Effect of Age, Practice Location and Covid-19 on the Use of POCT Methods by General Practitioners in Czechia in 2017–2021

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ABSTRACT
Background: Point-of-care testing (POCT) helps accelerate and streamline many processes in primary care. However, there is little information on the characteristics of their users.
Methods: Data were provided by the largest Czech health insurance company, covering 60% of the population. A proprietary spatial categorization model based on OECD typology, adapted to Czech primary care conditions, was used for localization.
Results: In all monitored groups, we observed continuous growth in the number of general practices using POCT methods, unaffected by Covid-19. Absolute numbers of POCT-INR and POCT-CRP examinations decreased during the pandemic years. The number of POCT-INR tests is more affected by practice location, while the number of POCT-CRP tests is influenced by the age of GPs.
Conclusions: Although POCT methods are a voluntary part of general practitioners' office equipment in Czechia, their more frequent use indicates that system-level conditions are appropriately set. The interest of GPs aged 60+ is surprising. Despite using POCT examinations the least, they show similar growth to other groups.

KEYWORDS
primary health care; general practice; rural health; covid-19; point-of-care systems

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INTRODUCTION

This article follows our previous study describing the use of selected POCT methods by general physicians in Czechia (1). In it, we focused on the differences between urban and rural general practices. We analysed contractual data of the largest health insurance provider in Czechia (General Health Insurance Company, GHIC) from 2016. Czechia's healthcare system is characterised by low monetary participation of patients (2) who are not used to paying for the procedures covered by health insurance. Thus, the data provided by the GHIC is a suitable data source because the procedures performed are reported to the health insurer, which subsequently disburses them to the practices. However, we did not have data on the number of procedures performed available.

This study aims to follow the previous article by monitoring the trends in using selected POCT methods in time over five years (2017–2021). Besides the urban – rural dimension, we included the age of GPs in the monitoring, considering the potential differences in working habits in various age categories, particularly those of physicians in the retirement age (3, 4). Furthermore, the Covid-19 pandemic burst out during this period, so we could evaluate the trends in time using three criteria: the age of physicians, practice location, and the impact of Covid-19. We also newly had available the number of procedures performed.

The Covid-19 pandemic declared by the WHO in March 2020 (5) had a substantial impact on the way primary care was delivered worldwide (6, 7). Restricted visits to general practices were reflected in many activities carried out by GPs, including – concerning POCT methods – limited antibiotics prescriptions (8, 9) and a lower number of colorectal cancer screening tests (10). On the other hand, many activities have changed to a minimum extent, including prescriptions for medicines for chronic conditions (9) and care for diabetics (11). Thanks to the five-year interval chosen, we could evaluate three normal years (2017–2019) and two years affected by the pandemic (2020 and 2021)

Using POCT methods in primary care practices reflects the scope of tasks that GPs must perform – from treating infectious diseases over monitoring patients with chronic conditions (including cardiovascular diseases and diabetes) to preventive care. There are substantial differences between individual countries (12), which also applies to the Central European region (13, 14). It is associated with the different weights of primary care in individual healthcare systems (15). In the past, the weight of primary care in Czechia was evaluated as weak due to low competencies and funding (16). The POCT methods expand GPs' diagnostic and treatment options, provide measurable improvements in patient care, and increase cost-effectiveness (17).

GPs in Czechia use a wide array of POCT methods (18). The mandatory equipment of each general practice includes a glucometer and accessories for the chemical examination of urine. As for FIT, GPs can analyse the tests on their own devices or refer them to accredited laboratories. GPs have these procedures contracted automatically with all health insurance providers. Other procedures are performed voluntarily on the condition that the GP owns the device and secures the procedure's external quality control within one year (only INR requires completion of certified training evaluated with a test). The voluntary POCT methods GPs use includes INR, CRP, HbA1c, D-dimers, troponin T, and NT-pro BNP. Surgeries of paediatricians frequently use the detection of group A β-haemolytic Streptococcus (GABH). In their home environment, patients use pregnancy tests; patients with diabetes use glycemia self-monitoring, and the INR self-monitoring is gradually expanding, as well.

Using individual POCT methods follows the regularly updated and recommended procedures published by the professional society associating general practitioners (The Society of General Practice) (19). ECG was used as a reference procedure. This examination has historically been the most accessible for GPs and can be regarded as a suitable reference indicator in Czechia as far as voluntary surgery equipment is concerned.

METHODS

We had available data from the largest health insurance provider in Czechia (GHIC) for the years 2017–2021. A total of 5.9 million people (including 4.5 million adults) were insured with the GHIC in the monitored period, i.e., about 60% of Czechia's population (20). Considering its nationwide activities, a contract with the GHIC is regarded as a standard, although the share of people insured by the GHIC differs in individual regions. Nonetheless, all general practices providing full-fledged treatment and preventive care have a contract with the GHIC.

In terms of the location, we categorised GP practices using our own model based on the regional typology principle according to the OECD (21), which we also used in many previous studies (1, 11, 22). This model categorises general practices into three types (Type 1 – urban, Type 2 – intermediate, Type 3 – rural) but is applied at a lower regional level that functionally corresponds to the primary healthcare structure in Czechia. While the OECD typology is built on the regional level NUTS 3, this modified typology uses the level of districts (LAU 1) and regions of municipalities with extended powers (MEP). In Czechia, it means smaller towns with a lower regional competence level in state administration. Another evaluation criterion is the presence of a hospital providing acute care in at least one essential field (internal medicine, surgery, paediatrics, gynaecology) in the given settlement. The intermediate type is divided into two subtypes: MEP with a hospital (Type 2a) and MEP without a hospital (Type 2b). If a provider runs several practices of multiple types, they are assigned to the type with a larger contracted share.

We also divided general practices into three groups based on the physicians' age. The limits were set at 40 and 60 years, i.e., the groups are as follows: "–39", "40–59", and "60+". In the case of multiple physicians with minimal FTEs, the resulting average age of physicians at the workplace is weighted according to the workload of each physician. Age categories were selected with regard to the minimum age of doctors upon completion of their curriculum (28 years), the average age of GPs in Czechia

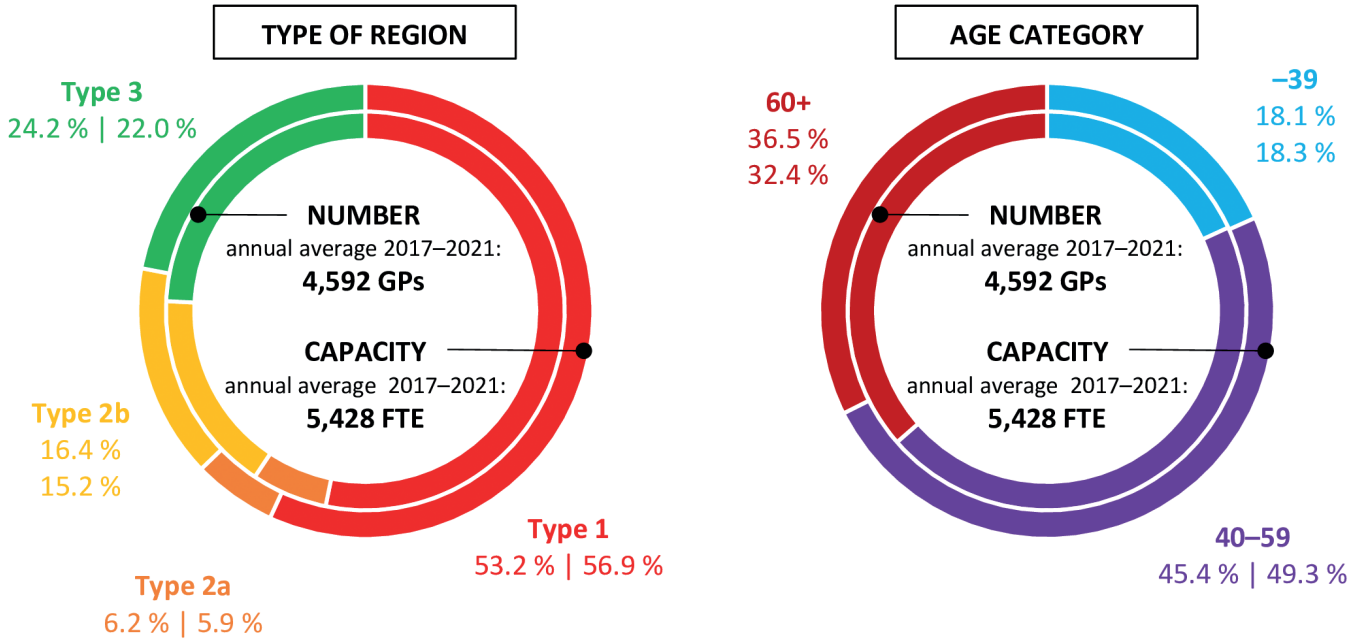

Fig. 1 Percentage of GPs by type of region and age category, Czechia, 2021.
Source: GHIC.

(54.8 years), and a more than 40% share of GPs aged 60+ in the total FTE capacity in Czechia (22). Thus, this division reflects the representation of young doctors, doctors of retirement age and doctors of pre-retirement age in the system. The retirement age in Czechia is gradually increasing (legislation currently sets a cap on the retirement age at 65 years). Now it is around 64 years (e.g., men and women without children born in 1960 retire at the age of 64 years + 2 months, while women with three/four children retire at 60 years + 8 months). Thus, our defined group of 60+ includes doctors who have already retired or are expected to retire within five years. The total number of practices and the FTE capacity by individual groups are shown in Figure 1 (urban practices have a moderately higher capacity compared to rural surgeries, and the same applies to the 40–59 category compared to 60+).

We analysed the GHIC data from the contractual perspective (i.e., whether the general practice has the monitored POCT method covered by the contract), the procedural perspective (i.e., whether the surgery actually reports the contracted procedure, hence performs it), and from the quantitative perspective (the number of procedures in individual years, see Table 1). For greater transparency, we converted the number of examinations performed to the full-time equivalent (FTE). Subsequently, we compared the share of individual POCT methods in individual GP groups, separately and in concurrence. The monitored methods included POCT-INR, POCT-CRP, POCT-HbA1c, FIT – the analytical part, and ECG as a reference method.

RESULTS

Table 1 shows the number and Figure 2 the share of individual POCT methods in the selected groups. The growing number of reporting practices is a clear trend across all methods and all GP groups. The pace of growth is about the same in terms of individual methods. The Covid-19 pandemic did not affect this trend at all. Doctors in the –39 group had the highest percentage share, followed by the age group of 40–59 and rural GPs. On the other hand, 60+ GPs had the lowest share, followed by urban GPs. While the scatter by age reached 15–20 percentage points, the dispersion by the location of practices was not that significant and increased by ten percentage points only in the case of POCT-INR.

Tab. 1 Number of procedures of selected POCT methods by GPs in the period 2017–2021.

POCT Method	2017	2018	2019	2020	2021
INR	604,532	662,984	709,074	668,182	574,761
CRP	455,615	562,980	659,773	488,353	555,808
HbA1c	35,239	40,798	50,138	56,726	73,101
FIT	no data	no data	116,653	270,090	310,409
ECG	533,649	582,038	665,371	641,813	750,808

Source: GHIC.

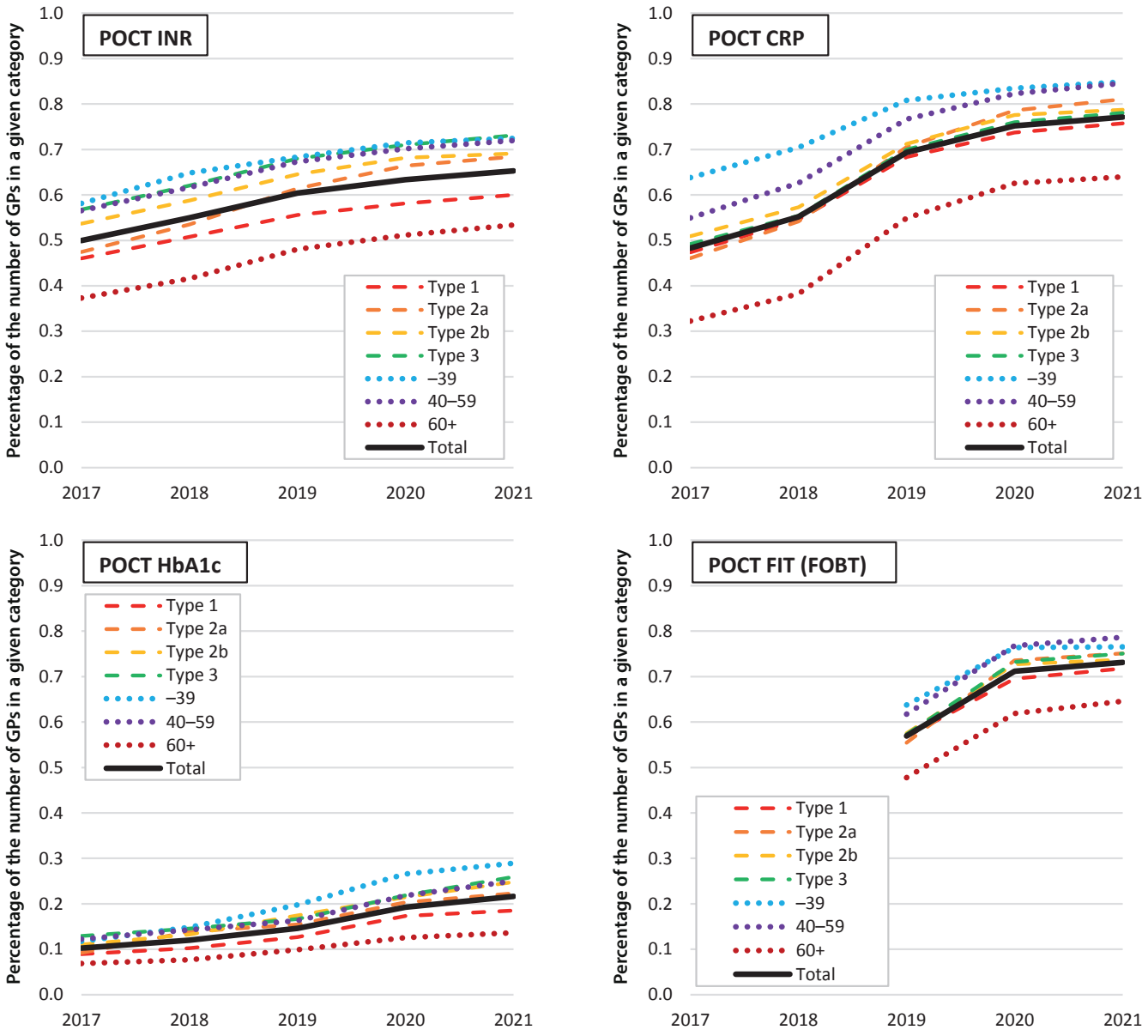

Fig. 2 Use of selected POCT methods by GPs in the period 2017–2021.
Source: GHIC, authors' calculations.

POCT-CRP saw the highest increase during the five-year interval (28.8 p.p.). It was about half in the case of other methods (POCT-INR 15.3 p.p., FIT 16.2 p.p., POCT-HbA1c 11.4 p.p., reference ECG 12.1 p.p.). POCT-CRP gradually became the most used method (2021: 77.1% of practices), followed by FIT (73.1%). POCT-HbA1c was the least used method (21.6%). The reference procedure (ECG) was used in 66.5% of practices in the same period (Figure 3). The concurrence of the most widespread methods, POCT-CRP and POCT-INR, was 61.8% on average, with a five-year growth of 21.6 p.p. with the same distribution of groups as if individual methods were measured separately.

In 2021, 80.6% of surgeries (+20.9 p.p.) used at least one POCT method (without including the less used POCT-HbA1c), and its highest share was in the group of GPs aged 40–59 years. Additionally, it can be noted that the number of general practices not using a single POCT method dropped below 20% on average, with a highly vigorous dynamic exceeding 20 p.p. in the five-year interval (except for the group of –39 years where the share of such practices was the lowest in the long term and reached merely 13% in 2021). The reference procedure (ECG) also copied the growing use of POCT methods.

We saw different results in monitoring the number of examinations performed (Figure 4). While the rise in POCT-CRP and POCT-INR examinations in 2017–2019 was followed by a decline in the pandemic years 2020–2021, the number of POCT-HbA1c and FIT procedures had continuously increased. The shape of the curves related to individual methods was again identical in all monitored GP groups. Rural GPs performed the highest number of POCT-INR examinations, while urban GPs had the lowest share. In the case of POCT-INR procedures, the highest number was performed by doctors aged –39, while the lowest was performed by the 60+ age group. For POCT-HbA1c and FIT, the highest activity was seen among GPs of the intermediate type and rural GPs, while the lowest was recorded in the age group 60+ and urban GPs.

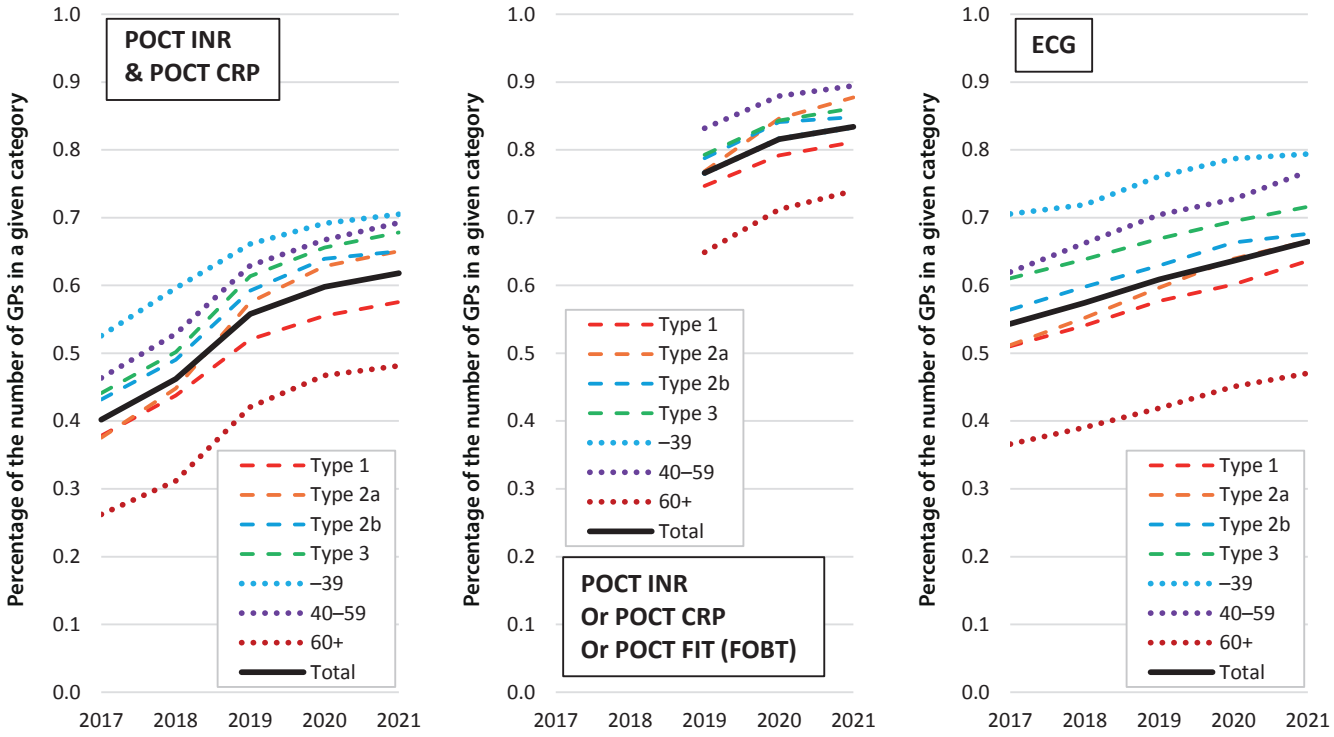

Fig. 3 Simultaneous use of selected POCT methods by GPs and ECG use in the period 2017–2021.
Source: GHIC, authors' calculations.

DISCUSSION

The GHIC is the largest health insurance provider in Czechia and is active throughout the country. Generally, its data can be regarded as sufficiently predicative thanks to its robustness. However, the general limitation includes an uneven share of people insured with the GHIC in various regions of Czechia. This limitation is relevant, particularly for quantitative indicators, i.e., the number of procedures performed in this case. However, as we do not compare specific regions in Czechia with different shares of people insured with the GHIC but homogenous groups of general practices defined by their geodemographic characteristics, we do not consider this limitation a methodological obstacle. As regards the monitored period, it can be noted that the GP network in Czechia was even and stable in time despite the current negative trends (22).

The differences in the number of POCT procedures between urban and rural practices were not proved abroad (23, 24). In Czechia, a single study was conducted using data from a small, regionally active health insurance company. It proved a rise in POCT procedures over time. However, spatial differences were not investigated, particularly with regard to the relatively small number of insured people and the specifically limited regional scope of this health insurance company for employees (25).

The continuous growth in the number of general practices using POCT methods testifies to the favourable setting of the contractual system of health insurance providers. Once a GP purchases a specific device, they must only register it and can report the procedure immediately with the respective code after their contract with the health insurer is amended. Periodical external quality inspections and submission of the relevant certificates are the only conditions. Differences regarding the preferences of individual GP groups can be seen in the number of procedures performed. The impact of the location is evident in the case of POCT-INR, where rural practices conduct about twice as many procedures as urban surgeries. With POCR-CRP, the same trend is apparent in age group comparisons (GPs in the group –39 carry out up to twice as many tests as GPs aged 60+).

Thus, this data confirms the findings proven globally, i.e., that GPs are increasingly interested in using POCT methods in their practices, especially those helping to diagnose acute conditions (26). The higher use of POCT-INR by rural GPs can be explained by their care for chronic patients treated with Warfarin, who are monitored in their practices, so they do not need to commute to specialist surgeries. The experience from abroad corresponds to this development, showing high patient satisfaction with using POCT-INR in general practices (27).

The most important aspect when purchasing a device is its beneficial effect and usefulness in clinical decision-making (28), which, however, probably differs in individual surveyed GP groups. This fact is demonstrated by the lower use of POCT-HbA1c, which can be affected by the wording of the recommended procedure (in uncomplicated patients with T2DM, HbA1c is routinely examined twice per year, but it is part of a complex laboratory examination once per year – GPs in Czechia are not apparently sufficiently motivated to buy the device due to the remaining one examination per year).

The colorectal cancer screening programme was launched in Czechia in 2000 (29) for people over 50. The most recent amendments took place in 2018 and 2019 from when only quantitative POCT with a fixed cut-off could be used (a condition for reporting an analytical procedure).

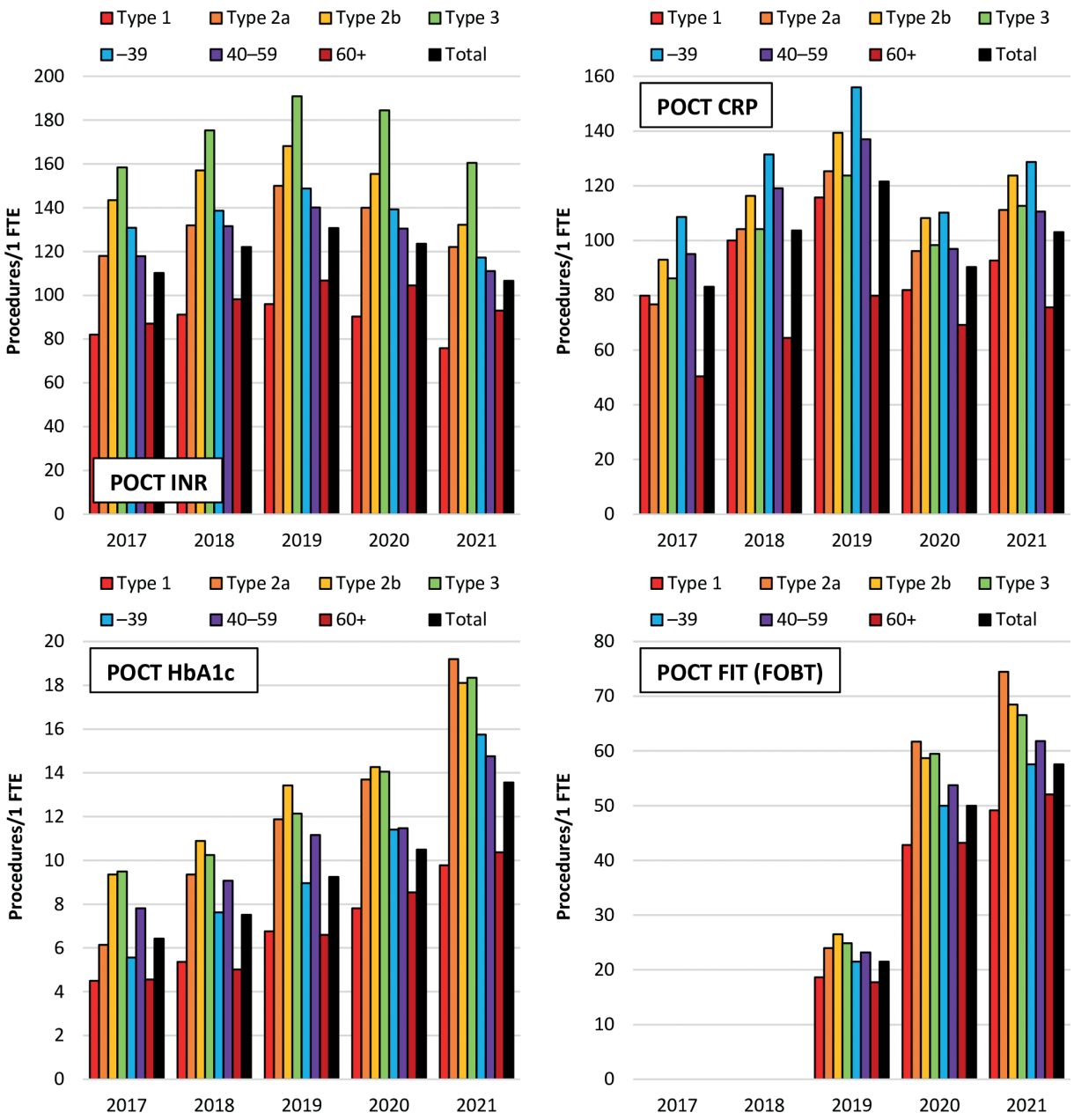

Fig. 4 Number of selected POCT methods used by GPs in the period 2017–2021.
Source: GHIC, authors' calculations.

Therefore, we have data for this method from as late as 2019. Nevertheless, GPs can also refer stool samples to lab analyses if they do not have the respective device. That is why the number of analytical procedures in general practices differs from the total number of FIT tests conducted in the given year. In Czechia the COVID-19 pandemic had significantly negative impact on the total number of FIT examinations performed (11).

Similarly to 2016 (1), we detected a GP group in the following years who had contracted individual POCT methods but did not report them to health insurance providers. If we take individual procedures, it is about 2–7% of general practices, with POCT-HbA1c having the highest share. It is a surprising finding, considering the healthcare system conditions in Czechia, where it is not common to bill patients for POCT examinations. This phenomenon cannot be clearly explained, and the GPs are likely to bear the costs of buying and operating the respective equipment only to streamline administration for health insurance companies.

The market for medical devices in Czechia is highly competitive. GPs can choose from a wide array of devices, and dealers can advertise in specialised magazines and present their products at educational events for doctors. The offer includes both multipurpose devices that can perform multiple POCT methods and single-method devices. They also vary in size, which affects their potential portability outside surgeries to patient homes. The competitive environment applies also to external control and inspections. The price of POCT devices is comparable to the acquisition price of an ECG, which is why we also regard the use of ECG as a suitable reference indicator.

CONCLUSIONS

The number of general practices using selected POCT methods in the monitored period 2017–2021 was continuously rising. Not even the Covid-19 pandemic put an end to the growing trend. We did not record differences in individual categories by age or practice location, yet the interest of the group 60+ is a surprise. Although they used POCT methods to the least extent, their trend curve has the same shape as that of other groups. The number of practices using multiple POCT methods also increased, as did those using at least one POCT method. That attests to the favourable setting of the contractual and disbursement conditions for using POCT methods in Czechia.

Concerning the number of examinations performed, we saw the highest differences by the practice location in the case of POCT-INR (a double use by rural practices compared to urban practices) and POCT-CRP (up to a double use by GPs aged –39 compared to the group 60+). This confirms the findings that the main motivation for buying a POCT device is its usefulness for clinical decision-making, which may, however, differ among individual groups.

The Covid-19 pandemic had a negative impact on the number of POCT-INR and POCT-CRP procedures performed. In contrast, it did not impact the growing number of POCT-HbA1c and FIT examinations (FIT concerned only a sample analysis in GP practices, not the total number of tests performed, which Covid-19 largely negatively affected). Still, we believe that the impact of Covid-19 on GPs using POCT methods in Czechia will be minimal in the long term. It is apparent from the continuously growing number of general practices reporting the respective procedures and identical shapes of the trend curves in individual GP groups.

ABBREVIATIONS

CRP	C reactive protein
ECG	electrocardiography
FIT	faecal immunochemical test
FTE	Full Time Equivalent
GABH	Group A β-haemolytic streptococcus
GHIC	General Health Insurance Company of the Czech Republic
GP	general practitioner
HbA1c	haemoglobin A1c
INR	international normalised ratio
LAU	Local administrative unit
MEP	municipalities with extended powers
NT-pro BNP	N-terminal type B natriuretic propeptide
NUTS	Nomenclature of units for territorial statistics
OECD	Organisation for Economic Co-operation and Development
POCT	point-of-care test
T2DM	type 2 diabetes mellitus
WHO	World Health Organization

CONFLICT OF INTEREST

We have no conflicts of interest to disclose.

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