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Original Article

Urgent care centres reduce emergency department and primary care same-day visits: a natural experiment

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Abstract

The aim of this study is to evaluate the impact of urgent care centres' (UCCs) implementation on emergency department (ED) and same-day visits in primary care in a Chilean public healthcare network. Quasi-experimental design study assessing changes in patient visits after UCC implementation in a local health district. Ten family health centres (FHC), nine UCCs and three EDs in the Talcahuano Health District, Chile. A total of 1 603 055 same-day visits to FHC, 1 528 319 visits to UCCs and 1 727 429 visits to EDs, monthly grouped, from 2008 to 2014. Data were obtained from the Monthly Statistical Register Database. We used quasi-experimental methods to evaluate the impact of UCC implementation on ED visits and same-day visits to FHC. We used a difference-in-difference analysis with seasonal adjustments to control potential confounders. We used a triple difference model to test for potential short-term effects. We used as an intervention a group of FHCs and EDs that implemented UCCs from 2008 to 2014 and, as a comparison group, the FHCs and EDs that implemented UCCs before that period. We observed a 5.70% (95% CI: −11.05 to −0.35) decrease in the same-day visits rate to FHCs and a 2.69% (95% CI: −3.96 to −1.43) reduction in ED visits after UCC implementation. The negative trend in same-day visits was more pronounced in children and adolescents (−14.18%; 95% CI: −20.10 to −8.25). The negative trend in ED visits was more pronounced in adult (−4.15%; 95% CI: −5.46 to −2.83) and elderly population (−2.24%; 95% CI: −4.00 to −0.48). We also confirmed that our results are not driven by transient short-term effects after the intervention. UCC implementation reduced ED visits. However, they also reduced same-day visits to primary care centres. This could have a negative impact on the quality of primary care provided.

Keywords: Acess, emergency services, primary healthcare

Introduction

When patients have an acute health need, they face the decision whether to visit a public primary healthcare centre, a private physician or an emergency department (ED). According to individual factors, such as the perceived disease seriousness (Uscher-Pines *et al.*, 2013; Butun and Hemingway, 2018) and time availability (Phelps and Newhouse, 1974; Acton, 1975; Coffey, 1983; Cauley, 1987; Janssen, 1992; Vistnes and Hamilton, 1995); and institutional factors, such as co-payments or accessibility of services (Flores-Mateo *et al.*, 2012; Morgan *et al.*, 2013; Uscher-Pines *et al.*, 2013), patients choose between visiting immediate care services (e.g. the ED) or scheduled-care services (e.g. primary healthcare).

Key Messages

- Most countries have implemented strategies to expand access to medical care such as urgent care centres (UCC), walk-in clinics or after-hours care. The impact of these facilities on service use has been scarcely evaluated, especially in primary care.
- We observed that UCC implementation reduces visits in emergency departments, but also same-day visits to primary care. This could be consequence of a substitution of primary care visits and it could have a negative impact on the quality of the services provided.

Despite the expansion of primary care in almost every country in the world, for many people the first point of access to the health system is the ED. Many ED visits are used by patients with low acuteness conditions, contributing to service overcrowding and leading to a large number of visits classified by providers as inappropriate (Carret *et al.*, 2009). As a consequence of this misuse, waiting time, economic costs and providers' workload are increased: therefore, the quality of care could be adversely affected.

To address this problem, strategies have been implemented in most countries to reduce ED visits through the expansion of primary healthcare access. The main strategies comprise walk-in clinics (WiCs), which are associated to primary care facilities, urgent care centres (UCC) or retail clinics (stand-alone facilities), and after-hours care at a primary care practice. The incidence of these strategies is supported by studies that found that people who visited the ED more often consistently reported worse access to primary healthcare (Grumbach *et al.*, 1993; Carret *et al.*, 2009; Cowling *et al.*, 2013; O'Malley, 2013; Zickafoose *et al.*, 2013; Huntley *et al.*, 2014).

The rationale behind these policies is that inappropriate use of ED visits could be safely substituted by alternative services (Weinick *et al.*, 2010). Despite their wide implementation, these services have scarcely been evaluated. One systematic review suggested that evidence about the effectiveness of these strategies is limited (Ismail *et al.*, 2013). Two studies in London showed a reduction in ED visits after the implementation of extended access (evenings and weekends) to primary care (Dolton and Pathania 2016; Whittaker *et al.*, 2016). Another study, in Australia, found a decrease in ED visits after the implementation of a similar policy (Buckley *et al.*, 2010). On the other hand, in Spain, the implementation of emergency visits to primary care was associated with an increase in ED visits (Oterino de la Fuente *et al.*, 2006).

The potential substitution of primary healthcare visits by these alternative services has been less explored. Only one study evaluated the impact of WiCs in other primary care activities and did not observed any statistically significant results (Chalder *et al.*, 2003). It is still uncertain whether these alternative services act as substitutes or complements to regular primary care activities.

UCC implementation started in Chile in 1990 after the enactment of a policy, designed to strengthen primary care, entitled 'Programa de Reforzamiento de la Atención Primaria de Salud'. This policy had six components; one of them was the implementation of UCCs in primary care. The aim of this policy was to solve pressing problems of access, and resolve capacity and coverage issues (Ministry of Health, 2005).

UCCs are defined by the Ministry of Health as complementary services to regular care provided in the Chilean primary care system. They provide care for low- and medium-complexity health problems during non-business hours. They may be operated independently or as part of a family health centre (FHC) (Frenz *et al.*, 2014).

Consequently, UCCs in Chile are a mix between UCCs and after-hours care. The clinical teams in UCCs comprise one or two physicians supported by paramedics and other technicians, according to local availability. The first UCCs were located in metropolitan urban areas and were progressively expanded throughout the national territory according to decisions by local authorities. To finance UCCs operation, local health districts sign a contract every year with municipalities to transfer money coming from the Ministry of Health.

After UCC implementation in Chile, a national downward trend was observed in same-day visits to primary healthcare centres and ED visits in public hospitals. Currently, UCCs are the most visited public health services. In 2013, there were almost 9 million visits to UCCs, surpassing the number of same-day visits in primary care and ED visits in public hospitals (Facultad de Economía y Negocios, 2016). The decrease in FHC visits cannot be explained by a decrease in demand; they are booked as quickly as always. The decrease in FHC visits is probably associated with providers' decisions to restrict visit availability because they see UCCs as legitimate outlets for same-day visit demands.

Although UCCs are defined as a complementary service, they appear to be acting as a substitute of same-day visits in primary care and of ED visits in public hospitals. Because UCCs are open during non-business hours, and visits do not require previous scheduling, these services are more convenient to users than regular services provided in primary care. In addition, because UCCs are closer to communities than EDs and have shorter waiting time, these services are more convenient than the regular care provided in EDs in public hospitals.

In this context, we consider UCC implementation a complex organizational intervention in which local authorities must decide whether to adopt an alternative service to the regular care they provide. We hypothesize that this new service substitutes for regular care activities and has a negative impact on the rate of same-day visits in primary care and ED visits in public hospitals in the Chilean public healthcare network.

Institutional context

In Chile, more than three-quarters of the population is covered by a public health insurance fund (FONASA). FONASA provides access to care for its beneficiaries mainly through an integrated public health network that offers primary, secondary and tertiary care. Primary care services are provided by FHCs, community healthcare centres (CHC) and rural healthcare facilities managed by the local county governments (*municipalidades*). Secondary and tertiary care is provided by specialty outpatient centres and hospitals managed by public healthcare districts (*Servicios de Salud*).

An FHC is a primary care facility operated by an interdisciplinary team comprising physicians, nurses, midwives, physical therapists, psychologists, social workers and dentists. CHCs and rural

Table 1 Public healthcare network in Talcahuano Health District, 2008–14

City	Family healthcare centre (FHC)	Urgent care centre (UCC)	ED in public hospital
Talcahuano	San Vicente	San Vicente[a]	Las Higueras
	Paulina Avendaño Pereda	Esmeralda[a]	
	Los Cerros	Los Cerros	
	Leocán Portus Govinden	Leocán Portus Govinden	
Hualpén	Talcahuano Sur	Talcahuano Sur[a]	
	Hualpencillo	Hualpencillo	
	La Floresta	–	
Tomé	Bellavista	Bellavista[a]	Tomé
	Alberto Reyes	Alberto Reyes[a]	
Penco	Penco	Penco	Penco

[a]UCC implemented during study period.

healthcare facilities are satellite installations that have the same clinical teams and depend administratively on FHCs. Each FHC, and its satellite facilities, provides acute, chronic and mental healthcare, among other services. People can enrol in any FHC located in either the county they live in or the one in which they work. An FHC population ranges between 12 000 and 55 000 beneficiaries.

One of the main difficulties at the FHCs is the shortage of physicians to perform same-day visits. Same-day visits are provided by physicians from 08:00 to 20:00 h Monday to Friday. Patient lists are usually built using a telephone scheduling appointment system that operates from 06:00. These appointments are booked until quotas are filled on a first come, first-served basis. Patient access to visits depends on the quota opened daily (40–50). A same-day visit usually takes 10 to 15 min. Generally, the physician has access to clinical record, and patients can be referred to other members of the interdisciplinary working team for preventive and curative care.

On the other hand, UCCs are usually located inside FHCs and provide out-of-hours care. These services are operated by a physician, a nurse, two paramedics, one driver and an administrative assistant. Visits usually take less than 10 min, during which the physician does not have access to regular clinical records and cannot make referrals to other members of the interdisciplinary team. If further clinical study is required, patients are supposed to schedule an appointment for same-day visits in an FHC.

EDs at public hospitals provide 24-h emergency care. Waiting time depends on a five-level triage scale that differentiates patients according to the severity of their conditions. Patients can be self-referred or referred from other healthcare facilities. As in other countries, EDs are usually overcrowded, and a large portion of all visits are categorized as non-urgent conditions. Publicly insured patients can additionally pay for a private physician visit that it is only partially covered by public health insurance.

Funding for these three services (FHC, UCCs and EDs) comes from FONASA and is free of charge at the point of care for most of the users. EDs are funded by an annual budget transferred from FONASA to the Local Health Districts. For services provided by Local County Governments, funds are transferred through two distinct schemes: (1) FHCs are financed by a prospective per capita allocation according to the number of population assigned in each facility (75% of the total annual budget), and (2) UCCs are financed by an annual contract (*convenio*) between a local health district and a local county government (5–10% of the total annual budget). Usually, funds received in this manner by UCCs are insufficient to pay for the total operating cost, and the local county government must provide its own funds to pay for the remainder (Parada Valenzuela, 2016). Despite this financial deficit, local managers value the UCCs highly because they solve the pressing problem of access to same-day medical care.

Methods

Our research was conducted in the Talcahuano Health District (*Servicio de Salud Talcahuano*) from 2008 to 2014. The district covers four cities: Talcahuano, Hualpén, Penco and Tomé, located in the Bío-Bío Region. In the study period, the projected population of these four cities was nearly 370 000 inhabitants with almost 310 000 persons covered by public health insurance.

The Talcahuano Health District network has 10 municipal FHCs, nine of them with a UCC, and three public hospitals with an ED (Table 1). Compared with others, this district has the highest rate of UCC by publicly insured population in the country. In our study, all UCCs are operated as a part of the FHC.

All public hospitals in the Talcahuano Health District were created before 2008. Las Higueras, the referral hospital, is located in Talcahuano, near Hualpén, so most emergency room attendees come from these cities. Tomé and Penco have community hospitals, and people living in these cities generally seek emergency care in these hospitals.

Almost all FHCs were created before the study period. The only one implemented during the study period was FHC La Floresta in Hualpén (September 2010); therefore, we excluded it from the analysis. In terms of existing UCCs, four were created before the study period (Los Cerros, Leocán Portus Govinden, Penco and Hualpencillo), and five were created during the study period (San Vicente in June 2011, Esmeralda in July 2011, Talcahuano Sur in June 2011, Bellavista in April 2012 and Alberto Reyes in May 2008).

During the study period, there were 1 603 055 same-day visits to FHCs, 1 528 319 visits to UCCs and 1 727 429 visits to EDs.

Data collection

Our data for healthcare utilization at the primary care and hospital level were obtained from the Monthly Statistical Register Databases (*Registro Estadístico Mensual*, or REM) of the Ministry of Health for the years 2008–2014. These data were periodically reported by healthcare facilities and compiled by national authorities following standardized guidelines and subject to quality assurance processes. The databases include monthly aggregate data of services utilization for sex- and age-specific groups and are available upon request to the Ministry.

We considered same-day visits in primary care as any appointment to a medical provider in a FHC or its satellite facilities,

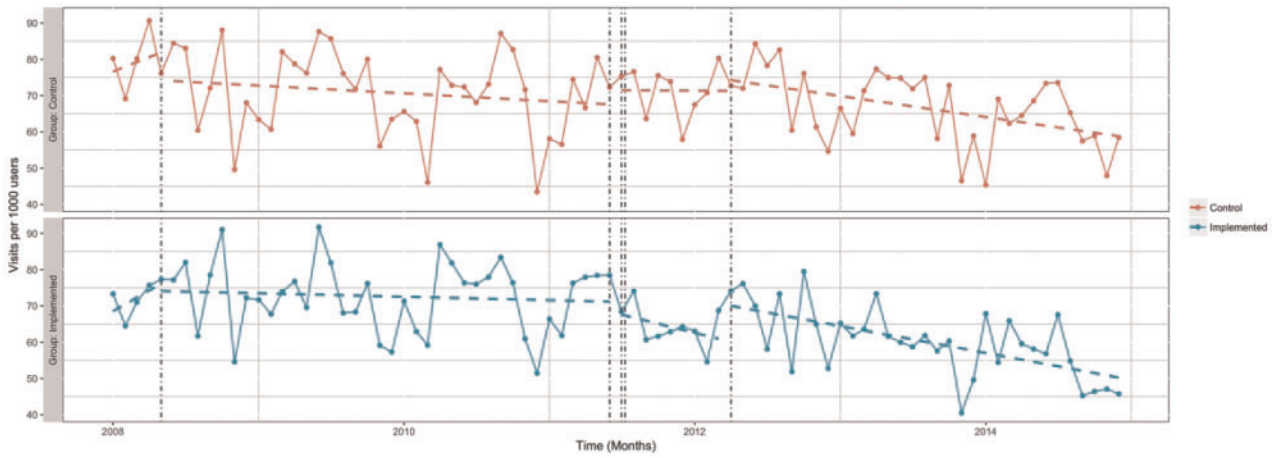

Figure 1 Trends in same-day visits in all-ages group in FHC with UCC created before the study period (Control Group) and during the study period (Implemented Group).

registered in REM A04 section A. This category included all 'same-day visits' for a wide variety of acute health problems as respiratory infections, urinary infections, skin infections, minor trauma, gynaecological and obstetrical disorders, and common mental health disorders, among others. This category excluded any scheduled visit to a primary care programme for chronic care, preventive care or mental healthcare.

In terms of UCC visits, we used any medical visit reported by a UCC. Finally, we considered as ED visits all visits to physicians in an ED of public hospitals. The size of age- and sex-specific population groups by FHC used to calculate utilization rates was provided by FONASA. Exact implementation dates of new UCCs were obtained from REM and were confirmed by health providers.

Since this study used non-individual secondary data which are registered anonymously, we did not require institutional review board approval.

Statistical analysis

To test our hypothesis, we used a quasi-experimental design to evaluate the impact of UCC implementation on same-day visits rates in primary care and ED visits rates in public hospitals.

In our first model, the outcome was the utilization rate of same-day visits in each FHC in a given month, evaluating the impact of UCC implementation as the intervention of interest because these new services could have an impact on user' preferences and provider's behaviours, thus changing regular care utilization patterns. We adopted a difference-in-difference analysis, using as a control group the four FHCs that had implemented a UCC before the study period.

Two important assumptions were made adopting this approach: (1) that sufficient time had passed between UCC implementation in control FHCs and the initial observation time of our study. Therefore, if there was any effect after UCC implementation, the rate of health visits utilization would have been modified already, reaching a new stable steady state; (2) in the absence of other interventions during the study period, we should see parallel trends between the intervention and control groups. Assumption (1) is theoretically reasonable, because UCC in the control group had been implemented in June 2007 at the latest (6 months before our observation period). Moreover, trends observed in both groups at the beginning of the observation held the parallel trend assumption (Figure 1). Assumption (2) is observable in the same figure. Parallel trend assumption holds in the time before the implementation of the first four UCCs. Notably, after the nearly concurrent opening of three UCCs between June and July 2011, a clear change in the slope of same-day visits was observed only in the group affected by the intervention.

In our second model, the outcome of interest was the rate of ED visits. Accordingly, the unit of analysis was each hospital of the corresponding health district in a given month. During the study period, the service area of two hospitals opened at least one UCC. We used the third hospital, which opened a UCC before the study period, as a control group for the difference-in-difference model. As a sensitivity check, we present in the supplemental material results using a before-and-after approach in a fixed-effect regression framework in which each hospital's pre-intervention period served as a control, adjusting for invariant, hospital-specific characteristics.

Due to the absence of randomization on treatment allocation, special considerations were taken to minimize potential confounders in both models. To account for invariant, centre-specific characteristics, we incorporated a fixed-effect term for each FHC, allowing for different slopes for each one. Time variant effects and potential exogenous effects were captured using a full set of time dummy variables (time-fixed effects) to account for any potential unmeasured external shocks that could affect the outcomes. We tested this fully adjusted FHC and time-fixed effects compared with alternative models, using modelling time as a continuous variable, and monthly dummy variables to account for seasonality. Alternative models were tested based on the parsimony and goodness of fit, using the Akaike information criterion (AIC), selecting the fully adjusted model with the lower value of AIC. Due to the nature of the data, heteroscedasticity and autocorrelation consistent standard errors were used to estimate and report 95% confidence intervals and hypothesis testing. All models were estimated for different demographic groups: children and teenagers (under 20 years), adults (20–64 years), elderly (65 years and over) and all ages.

The same-day visits effect model was defined as:

$$\log(Y_{it}) = \gamma\ group_i + \tau\ time_t + \delta\ DID_{it} + \sum_{i=1}^{n} \alpha_i fhc_i + Z_{it} + \varepsilon_{it} \quad (1)$$

With Y_{it} as the number of visits per 1000 persons in FHC i at time t (months). $Group_i$ is a dummy variable taking the value of 0 in

control FHC and 1 in FHC that had implemented a UHC during the study period; γ represents the effect of been in the treated vs control group. *Time* is a variable that capture the different intervention periods on implementation of a UCC; τ represents the effect of time periods after the implementation of UCC compared with the pre-implementation time. *DID* is a dummy variable that takes the value of 1 at FHC *i* at times *t* when a UCC has been implemented. Therefore, δ is the difference-in-difference estimator that captures the effect of the implementation of the UCC. Fhc_i represents a vector of dummy variables specific for each family health centre *i*, with α_i the fixed effect for each. Z_{it} is a vector of adjustment co-variables and their coefficients including a set of monthly time dummy variables, and ε_{it} the error term.

The emergency care effect model was defined as:

$$\log(Y_{it}) = \gamma\ \text{treat}_i + \tau\ time_t + \delta(\text{treat}_i * time_t) + \sum_{i=1}^{n} \alpha_i hosp_i + Z_{it} + \varepsilon_{it} \quad (2)$$

With Y_{it} the number of ED visits per 1000 persons in public hospital *i* at period *t* (months), γ represents the effect of been in the treated vs control group at baseline, τ represents the effect of time periods after the implementation of UCC compared with the pre-implementation time, δ is the difference-in-difference estimator that captures the effect of the implementation of the UCC, α_i is the fixed effect for each hospital *i*, Z_{it} is a vector of adjustment co-variables and their coefficients including a set of monthly time dummy variables, and ε_{it} the error term.

To test the robustness of our results and test potential short-term effects after the implementation, we implement a triple difference model specified as:

$$\log(Y_{it}) = \gamma\ group_i + \tau\ time_t + \rho\ short_t + \delta\ DID_{it} + \varphi\ DDD_{it} + Z_{it} + \varepsilon_{it} \quad (3)$$

With Y_{it} as the number of visits per 1000 persons in FHC *i* at time *t* (in months). $Group_i$ is a dummy variable taking the value of 0 in control FHCs and 1 in FHC that had implemented a UHC during the study period; γ represents the effect of been in the treated vs control group. $Time_t$ is a variable that capture the different intervention periods on implementation of a UCC for each time *t*; τ represents the effect of time periods after the implementation of UCC compared with the pre-implementation time. $Short_t$ is a dummy variable that takes values of 1 in the short-term (6 months) after the implementation of a UCC and 0 otherwise; ρ represents the effect of this short-term period on the number of visits; *DID* is a dummy variable that takes the value of 1 at FHC *i* at times *t* when a UCC has been implemented. Therefore, δ is the difference-in-difference estimator that captures the effect of the implementation of the UCC. *DDD* is a dummy variable that takes the value of 1 at FHC *i* at times *t* from the moment of a UCC implementation until 6 months after and 0 otherwise. φ is the difference-in-difference estimator that captures the short-term effects of the implementation of the UCC. Z_{it} is a vector of adjustment co-variables and their coefficients including a set of monthly time and family health centre dummy variables to account for fixed effects, and ε_{it} the error term.

All statistical analysis were performed using R 3.5.1 (R Foundation for Statistical Computing, 2016). Further information about model specification is included in Supplementary data.

Results

In FHC model, we observed a negative implementation effect in adjusted model for all-ages group (−5.70%; CI 95%: −11.05 to −0.35). In subgroup analysis, the most affected was the children and adolescent group with a 14.18% (95% CI: −20.10 to −8.25) reduction in the adjusted model (Table 2). These results could be underestimated because the control group also was affected.

These results are consistent with Figure 1, which displays an immediate downward trend after the implementation of four UCCs between 2011 and 2012. This biggest decrease seems to occur shortly after the implementation of UCC in mid-2011, This negative trend was not observed in the control group in 2012 and was less pronounced during 2013–14.

To exclude that the intervention effects are only short-term changes, we did a triple difference model (Table 3) that provided evidence that the implementation effect persisted over time. We did not observe any substantial change in the implementation effect after adjusting by short-term effect estimators (see Tables 2 and 3).

In the emergency care model (Table 4), we observed a decrease in the ED visit rate after UCC implementation in the all-ages group (−2.69%; 95% CI: −3.96 to −1.43). The most affected group was the adult group (−4.15%; 95% CI: −5.46 to −2.83), followed by the elderly group (−2.24%; 95% CI: −4.00 to −0.48). In addition, we observed a negative association between FHC visits and ED visits in the all-ages group and a slightly positive association between UCC and ED visits (Table 3).

As a sensitivity check, we did a fixed-effect regression, using a before-and-after approach, in which we observed a dose-response decrease by −2.69% (95% CI: −4.28% to −1.1%) in the ED visits rate per UCC implemented. This impact was most pronounced in the adult group (−4.15%; 95% CI: −5.81 to −2.48). Also, we performed a triple difference model that excluded any short-term effect. Both analyses are available in Supplementary data.

Table 2 Difference-in-difference model results in PHC visits

	<20 years		20–64 years		>65 years		All ages	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Difference-in-difference	−17.64*** (−21.14, −11.13)	−14.18**** (−20.10, −8.25)	11.59*** (5.52, 17.65)	−2.37 (−7.92, 3.17)	−3.25 (−10.27, 3.77)	−5.95* (−12.44, 0.55)	0.36 (−5.52, 6.24)	−5.70** (−11.05, −0.35)
Observations	756	756	756	756	756	756	756	756
Adjusted R^2	0.07	0.76	0.05	0.74	0.03	0.54	0.05	0.72

Impact of new UCC opening in same-day visits per 1000 patients. Coefficients are reported as % change. Robust 95% CI in parentheses. Model 1: crude model. Model 2: fully adjusted model., ***Significant at the 1% level., **Significant at the 5% level., *Significant at the 10% level.

Table 3 Triple difference model results in PHC visits

	<20 years		20–64 years		>65 years		All ages	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Difference-in-difference	−17.85*** (−24.38, −11.31)	−14.18**** (−20.17, −8.19)	11.57*** (5.52, 17.61)	−2.37 (−7.92, 3.18)	−3.28 (−10.30, 3.74)	−5.90* (−12.39, 0.59)	0.32 (−5.56, 6.20)	−5.63** (−11.01, −0.26)
DDD (instead of triple difference)	0.51 (−7.03, 8.06)	0.05 (−6.63, 6.74)	−1.46 (−8.41, 5.48)	−0.07 (−6.10, 5.95)	−0.97 (−8.44, 6.50)	−0.69 (−7.38, 6.01)	−1.71 (−8.24, 4.82)	−1.08 (−6.72, 4.57)
Observations	756	756	756	756	756	756	756	756
Adjusted R^2	0.10	0.76	0.06	0.74	0.03	0.54	0.06	0.72

Impact of new UCC opening in same-day visits per 1000 patients. Coefficients are reported as % change. Robust 95% CI in parentheses. Model 1: crude model. Model 2: fully adjusted model., ***Significant at the 1% level., **Significant at the 5% level., *Significant at the 10% level.

Table 4 Difference-in-difference model results in ED visits

	<20 years		20–64 years		>65 years		All ages	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Implementation effect	−1.25 (−3.37, 0.86)	−0.16 (−1.96, 1.63)	−5.97*** (−7.62, −4.32)	−4.15*** (−5.46, −2.83)	−3.63*** (−5.65, −1.61)	−2.24*** (−4.00, −0.48)	−4.12*** (−5.78, −2.47)	−2.69*** (−3.96, −1.43)
Rate of UCC visits		0.07* (−0.01, 0.16)		0.16** (0.00, 0.32)		−0.01 (−0.15, 0.13)		0.10* (−0.01, 0.21)
Rate of FHC same-day visits		−0.12** (−0.22, −0.02)		−0.17*** (−0.25, −0.09)		−0.02 (−0.07, 0.02)		−0.13*** (−0.21, −0.04)
Observations	252	252	252	252	252	252	252	252
Adjusted R^2	0.54	0.89	0.68	0.97	0.74	0.94	0.68	0.96

Impact of new UCC implementation on ED visits per 1000 patients. Coefficients are reported as % change. Robust 95% CI in parentheses. Model 1: crude model. Model 2: fully adjusted model., ***Significant at the 1% level., **Significant at the 5% level., *Significant at the 10% level.

Discussion

After UCC implementation in the Talcahuano Health District Network, we observed a decrease in ED visits, especially among adults. Considering that ED is usually overcrowded, the substitution of patients' visits to other healthcare outlets can be valued as a positive policy outcome. Despite this positive effect, we observed an additional, unintended, consequence: a reduction of same-day visits to primary care in the overall population, with a marked visit reduction in the children and adolescent group. The UCC implementation effect on ED and FHC is not temporary and persists over time.

According to micro-economic studies carried out in countries with widespread health insurance coverage, the time used to access to medical care (travel, waiting and treatment time) was one of the main determinants in choice of medical care services (Phelps and Newhouse, 1974; Acton, 1975; Coffey, 1983; Cauley, 1987; Janssen, 1992; Vistnes and Hamilton, 1995). To reduce this time, people usually chose the nearest provider with the shortest waiting time. Because UCCs are close to the community, do not require a previous scheduled appointment, and provide out-of-hours care, we pose that users would prefer them above same-day regular care. If UCC availability increases, we would expect a decrease in other primary care activity utilization. This seems to be the true, at least in the Chilean case.

The children and adolescent groups were most affected in this direction. This is consistent with previous studies that observed a high value of time in working parents. Compared with adults without dependent children, this group showed greater disutility in the utilization of children sick-care visits (Janssen, 1992; Vistnes and Hamilton, 1995). This phenomenon possibly occurs because most parents have a double task, to work and to care, so their time is very scarce, and they will prefer a handy and accessible healthcare service. Also, some parents could be very concerned about delaying care and prefer rapidly obtained treatment to avoid anticipated complications (Butun and Hemingway, 2018). These parents could prefer the immediate care provided in UCCs rather than same-day visits provided in FHCs.

Some authors have suggested that policies to expand access could undermine other primary care attributes. In North America, recent discussions about the rapid expansion of UCC and other emergency-like centres, grouped as convenient care, have proposed that these services are promoting sporadic and fragmented care that could lessen the continuity of care and harm the construction of long-term physician–patient relationship (Chang *et al.*, 2015; Prince, 2016). This type of service could be enough for simple diseases as a cold in a previously healthy patient, but not for other complex health needs as acute diseases in chronic multi-morbid patients, mental health problems or social issues. If UCCs and FHCs are not strongly co-ordinated, continuity of care could be gravely weakened. This is a challenge in Chile, were UCCs and FHCs face difficulties in retaining the same staff working in both settings and lack of common clinical registries.

Organizational factors can also help clarify our results. The Chilean public primary healthcare system is usually overburdened, so decision-makers could use UCCs as a way to manage the massive daily demand of medical care. UCC visits usually require less time and fewer staff than a same-day visit in primary care. In the context of scarce resources, municipal managers would prefer them above other primary care activities.

As we described before, some strategies to expand primary care access have led to a reduction in ED visits (Buckley *et al.*, 2010; Dolton and Pathania, 2016; Whittaker *et al.*, 2016). In our study,

we observed a marked reduction in ED visits in the adult group and a less pronounced reduction in the elderly. We pose that extreme age groups are usually sicker or more vulnerable, so they are less likely to change to new ambulatory services since they need more specialized health services. This is consistent with previous studies in paediatric population that observed a neutral effect in ED visits after an increase in primary care visits (Dolton and Pathania, 2016; Walsh *et al.*, 2018). Conversely, the adult group is healthier and more sensitive to convenient new service offerings. As Whittaker *et al.* (2016) observed, ED visits for low severity conditions were more frequently substituted in an extended access to primary care programme. This situation could be explored in future research.

Our study has multiple limitations. First, we worked with aggregated data, so we cannot make individual inferences about our results. Because our findings are novel, we tried to explain it at the individual and organizational level. However, other explanations could exist and must be considered in future studies, such as time availability, geographical access and cultural preferences, among others.

Second, due to the quasi-experimental nature of the design, causal inference could yield spurious results. We used seasonal and fixed-effects adjustments to control for unobserved, centre-specific, and time-specific confounding factors, and performed a difference-in-difference analysis, using a group of primary health centres not intervened during the study period as controls. Also, we did a triple difference analysis to test if the effects persisted over time.

Because our control group was also affected in the past, a potential misclassification by exposure of the control group could occur. Even when this could constitute a study limitation, our assumption regarding this group to be in a new stable phase held during analysis, and we were able to show a significantly decreasing trend in utilization rates. In this context, our results could be considered a conservative estimate of the true effect of the intervention.

Despite these methodological efforts, other variables were not controlled. We could not control for the 'visits to private physicians' variable because these visits are not registered at a local level. Not controlling for this variable can bias our results in both directions in terms of the effect of UCC implementation on same-day primary care visits. If the number of visits to private providers increased significantly in the study period, the effect of UCC implementation on same-day visits could be overestimated because some of the decline in same-day visits could be attributed to a spill-over to the private system. However, because public health network access is free or is associated with a low co-payment, we think that public health users would prefer it over other private options, reducing the risk of bias.

Third, because patients could visit any centre, spill-over effects between groups cannot be ruled out. Nevertheless, the centres are far from each other, so we think that spill-overs were few and not relevant.

Conclusion

After UCC implementation in a public health network in Chile, we observed a decrease in ED visits and a decrease in same-day visits to primary care. This change could be due to changes in users' preferences and provider's behaviours. If the quality of these services is not equivalent, as we argue, this policy would be promoting an unbalanced primary care that fosters accessibility above such other attributes as continuity of care, longitudinality or comprehensiveness (Starfield, 1998). Consequently, expanding primary care access through UCCs has the desired impact in ED visits and a detrimental impact on other primary care activities.

According to our findings, the evaluation of these policies (UCCs, WiCs and after-hours care) must consider the potential substitution of other primary care activities and not only the impact on ED utilization. This could provide insights to decision-makers attempting to implement similar policies in different policy contexts in the future.

Supplementary data

Supplementary data are available at *Health Policy and Planning* online.

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Conflict of interest statement. None declared.

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