hospital and outpatient services without copayments.[19] These systems do not, however, provide such universal no-cost coverage for outpatient prescription drugs and devices. Similar to many European countries with universal health systems, where co-payments and deductibles for outpatient prescriptions (including contraception) are common,[20 21] the cost of prescribed outpatient medications and devices often fall fully or partially to patients in Canada. While most Canadian residents have insurance coverage for prescription drugs, the existing mix of private and public insurance leaves patients with substantial out-of-pocket costs.[22] This results from most Canadian insurance plans requiring copayments, coinsurance, or annual deductibles, and many not covering contraception at all.[23 24] High out-of-pocket costs for contraception reduces contraception use and adherence and affects contraception method selection in Canada.[25-27]

The impact of removing out-of-pocket payments on prescription contraception use and method selection in a Canadian population remains unclear. The effect of reducing or removing cost related barriers for prescription contraception has been studied in some specific populations. For example, a 2023 randomised trial among patients who were uninsured in a family planning clinic setting in the US found that, compared with controls, participants provided with vouchers covering all contraception costs had 1.4-fold higher use of any prescription contraception and 4.5-fold higher use of LARC (22% of voucher recipients *v* 4% of controls).[28] However, expansions to public insurance coverage and family planning service grants for adolescents and low income groups in the US has yielded mixed results,[29 30] with some reporting no change in LARC use and others reporting increased contraception and LARC use (with wide variability in reported effect sizes),[30-34] decreased fertility rates,[32] and improved economic circumstances for families.[35 36] A policy offering one free LARC method to residents of a Finnish city doubled LARC initiation rates.[37] However, whether these effects of targeted contraception coverage generalise to an entire population of reproductive aged female residents of a diverse provincial population is unclear.

On 1 April 2023, the province of British Columbia (BC) implemented Canada's first universal, no-cost, first-dollar contraception coverage policy, making most prescription contraception types, including all LARC, free for provincially insured residents. Under this policy, the public insurance plan starts paying from the first dollar expense incurred, regardless of other insurance coverage. This policy yields a unique opportunity to isolate coverage effects from broader cost related barriers to health or reproductive services, which were already universally covered in Canada. Therefore, we used a quasi-experimental interrupted time series design and population based data to estimate the effect of this policy on LARC use and use of all prescription contraception.

Methods

Study setting

Canadian provinces have single payer health systems that cover outpatient and hospital services, pregnancy care (for miscarriage, abortion, and birth), and contraception services (eg, counselling and LARC placement) with no copayments.[19] Nearly all residents are covered through provincial insurance, except for people covered through federal programmes (eg, federal police or military, refugee or asylum seekers, and First Nations communities living on reserves) or without legal working status in Canada.

Study intervention

The introduction of BC's universal, no-cost prescription contraception coverage on 1 April 2023 served as the study intervention. For all provincially insured BC residents, this policy provides 100% coverage for all LARC (copper and levonorgestrel-releasing intrauterine contraceptive devices and levonorgestrel-releasing contraceptive implants), injectable contraception, contraceptive vaginal ring (full coverage for generics; partial coverage up to generic price for brand name rings), most oral contraceptive pill formulations (full coverage for all generic formulations, with partial coverage to the generic price for brand name formulations), and emergency oral contraceptives. The policy does not include coverage for the contraceptive patch.[38] The coverage was implemented through the Assurance Plan (Plan Z) under BC PharmaCare, a provincial public drug programme that assists residents to pay for prescription drugs, medical supplies, and pharmacy services.[39] To access 100% contraceptive coverage, residents need to obtain their contraceptives from a pharmacy. During the study period, no other changes to contraception coverage were made, except

the addition of a contraceptive vaginal ring on 3 August 2023 to the list of covered contraceptive products.

Study design

Using a rigorous quasi-experimental design, including a controlled interrupted time series analysis of a national prescription database with a synthetic control and an interrupted time series analysis of BC's population based health data, we examined prescription contraception use in BC (the intervention group) and other Canadian provinces (synthetic control) from 1 April 2021 to 30 June 2024.

Interrupted time series analyses examine population outcome frequencies before and after an intervention, such as the implementation of a policy.[40 41] Pre-intervention trends provide expected values (ie, the counterfactual) for post-intervention outcome level and trend.[40 42] Interrupted time series designs are generally not susceptible to confounding by individual level characteristics because any changes to these are usually gradual in the population, and thus accounted for in pre-intervention level and trend.[40 42] The primary threat to the validity of an interrupted time series analysis is the presence of co-interventions, or events that co-occur with the intervention that may affect study outcomes.[40 42 43] Controlled interrupted time series deal with the potential bias arising from co-interventions through use of a control group, defined as an external population exposed to any co-interventions but not exposed to the study intervention.[43 44] Under a controlled interrupted time series design, the counterfactual is derived from both the pre-intervention period in the intervention group and any changes in the outcome level or trend occurring in a control group when the intervention is implemented.[43] When more than one potential control population is available, the synthetic control method offers a robust approach for conducting a controlled interrupted time series. Synthetic controls are a weighted combination of multiple potential controls that best approximate pre-intervention trends in the intervention group.[44-49] Compared with use of a single control group, use of a synthetic control increases the likelihood of identifying a suitable control.[43 44 49] In this controlled interrupted time series, we used a synthetic control derived from all Canadian provinces other than BC.

Data sources

We identified prescription contraception dispensations to female individuals aged 15-49 years using the IQVIA Geographic Prescription Monitor database, a national database that captures outpatient pharmacy transactions for dispensed pharmaceutical products. This dataset was derived from a panel of about 6100 retail pharmacies, which captured 83% of all prescriptions dispensed, and estimates all dispensations using geospatial projection methods. This database provides monthly dispensation volumes for all prescriptions dispensed to all individuals regardless of insurance coverage or province. Dispensation volumes are disaggregated by province, age, and administrative gender[50] for all provinces in Canada, which enables cross provincial comparisons. This database has established validity and has been used extensively in research of medication use.[51-54]

We also created a provincial cohort of female (according to administrative gender in health records[50]) residents of BC aged 15-49 years with continuous provincial health insurance for the entire study period. We excluded individuals receiving income assistance or with First Nations Health Authority health coverage at any time during our study period because these groups already received full prescription coverage before the policy.[39] We identified our cohort using the BC Client Roster,[55] contraception dispensations using PharmaNet (a provincial dataset that captures all outpatient prescription dispensations),[56] and LARC episode initiation using Medical Services Plan billing records or LARC dispensations in PharmaNet.[57] We identified pregnancies in the population using practitioner billing and hospital discharge records.[58 59] Data linkage and preparation for these analyses were performed by the BC Ministry of Health.

Outcomes

We examined five monthly measures of contraception use. In the national prescription data, we examined: (1) number of monthly LARC dispensations and (2) number of monthly dispensations for all forms of prescription contraception (including LARC). In the BC population data, we examined: (3) rate of LARC use (percent of the cohort using LARC), (4) rate of prescription contraception use (percent of the cohort using any prescription contraception), and (5) LARC market share (percent of people who use prescription contraception who use LARC).[60]

Our two complementary data sources enabled analysis of dispensations for prescription contraception nationally and episodes of prescription contraception use defined at the record level based on individual data. Together, these comprehensively measure prescription contraception use in the population.

Analytical variables

In the national prescription database, we identified monthly dispensations for all prescription contraception and for LARC (supplemental table 1) in all Canadian provinces. To examine how the implementation of this policy may have differentially affected use across the population, we stratified monthly LARC dispensations and monthly dispensations for all prescription contraception (including LARC) by categories of patients' age (15-19, 20-29, 30-39, and 40-49 years).

In the BC population data, we identified people who used contraception by creating contraception treatment episodes, defined as continuous periods of contraceptive use. Episodes for short-acting methods (ie, pill, patch, ring, injectable) were constructed using dispensation date and days supplied, with discontinuation defined as a gap in supply lasting at least seven days. We defined LARC treatment episodes

using the date of LARC placement from billing records, when available (82% of intrauterine contraceptive device episodes and 73% of implant episodes). As billing records are sometimes incomplete, we assumed the placement date based on a year-specific mean dispensation-to-placement interval for LARC dispensations without an accompanying placement billing record. We examined records starting in April 2017 to detect LARC dispensations in place at the start of our study period. We discontinued LARC episodes if removal codes were found in billing records or if a dispensation record was found for a new, non-LARC contraceptive. We considered all prescription contraception episodes discontinued at the estimated time of conception for detected pregnancies. For LARC episodes without any discontinuation event, we assumed a three year duration for intrauterine contraceptive devices and two year duration for implants, based on prior literature for expected, real world episode duration.[61-63] Among people who used LARC, we separately examined the frequency of individuals who initiated LARC following at least three months of no active contraception use and individuals who initiated LARC within three months of a non-LARC contraception episode, with sensitivity analyses using a six month period to define new users (see supplemental table 2 for additional contraception episode information).

Statistical analysis

To create synthetic controls, we assigned a weight to each candidate control province (the nine Canadian provinces other than BC), with weights assigned using the R(Synth) package.[64] This method selects the weighted combination of potential controls that best approximates the level and trend in the intervention group before the policy. To achieve this weighting, we used optimisation to minimise the mean squared error (distance between the synthetic control and intervention group before the policy) by assigning weights ranging from 0 to 1 to each potential control.[47 64 65] As such, we included all nine potential control provinces in the synthetic control for both LARC dispensations and all prescription contraception dispensations, with weights ranging from 8% to 26% for individual provinces. Weighting structures are shown in supplemental table 3, while monthly plots for each province, resulting weighting schemes, and resulting synthetic control level and trend for each model are shown in supplemental figures 1-2. Level and trend before the policy were similar for both outcomes in the synthetic control and in BC, indicating appropriate control specification.

In our interrupted time series analysis of BC population data, we used segmented generalised least squares models to estimate the level (baseline or intercept) and trend before the policy, immediate level change when the policy was introduced, and gradual (trend) change after the policy was introduced. Our controlled interrupted time series models included additional parameters for group (difference between baseline level in BC *v* synthetic control), and interaction terms for trend and group before the policy (difference between pre-policy slope in BC *v* control), level and group when the policy was introduced (difference in level change in BC *v* control when the policy was introduced), and trend and group after the policy was introduced (difference in post-policy trend change in BC *v* control). We assessed seasonality and autocorrelation structures based on visual assessment of the autocorrelation function and partial autocorrelation function and selected the autocorrelation structure that yielded a Durbin-Watson statistic closest to 2 and with a non-significant Ljung-Box test.[41] In our controlled interrupted time series models, we compared pre-policy level and trend parameters in the synthetic control with those in BC using t tests; these results were not significantly different at the 0.05 level, indicating appropriate control specification. We modelled April 2023 as a phase-in period; the first policy month after the policy showed a spike in all outcomes, likely reflecting pent up demand, whereby individuals planning prescription contraception use delayed dispensation until the policy was introduced owing to the pending policy.[41] When models showed potential non-linearity, we added quadratic or log transformations and selected the model that minimised Akaike's information criterion. This resulted in the inclusion of a log transformation for all prescription contraception dispensations and quadratic terms in models for LARC use, people who initiated LARC within three months of using a non-LARC contraception method, and LARC market share. LARC dispensations were low each December, which we accounted for by adding a model parameter for all December months, following best practices in interrupted time series modelling.[66]

We used the resulting model estimates to estimate absolute policy effects (predicted level – counterfactual level) and relative policy effects (predicted level ÷ counterfactual level) 15 months after the policy was introduced. We used bootstrapping (with 2000 iterations) to estimate 95% confidence intervals (CI) around these summary measures.[67] To check for consistency across data sources, we compared dispensation volumes in national prescription data for BC with dispensation volumes from BC population data. All analyses were conducted in SAS version 9.4 and R version 4.4.1.

Patient and public involvement

We involved members of the public who had lived experience of seeking or using prescription contraception in the design of this research through our project specific public advisory committee.

Results

The number of monthly dispensations for LARC and for all prescription contraception (including LARC) in BC and in the synthetic control are shown in figure 1, with parameter estimates shown in table 1. The trend in LARC dispensations gradually declined in

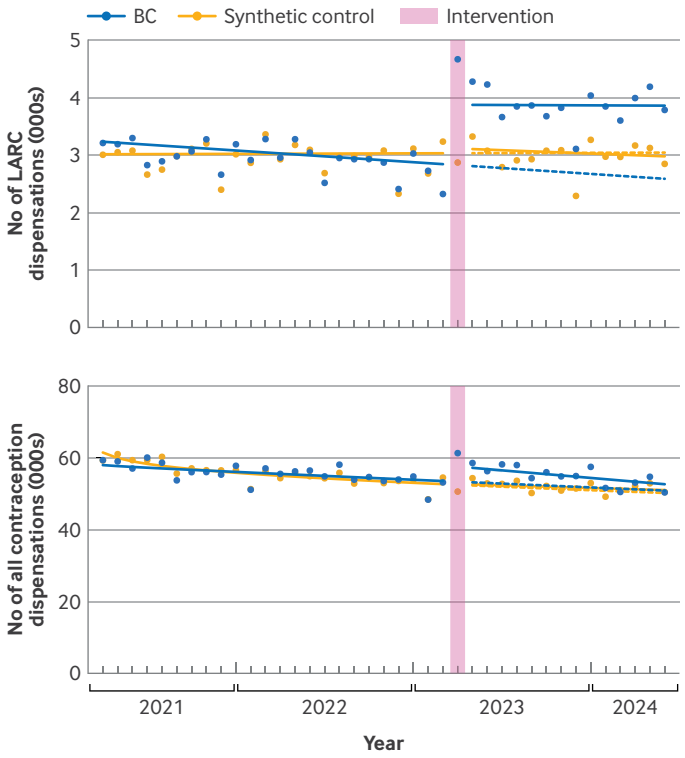

Fig 1 | Controlled interrupted time series analysis in British Columbia (BC; blue) and in a synthetic control derived from Canada's other nine provinces (yellow) before and after the introduction of BC's universal, no-cost contraception coverage in April 2023. Solid lines=observed trends before and after the policy; dashed lines=expected (or counterfactual) trends after the policy. Number of monthly LARC dispensations are shown in the top graph; when the policy was introduced, monthly LARC dispensations increased by 1050 (95% confidence interval (CI) 942 to 1487), and the declining trend attenuated by 16 (−20 to 39) dispensations per month thereafter. Monthly prescription contraception dispensations (for all types, including LARC) are shown in the bottom graph; when the policy was introduced, monthly dispensations increased by 4093 (95% CI 3156 to 4796), and the declining trend accelerated by −151 (−244 to −55) dispensations per month relative to the pre-policy trend in BC and to the change observed in the synthetic control. Figure is based on information licensed from IQVIA: GPM, 1 April 2021 to 30 June 2024. BC=British Columbia; CI=confidence interval; LARC=long-acting reversible contraception

BC before the policy by −17 (95% CI −30 to −7) per month, decreasing from 3249 (3067 to 3391) in April 2021 to 2841 (2616 to 2945) by March 2023 (fig 1, top). When BC's universal coverage was introduced, monthly LARC dispensations immediately increased by 1050 (942 to 1487) (representing the level change) and the declining trend attenuated by 16 (−20 to 39) dispensations per month relative to the pre-policy trend in BC and to the synthetic control (representing the trend change). Fifteen months after policy introduction (June 2024), we found that the policy resulted in an additional 1273 (963 to 1698) monthly LARC dispensations than would have been expected without the policy, amounting to a 1.49-fold (95% CI 1.34 to 1.77) increase. LARC dispensation level and trend remained similar in the control group when BC's policy was introduced.

For all forms of prescription contraception (including LARC; fig 1, bottom), we found 57 991 (95% CI 57 162 to 58 838) dispensations in April 2021 in BC, which declined by 204 (−826 to 411) dispensations per month before the policy. When the policy was introduced, monthly dispensations immediately increased by 4093 (3156 to 4796) relative to the synthetic control. After the policy was introduced, BC's declining trend in monthly dispensations accelerated by −151 (−244 to −55) per month, resulting in a post-policy trend of −336 (−406 to −261). Compared with expected volumes based on pre-policy trends in BC and in the synthetic control, the policy led to an additional 1981 (356 to 3324) monthly dispensations at 15 months, equating to a 1.04-fold (95% CI 1.01 to 1.07) increase. Before the policy, dispensation level and trend were similar in the control to BC and remained stable when BC's policy was introduced, which support the conclusion that no co-interventions affected the observed policy effects.

Stratified by age, we found that LARC dispensations increased across all age groups, but increases were most pronounced among individuals aged 20-29 and 30-39 years (fig 2). LARC were most frequently dispensed to individuals aged 20-29 and 30-39 years and least commonly to those aged 15-19 years (estimates in supplemental table 4). Declining trends before the policy were steepest among individuals aged 20-29 years and were relatively stable in other age groups. When BC's policy was introduced, we found significant level changes in LARC dispensations for all age groups, with the largest increases in the 20-29 and 30-39 year groups, and found that declining trends stabilised for individuals aged 15-39 years and reversed for those aged 40-49 years. At 15 months after the policy, LARC dispensations were higher than expected by 1.31 times (95% CI 1.09 to 1.57) for those aged 15-19 years, 1.70 times (1.56 to 2.24) for those aged 20-29 years, 1.40 times (1.26 to 1.63) for those aged 30-39 years, and 1.42 times (1.21 to 1.63) for those aged 40-49 years.

In age stratified analyses for all prescription contraception (supplemental figure 3; supplemental table 5), all age groups had significant level changes, although the magnitudes of increase were relatively small. With declining trends in all age groups after the policy was introduced, differences between observed and expected dispensation volumes were non-significant at 15 months, with the exception of those individuals aged 20-29 years. Declining trends for all prescription contraception dispensations found in the overall population were driven by those aged 20-29 years, for whom steep declines were noted both before and after the policy was introduced.

In the BC population data, we examined monthly prescription contraception use episodes among the 859 845 female BC residents that met our cohort inclusion criteria of continuous provincial health insurance coverage throughout the study period. We found that 78 207 individuals (95% CI 77 736 to 78 677), representing 9.1% (95% CI 9.0% to 9.2%) of our cohort, were using LARC in April 2021 (shown in fig 3, top; number of users shown in supplemental figure 4 and parameter estimates in supplemental tables 6-7). Trends before the policy were non-linear, initially increasing by 0.1% (0.0% to 0.1%) from April to May

Table 1 | Regression parameters from controlled interrupted time series models for monthly dispensation volumes of LARC and all prescription contraception (with 95% CIs) in a national prescription database

Regression parameters	Monthly dispensation of LARC	All monthly prescription contraception (including LARC)
Level and trend, before policy introduction		
Outcome level in April 2021 in synthetic control (intercept)	3013 (2960 to 3067)	61 809 (60 953 to 62 665)
Difference in outcome level in April 2021 in BC *v* control	236 (163 to 309)	−3818 (−5028 to 2607)
Slope in synthetic control	1 (−3 to 5)	−2357 (−3013 to −1654)
Slope in BC	−17 (−30 to −7)	−204 (−826 to 411)
Month-group interaction: difference in slope in BC *v* synthetic control	−18 (−23 to −12)	2153 (1217 to 3043)
Level and slope changes, after policy implementation		
Immediate change in outcome level in synthetic control at time of policy introduction (level change)	82 (−47 to 211)	279 (−313 to 870)
Difference in immediate change in outcome level at time of policy introduction in BC (*v* synthetic control)	968 (786 to 1150)	3815 (2978 to 4652)
Difference in slope between periods before and after policy and post-policy periods (trend change) in synthetic control	−10 (−25 to 4)	4 (−69 to 76)
Difference in trend change in BC *v* synthetic control	26 (6 to 47)	−154 (−257 to −51)
Predicted v counterfactual monthly dispensation volumes, 15 months after policy introduction*		
Difference in BC (predicted minus counterfactual)	1273 (963 to 1698)	1981 (356 to 3324)
Risk ratio in BC (predicted divided by counterfactual)	1.49 (1.34 to 1.77)	1.04 (1.01 to 1.07)
Difference in synthetic control (predicted minus counterfactual)	−65 (−373 to 349)	328 (−1095 to 1766)
Risk ratio in synthetic control (predicted divided by counterfactual)	0.98 (0.89 to 1.13)	1.01 (0.98 to 1.04)

Estimates presented in this table were derived from segmented generalised linear regression models used to implement controlled interrupted time series analysis. A linear model was used for LARC dispensations and a log transformation was used for all prescription contraception dispensations in the synthetic control. The counterfactual was the expected values for post-intervention outcome level and trend.
BC=British Columbia; CI=confidence interval; LARC=long-acting reversible contraception.
*Summary measures: data are effect estimate (95% CI).

2021, plateauing at 9.8% from March to September 2022, declining to 9.2% by March 2023. When BC's contraception coverage policy was introduced, monthly LARC use immediately increased by 0.2% (0.1% to 0.3%) in female residents of reproductive age, and increased a further 0.1% (0.1% to 0.1%) per month thereafter. Fifteen months after the policy, 11 375 (10 273 to 13 013) more female BC residents used LARC than would have been expected had the policy not been introduced, representing an additional 1.3% (1.2% to 1.5%) of the population and a 1.17-fold (95% CI 1.15 to 1.19) increase.

In April 2021, 187 418 (95% CI 185 785 to 189 050) individuals were using prescription contraception, representing 21.8% (95% CI 21.6% to 22.0%) of reproductive aged female residents of BC (fig 3, middle, supplemental figure 4, supplemental tables 6-7). Use before the policy was declining by −0.1% (−0.1% to −0.0%) of the population per month. Contraception use immediately increased by 0.3% (0.1% to 0.5%) when the policy was introduced and the slope increased by 0.1% (0.0% to 0.2%) per month, nearly offsetting the negative trend in the period after the policy was introduced. Overall, an additional 14 268 (13 039 to 19 431) female BC residents of reproductive age were using contraception 15 months after the policy was introduced, representing an additional 1.7% (1.5% to 2.3%) of the population using contraception than expected. This amounted to a 1.10-fold (95% CI 1.09 to 1.14) increase in users of all prescription contraception.

In April 2021, 41.8% (95% CI 41.7% to 41.9%) of prescription contraception users in BC used LARC (LARC market share), shown in figure 3 (bottom) and supplemental table 6. The LARC market share was increasing by 0.4% (0.3% to 0.4%) per month, reaching 47.8% (47.7% to 47.9%) before the policy was introduced. We found no immediate increase in LARC market share when the policy was introduced 0.0% (−0.1% to 0.2%), but the trend accelerated by an additional 0.1% (0.1% to 0.2%) per month after the policy. At 15 months after the policy, the LARC market share was 1.9% (1.2% to 2.3%) higher than expected based on the trend before the policy.

As shown in figure 4 (with parameter estimates in supplemental table 8), among individuals initiating LARC, most were new users of LARC. In April 2021, there were 2045 new LARC users (fig 4, top) and 584 LARC switchers (fig 4, bottom), with declining trends before the policy for both. When BC's contraception coverage policy was introduced, new LARC users increased by 403 (95% CI 315 to 491) individuals and LARC switchers increased by 119 (86 to 152) individuals. For individuals who were newly initiating LARC, trends reversed from a decline before the policy to an increasing number of initiators per month after the policy. Declining trends continued for LARC switchers after BC's policy change. Findings were similar with three month and six month thresholds used to define these subtypes (supplemental fig 5).

As shown in supplemental figure 6, the volume of contraception prescriptions dispensed in BC per month was nearly identical in our two data sources throughout the study period.

Discussion

Principal findings

Access to effective contraception is essential to reach reproductive population health and gender equity.[5] In this population based analysis, we found

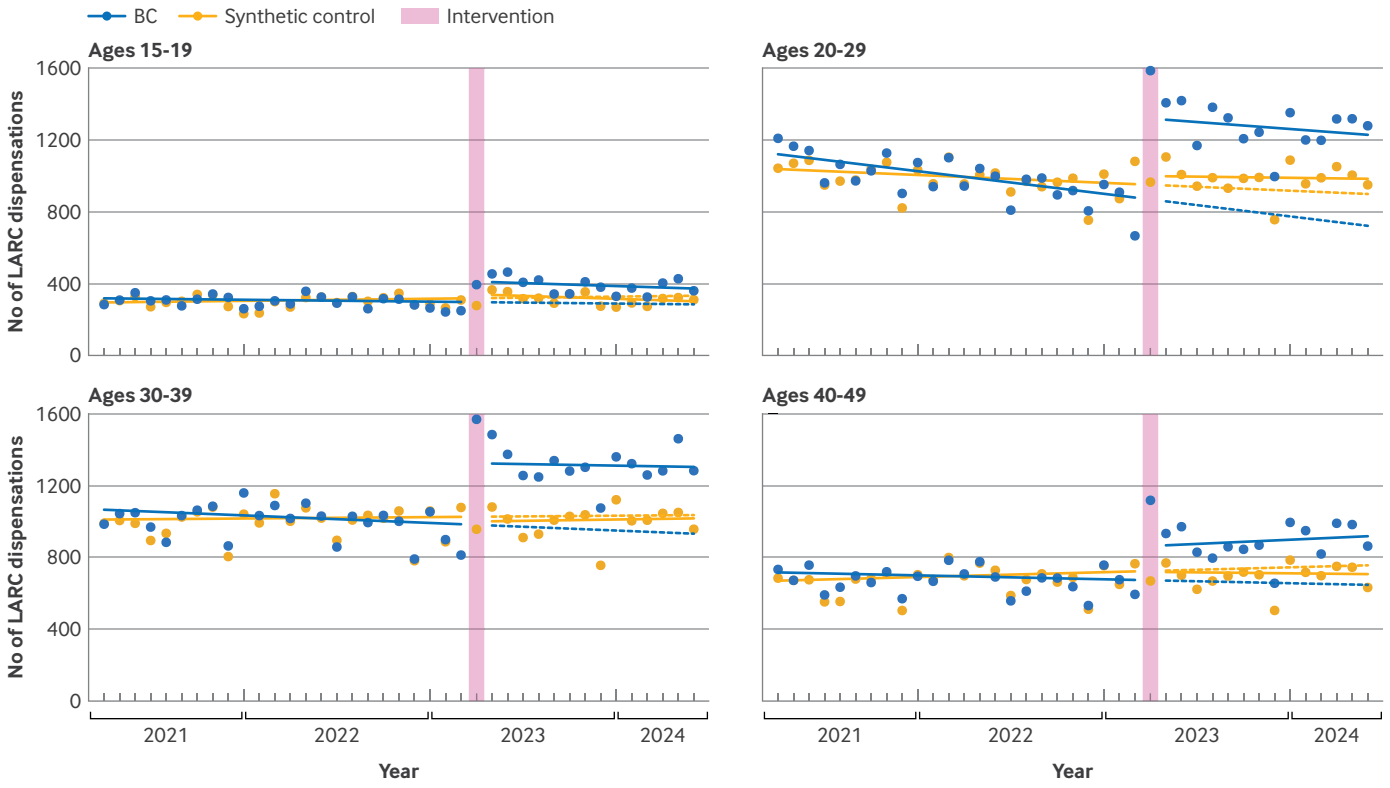

Fig 2 | Age stratified controlled interrupted time series analysis of the number of monthly LARC dispensations before and after the introduction of British Columbia's (BC) universal, no-cost contraception coverage in April 2023 in BC (blue) and in a synthetic control derived from Canada's other nine provinces (yellow) among female residents aged 15-19, 20-29, 30-39, and 40-49 years. Solid lines=observed trends before and after the policy; dashed lines=expected (or counterfactual) trends after the policy. Figure is based on information licensed from IQVIA: GPM, 1 April 2021 to 30 June 2024. BC=British Columbia; LARC=long-acting reversible contraception

that after 15 months of the introduction of Canada's first universal, no-cost, first-dollar contraception coverage policy, LARC dispensations increased by 49%, equating to an additional 11 375 individuals (1.3% of the population). These data represent a substantial increase in the use of LARC, which are the most effective contraception methods.[9 10] LARC dispensation increases were both immediate (1.3-fold increase) and sustained (1.49-fold increase 15 months after the policy). Even with a high baseline market share in BC, the policy resulted in a sizeable increase in LARC market share 15 months after the policy, which was mainly driven by new users of LARC. Together, our findings suggest that there was substantial unmet need for prescription contraception (especially LARC) before the policy and that costs were an important barrier to contraceptive use and method choice. These results provide clear evidence that provision of universal prescription contraception coverage, at no cost to patients, substantially increased prescription contraception use and, particularly, LARC use.

Most of the increase in contraception use was for LARC: an estimated 11 375 (79.7%) of the 14 268 additional users of all prescription contraception 15 months after the policy were additional LARC users. Although the policy resulted in a significant immediate increase in dispensation volumes for all prescription contraception, dispensations per month continued to decline after the policy was introduced. Such a decline in dispensations for all prescription contraception should be expected as the LARC market share increases because one LARC dispensation can provide 3-10 years of contraception coverage. Thus, if more individuals use LARC, including those switching from a short-acting method that requires multiple dispensations, the dispensation volumes for all prescription contraception are expected to decline more rapidly while use continues to increase. However, declining trends in the percentage of reproductive aged female BC residents using prescription contraception both before and after the policy raise some concerns. These decreasing trends were driven by steep declines in trends before and after the policy was introduced among those aged 20-29 years. This finding is consistent with reported declines in contraception use found in other settings such as England,[68] which has been attributed to false or inaccurate contraception information on social media[69-71] and merits further research.

Comparison with other studies

The high LARC market share reported in this study (nearly half of prescription contraception users) differs from estimated market share in other large

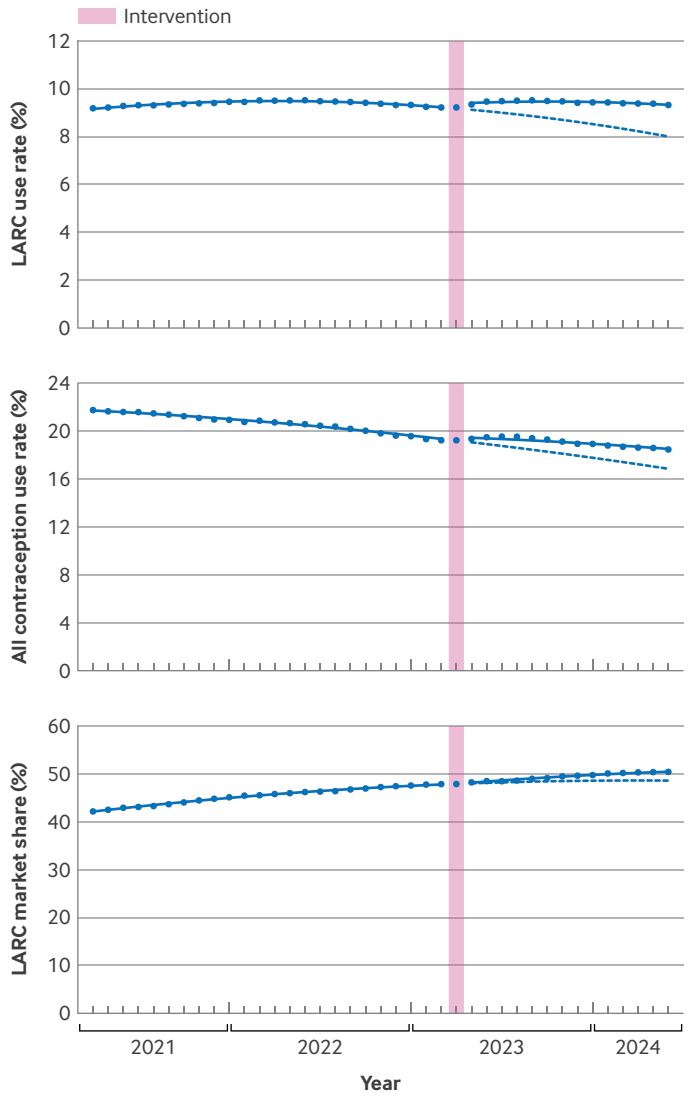

Fig 3 | Percentage (%) of female residents of British Columbia, Canada aged 15-49 years using (A) LARC; (B) all prescription contraception (including LARC); and (C) LARC market share, defined as the proportion of all users of contraception who used LARC. Solid lines=observed trends before and after the policy; dashed lines=expected (or counterfactual) trends after the policy. In April 2021, 9.1% (95% CI 9.0% to 9.2%) of reproductive aged female residents used LARC, and use showed declining trends from September 2022. Use increased by 0.2% (0.1% to 0.3%) immediately when the policy was introduced and the slope increased by 0.1% (0.1% to 0.1%) per month. In April 2021, 21.8% (21.6% to 22.0%) of reproductive aged female residents used prescription contraception, with use declining by −0.1% (−0.1% to −0.0%) per month. Use increased by 0.3% (0.1% to 0.5%) immediately when the policy was introduced, and the slope increased by 0.1% (0.0% to 0.2%). At baseline, 41.8% (41.7% to 41.9%) of contraception users were using LARC, which increased in the pre-policy period by 0.4% (0.3% to 0.4%) per month. No level increase in LARC market share was noted when the policy was introduced 0.0% (−0.1% to 0.2%), but the slope increased by 0.1% (0.1% to 0.2%) per month. CI=confidence interval; LARC=long-acting reversible contraception

populations,[1] although similar estimates have been reported in specific populations with universal contraception coverage (eg, US active duty military service members).[72] The high baseline market share in BC may be due to existing policies, including a programme that provided free contraception after abortion from 2017 to 2024. Existing evidence suggests that such increases in LARC will reduce unintended pregnancy, abortion, and long term costs to individuals who often bear the cost of prescription contraception and reproductive health services.[7 9] With costs spread over a multiyear episode of use, LARC offers the most cost-effective contraceptive option.[60]

This study used high quality, population based, prescription and health administrative data and a robust, quasi-experimental design to evaluate the effect of a universal contraception coverage policy across a large, geographically and demographically diverse population. The effect of BC's universal prescription contraception coverage is similar to estimates reported for contraception cost coverage programmes that targeted specific demographic groups[28] or small, restricted populations.[73] The effect was larger (particularly for LARC use) than a recent evaluation of the removal of contraception cost sharing in the US through the Affordable Care Act.[34] As the policy focus for contraception coverage is usually increasing LARC use, owing to superior effectiveness and cost-effectiveness,[34 60] previous research has largely evaluated contexts in which only LARC coverage was provided or has coupled cost sharing interventions with LARC informational interventions.[37 73] However, BC's policy was broad, providing coverage for all forms of prescription contraception to emphasise patient choice and avoid reproductive coercion. Furthermore, BC's policy was not coupled with counselling specifically about LARC or knowledge interventions.

Strengths and limitations

Our results should be interpreted in the context of potential study limitations. We cannot detect the fraction of dispensed contraception that was actually used by patients in either data source. We have assumed that all dispensed LARC was placed when specific billing records for placement were not found (for 18% of intrauterine contraceptive device episodes and 27% of implant episodes). Furthermore, we relied on an assumed maximum LARC duration to end LARC episodes when records lacked a removal code; this assumption triggered the end of about 50% of LARC episodes over the study period. As intrauterine contraceptive devices can be used for up to 7-10 years and implants for three to five years, our three year maximum intrauterine contraceptive device duration and two year maximum contraceptive implant assumption was conservative and could underestimate LARC use.[63 74] The national prescription database did not have data on copper intrauterine contraceptive devices because these devices are not pharmaceutical products. However, in BC population data, we found that these represent a small fraction of all intrauterine contraceptive devices (about 5-10%). Neither data sources had information on contraception provided directly in public health clinics that do not use fee-for-service billing or report dispensed medications to the provincial outpatient prescription database. Together, these are estimated to represent a small proportion (about 2%) of all prescription contraception use in BC.

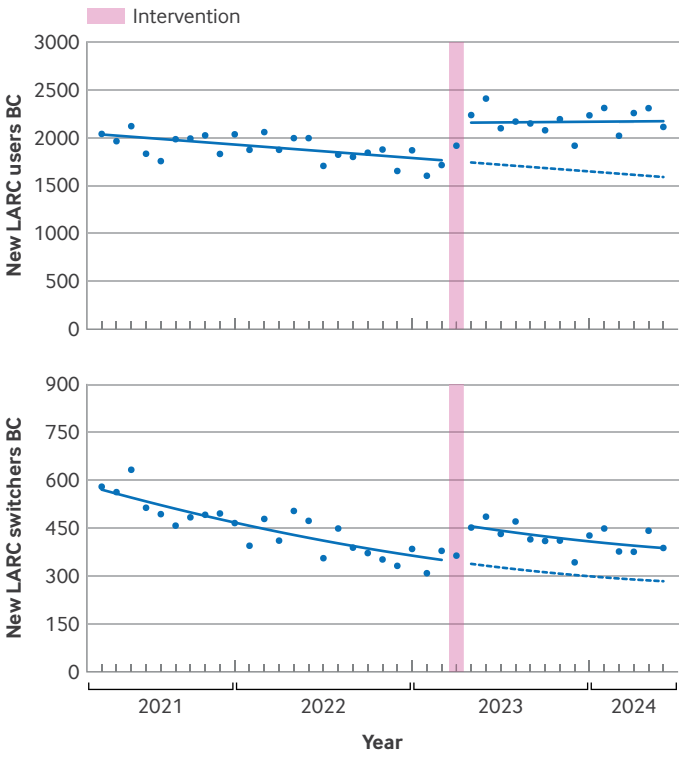

Fig 4 | Number of female residents who use LARC in British Columbia, April 2021 to June 2024, that (top) initiated LARC after at least three months with no contraception use (new LARC users) and (bottom) initiated LARC within three months of using a non-LARC contraception method (LARC switchers). Solid lines=observed trends before and after the policy; dashed lines=expected (or counterfactual) trends after the policy. BC=British Columbia; LARC=long-acting reversible contraception

The national prescription database, which provided data for the nine potential control provinces, lacks individual level data required to estimate use rates and LARC market share; therefore, we were unable to conduct a controlled interrupted time series analysis for these outcomes. This study does not capture non-prescription contraception methods (eg, condoms, withdrawal, or methods based on fertility awareness), which are used by an estimated 16% of contraception users in Canada[8] and were outside the scope of our study. In BC, some persistent barriers specific to LARC, such as inadequate workforce able to promptly place LARC after dispensations (especially in the early post-policy period[75]), could have delayed immediate policy impacts or attenuated the overall increase in LARC. Although, together, these data limitations might slightly underestimate prescription contraception use, our estimated effects of BC's contraception coverage policy are unlikely to be affected due to our quasi-experimental design; we anticipate that these would not have shifted at the same time as the policy change. Future areas for research include examining impacts of this policy on pregnancy outcomes (eg, abortion and birth rates and adverse events associated with contraception use and pregnancy) and of other outcomes affected by contraception use that require longer follow-up after the policy (eg, changes in educational or economic attainment[6 35 36]).

Policy implications

Our findings provide evidence that populations shift towards LARC when cost related barriers to all prescription contraceptives are removed. This supports broad cost sharing interventions that do not prescriptively target specific contraception methods or restrict coverage to targeted populations.

Conclusions

This study provides a comprehensive evaluation of how universal, first-dollar coverage for all prescription contraception, without other behavioural or informational interventions, affects prescription contraception use in a large, diverse population. In the context of a universal, single payer health system, contraception coverage results in overall higher prescription contraception use, specifically higher LARC use, and provides greater choice in the selection of a contraceptive method.

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Data sharing: The code used to analyse the data in the paper can be found in the supplemental files. The data underlying the paper can be requested for research from IQVIA and from the British Columbia Ministry of Health in accordance with instructions found here: https://www2.gov.bc.ca/gov/content/health/conducting-health-research-evaluation/data-access-health-data-central

Transparency: The lead author (the manuscript's guarantor) affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

Dissemination to participants and related patient and public communities: In collaboration with our Public Advisory Committee, and with support from partners, we will produce knowledge translation outputs for patient and public audiences. These will include social media content and an accompanying public-facing summary or opinion piece, and these will distil key points for journalists to share results with the public.

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Web appendix: Extra material supplied by authors