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Impact of reimbursement reform on Finnish occupational health service trends in 2018–2022: an interrupted time series analysis

Katri Oksanen ,[1] Mervi Viljamaa,[2] Tiia Reho,[1] Mikko Korhonen,[3] Riitta Sauni[1]

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[1]Faculty of Medicine and Health Technology, Tampere University, Tampere, Pirkanmaa, Finland
[2]Pihlajalinna Lääkärikeskukset Oy, Pihlajalinna Oyj, Tampere, Finland
[3]Faculty of Information Technology and Communication Sciences, Tampere University, Tampere, Finland

Correspondence to
Dr Katri Oksanen;
katri.oksanen@tuni.fi

ABSTRACT

Objectives In Finland, the reimbursement system for occupational health services (OHSs) was reformed on 1 January 2020 to shift the focus from curative care to preventive OHS and promote employees' work ability. We investigated the OHS trends and how the reimbursement affected them.

Design A register-based study that used moving averages to visualise OHS trends in 2018–2022. To detect the impact of the reform, we used two types of interrupted time series (ITS) analyses: a linear regression model (ITS linear model) and an analysis of variance (ANOVA) lagged dependent variable model (ITS ANOVA).

Setting Retrospective register data (2018–2022) of a major OHS provider in Finland.

Outcome measures Time spent on OHS activities and the number of OHS activities per 1000 individuals per month. Level and slope changes in these measures in the ITS linear model, as well as the changes in these measures in the ITS ANOVA.

Results After the reimbursement reform, the trend of preventive OHS shifted from a decline to a rise. Among nurses, the ITS linear model also showed changes of 0.6 hours (95% CI: 0.2 to 0.9) and 0.9 activities (95% CI: 0.2 to 1.7) per 1000 individuals per month. Throughout the study period, the trend of work ability health examinations for both physicians and nurses rose, with a monthly slope change of 0.03 hours (95% CI: 0.01 to 0.04) per 1000 individuals among nurses in the ITS linear model. We observed a descending trend in curative care with a monthly decrease of 14.3 hours (95% CI: −25.5 to −3.1) and 32.4 activities (95% CI: −64.1 to −0.1) per 1000 individuals by all professionals in the ITS ANOVA.

Conclusions After the 2020 reimbursement reform, the focus of OHS shifted from curative care to preventive OHS. It is likely that the reform affected these changes, although other factors may also have influenced them.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ A strength of this study was its use of a major occupational health service (OHS) provider's register data and two types of interrupted time series analyses, which ensured a comprehensive picture of the associations.
⇒ This is the first study to explore work ability health examinations (HEs) separately from other voluntary HEs when analysing the Finnish OHS system.
⇒ This study considered the time spent on OHS activities as well as their number.
⇒ A limitation of this study was its lack of a reference group, which was due to the nationwide legislative change.

INTRODUCTION

Work disability is a global challenge and the focus of many types of management strategies.[1 2] In the Finnish healthcare system, the key operator in work ability issues is occupational health services (OHSs).[3–5]

The aim of Finnish OHS is to foster employees' health and work ability.[6] Employers are legally obliged to arrange preventive OHS for their employees, while curative care, meaning the treatment of illnesses, is optional. For entrepreneurs, OHS is voluntary.[6] Employers can either provide OHS themselves or purchase it from a range of OHS providers. To encourage employers and entrepreneurs to arrange OHS, the Social Insurance Institution of Finland (Kela) provides partial reimbursement of OHS expenses.[7] These reimbursements are covered by insurance contributions collected from employers and employees.[8] In 2021, preventive OHS was provided for nearly 2 million employees in Finland, covering 90% of all employees. Curative care was also accessible to 94% of those who received OHS.[9]

As part of preventive measures, OHS organises health examinations (HEs). Some HEs, such as those related to workplace exposures, are mandatory: employers must offer them, and employees must undergo them. In cases of work ability problems, HEs focusing on work ability (work ability HEs in this article) are used as a preventive method to avoid work disability. These HEs examine, assess, monitor and support employees' work ability,[10] and they are voluntary for employees. Work ability

HEs are widely used in Finnish OHS, and they can be initiated by any stakeholder, such as the employee, supervisor or OHS.[11] These HEs may have a positive impact on work ability,[12] particularly when linked to active collaboration between the workplace and OHS,[13] as is the case in work ability negotiations. In these negotiations, OHS professionals, the employer and the employee take part in a confidential discussion on ways to support the employee's work capacity in cases of work-related disability issues.

Other voluntary HEs are also carried out to assess the overall physical and mental health of employees and to identify any potentially harmful health issues. Today, questionnaires are commonly used for screening health risks.[14] Subsequent HEs may then be conducted on the basis of any risks identified.

In the last two decades, curative care has accounted for approximately four times the number of appointments and twice the costs of preventive OHS in Finland.[15] In the 2000s, multiple legislative adjustments were made to the OHS system, aiming to shift the focus from curative care towards preventive OHS and support of work ability.[10 16–18] The reimbursement reform introduced in 2011 increased reimbursements if workplaces, in collaboration with OHS, had procedures for managing work ability, monitoring employees' work ability and providing early support.[16] A study based on the OHS register data from Kela found that OHS resources had shifted towards preventive OHS after the reform.[19] In another study, work ability management practices had increased from what they were before the reform. Legislative changes were generally regarded as a positive way to promote work ability management. However, it was difficult to isolate the specific influence of the reform on the support for work ability, given the presence of similar concurrent trends.[20]

The latest legislative change in the OHS system is the reimbursement reform in 2020.[21] After the reform, preventive OHS costs have been first in line for reimbursement (reimbursement category I (RC I)). The reimbursement rate for preventive OHS is 60% of the costs. If preventive OHS costs do not require the maximum amount of reimbursement, curative care costs can also be partly reimbursed but not more than 50% of the curative care costs (RC II). Previously, curative care was reimbursed regardless of the reimbursements for preventive OHS.[18 21] Thus, like previous legislative changes, this reform also encourages employers and OHS providers to prioritise preventive OHS over curative care.

The effects of the latest reimbursement reform are unclear. According to Kela's data, the proportion of curative care in OHS has been considerable, although declining. The trend of curative care appointments has been steadily declining since its peak in 2011, with up to 5.4 million curative care appointments in OHS. The numbers of all HEs have increased modestly over recent decades, rising from approximately 1 million in 2001 to 1.4 million in 2021.[15] Kela's statistics do not differentiate between the different types of voluntary HEs, but it is possible to obtain more detailed information about the different types of HEs and other services, as well as the time spent on these services, by examining the OHS providers' data.

The objective of this study was to (1) examine the OHS trends in the years 2018–2022 in one large OHS provider and (2) assess whether the reimbursement reform in 2020 had achieved its intended impact on OHS activities, that is, shifted the focus from curative care to preventive OHS and increased work ability support.

Our hypothesis was that, although there has been a rising trend in work ability HEs and a decreasing trend in other voluntary HEs and curative care, the reimbursement reform has also played a significant role in the change.

METHODS

Study design

The data consisted of one major OHS provider's (Pihlajalinna) registered data of OHS used by employees and entrepreneurs (individuals in this article) in 2018–2022. During this period, the number of individuals covered by this OHS provider grew from approximately 107 000 to 260 000 (an average of approximately 191 000), which is approximately 10% of the working population receiving OHS in Finland.[9] The workplaces of these individuals varied in size and sector, including both public and private sectors.

OHS activities

The data comprised invoice codes, and each type of OHS activity was assigned a different code. We categorised the activities into two subgroups: preventive OHS and curative care. Within preventive OHS, we further divided voluntary HEs into work ability HEs and other voluntary HEs. All groups also included remote services, defined as consultations conducted via video, phone, chat, email or letter.

Preventive OHS activities included all types of HEs, advice and guidance, work ability negotiations, remote HEs and other RC I-categorised remote services. Work ability HEs included return-to-work assessments, partial sickness allowance assessments, monitoring of a person with partial work ability, employer-requested work ability assessments, vocational and medical rehabilitation assessments and other work ability examinations.

In terms of curative care activities, the data included appointments, remote appointments, other RC II-categorised remote services and prescription renewals.

Only OHS activities provided to individuals and covered by the reimbursement system were included. For instance, appointments covered by health insurance or health questionnaires are not covered by the OHS reimbursement system and were thus excluded.

The OHS provider expanded rapidly, particularly in 2018, which may have resulted in inaccuracies. Otherwise, the data was comprehensive, with no missing or duplicate entries.

Outcomes

HEs are usually time-consuming, whereas phone calls, for instance, are short. For a more reliable comparison of the different services, we collected data on time spent on each type of OHS activity and the number of OHS activities. The data consisted of OHS activities performed by each group of OHS professionals, namely, physicians, nurses, physiotherapists, psychologists, social service experts, medical specialist consultants and, in the case of curative care, also general practitioners. We examined the activities of professionals as a single group and separately analysed the activities of physicians and nurses, as their work accounts for most of the OHS activities.

Outcome measures included total time spent on OHS activities in hours per 1000 individuals per month and number of OHS activities per 1000 individuals per month.

Patient and public involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

Statistical analyses

First, we calculated the descriptive statistics from the data to provide an overall picture.

Second, we computed moving averages from the data to illustrate the trends during the years 2018–2022.

The invoice code data from the OHS provider were obtained at 2-month intervals, with the number of individuals (OHS provider's individual customers) recorded monthly. The values were aggregated into 2-month bins, with six bins per year. For example, the first bin comprised data from January and February 2018, where the number of individuals was the average of the numbers for January and February 2018.

As the outcomes were expected to fluctuate according to the season (with OHS activity reaching a minimum in the data points for July–August), we smoothed the time series with a moving average using averages of three adjacent data points, MA(3), as the data were in 2-month intervals.

The monthly OHS activity value, in hours and numbers, was obtained by dividing the 2-month value by two and multiplying by 1000 to achieve an appropriate scale. Thus, the outcome measure units were OHS activity hours per 1000 individuals per month and the number of OHS activities per 1000 individuals per month.

Third, to examine the impact of the reimbursement reform on the trends described above, we used two types of interrupted time series (ITS) analyses: the linear regression model (ITS linear model) and the analysis of variance (ANOVA) lagged dependent variable model (ITS ANOVA). The interruption date was 1 January 2020, which is when the reimbursement reform entered into force. The response variables were OHS activities, measured in time used and in number, between 1 January 2018 and 31 December 2022.

In the ITS linear model, the response variable is modelled based on a linear equation, as the interruption may cause a change in the intercept (immediate change, ie, level change) and/or slope (gradual change, ie, slope change). The equation is given as:

$$Y_t = \beta_0 + \beta_{slope} \times 12 \times t + \beta_{immediate} \times X_t + \beta_{gradual} \times X_t \times 12 \times (t - t_0)$$

where Y_t is the response variable at time t. Time t is the point in time as a decimal number for the year, and t_0 is the interruption date as a decimal number, set at 2020.0. X_t is the dummy variable at time t with the values 0 (before the interruption date) or 1 (after the interruption date). β_{slope} measures the trend over time and is the slope before the interruption. $\beta_{gradual}$ measures the change in the slope after the interruption has taken place; therefore, the trend after the interruption is $\beta_{slope}+\beta_{gradual}$. β_0 is the constant value over time, and $\beta_{immediate}$ is the level change in the response variable after the interruption. The units of the β values were total time in hours or number of OHS activities per 1000 individuals per month.

Due to the nature of data as time series, the regression model was fitted using generalised least squares with correlation structure autoregression, AR(1). Estimated regression models were presented as solid lines in illustrations (regression lines in figures 1 and 2).

The ITS ANOVA takes into account previous results, in addition to the trend. It can also detect non-linear dependencies in data. In this analysis, we used ANOVA from the R package its.analysis, which tests the significance of the interruption by measuring the difference in means between the interrupted and uninterrupted time periods while accounting for the lag of the dependent variable.[22] The equation used was

$$Y_t = b_0 + b_1 \times X_t + b_2 \times Y_{t-1}$$

where Y_t is the response variable at time t. Time t is the point in time as a decimal number for the year, Y_{t-1} is the former observation, X_t is the dummy variable at time t with the values 0 (before the interruption date) or 1 (after the interruption date), b_1 is the change due to the interruption per 1000 individuals per month and b_0 and b_2 are the model coefficients.

Moving averages were not used for ITS modelling because some data points were lost. However, we tested the ITS analyses by also using moving averages but detected no substantial differences.

To evaluate the effect of the COVID-19 pandemic on our study set, we also tested the ITS analyses by excluding the most COVID-19-affected data points (March–June 2020). As the impact of the multi-year COVID-19 pandemic could not be fully controlled without significant loss of data, these ITS analyses were only exploratory.

We analysed each type of service targeting individuals (work ability HEs, other voluntary HEs, preventive OHS as a whole, curative care and all OHS) separately for services provided by physicians, nurses and all OHS professionals. Because the analyses were performed both

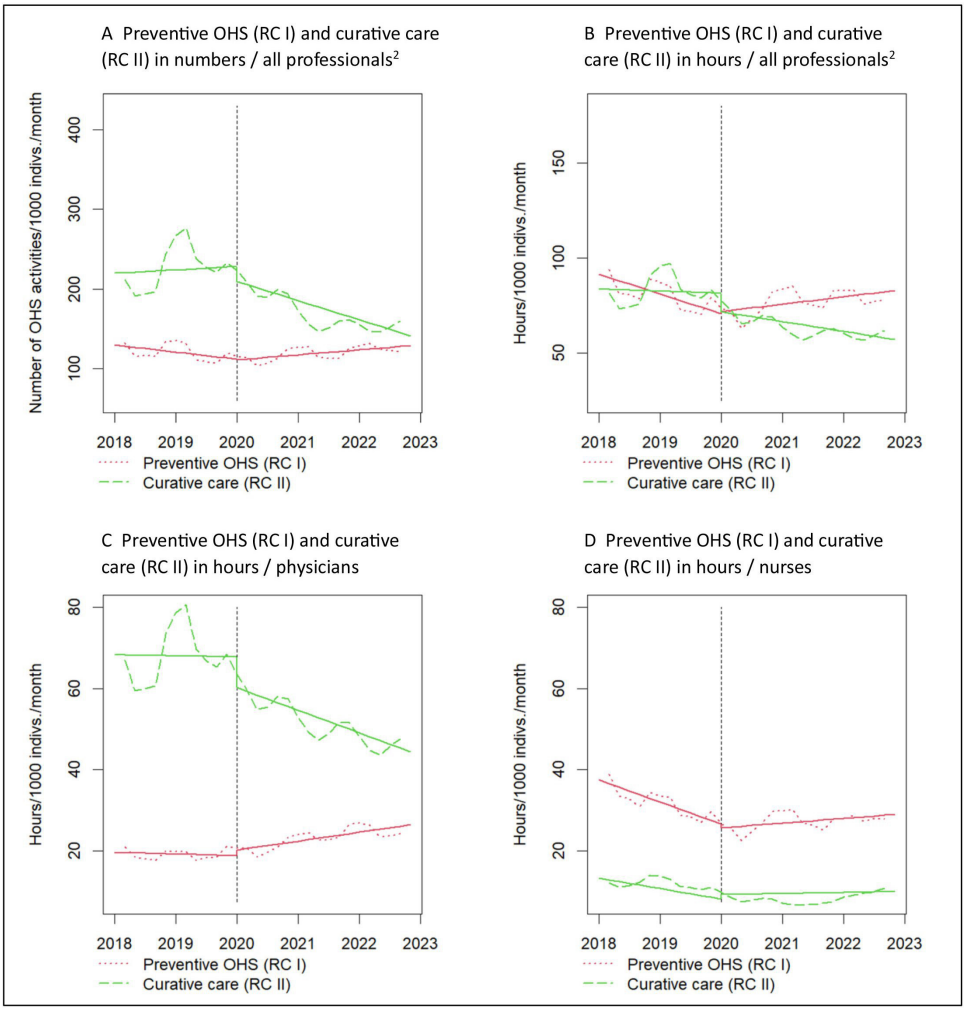

Figure 1 Moving averages[1] and regression lines of monthly preventive OHS and curative care in occupational health services provided by different professionals in 2018–2022. Vertical dashed lines indicate the reimbursement reform date of 1 January 2020. ITS analysis (ITS linear model). [1]An average of three adjacent data points over the follow-up period. [2]All physicians (including general practitioners in curative care), nurses, physiotherapists, psychologists, social service experts and medical specialist consultants. indivs., individuals; ITS, interrupted time series; OHS, occupational health service; RC, reimbursement category.

by hours and by number of OHS activities using both ITS methods, a total of 60 ITS runs were conducted. All analyses were performed in R version 4.3.1, and the results were considered to be statistically significant at p<0.05.

RESULTS

Descriptive statistics

Table 1 shows the total amount of reimbursable OHS for individuals conducted by the OHS provider between 2018–2022. Total OHS activities were approximately 3.6 million, totalling 1.7 million hours over the 5 years. In comparison to curative care (RC II), more time was spent on preventive OHS (RC I), representing 53% of the total time but only 39% of all OHS activities.

Physicians administered over 80% of curative care, both in terms of time and the number of activities, whereas preventive OHS was predominantly delivered by nurses. Physicians conducted 85% of all work ability HEs, whereas nurses administered more than 61% of other voluntary HEs.

Trends and ITS analyses

Preventive OHS and curative care

Figure 1 and table 2 illustrate the changes in preventive OHS and curative care from 2018 to 2022. In figure 1, moving averages represent the trends during the study period, and the regression lines represent the results of the ITS linear model (effect of the interruption, ie, the reimbursement reform), with the exact values in table 2. The moving averages in figure 1A show that before the reform, the number of curative care activities was twice that of preventive OHS activities when all professionals were considered together. In 2019, the number of curative care activities began to decrease, with only a minimal difference compared with preventive OHS activities at the end of the follow-up period. A reduction of 32.4 curative care activities due to the reform was also observed (p=0.049

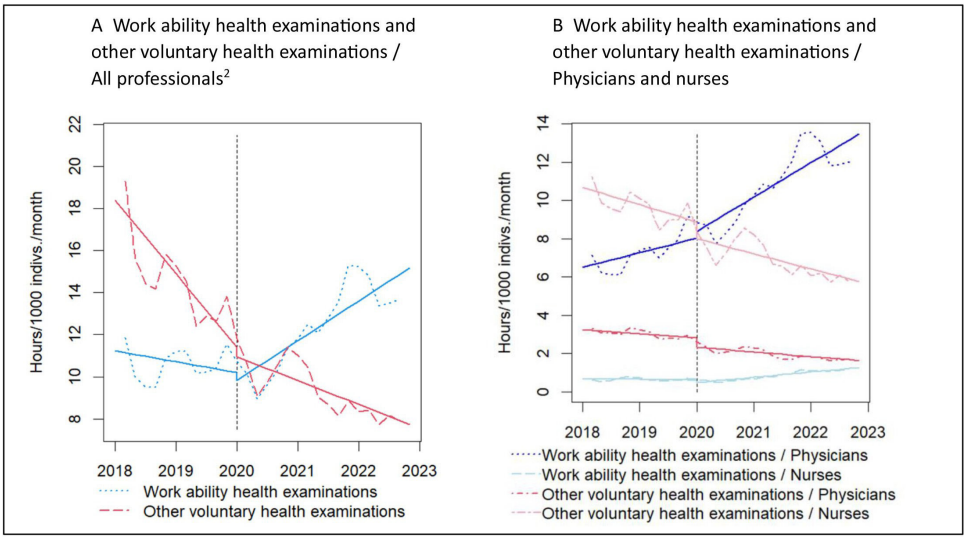

Figure 2 Moving averages[1] and regression lines of monthly work ability HEs and other voluntary HEs in occupational health services in 2018–2022. Vertical dashed lines indicate the reimbursement reform date 1 January 2020. ITS analysis (ITS linear model). Note the different scales in the figures. [1]An average of three adjacent data points over the follow-up period. [2]All physicians, nurses, physiotherapists, psychologists and social service experts. HEs, health examinations; indivs., individuals; ITS, Interrupted time series.

Table 1 Reimbursable OHSs targeting individuals in 2018–2022, divided into reimbursement categories and professionals

OHS type and professionals	Total time spent on OHS activities in hours (%)		Number of OHS activities (%)	
Preventive OHS (RC I)				
All preventive OHS*				
All professionals†	908 723		1 394 161	
Physicians	256 715	(28.3)	439 342	(31.5)
Nurses	333 401	(36.7)	625 797	(44.9)
Others	318 607	(35.0)	329 022	(23.6)
Work ability HEs				
All professionals†	139 315		194 164	
Physicians	114 496	(82.2)	165 213	(85.1)
Nurses	9449	(6.8)	13 798	(7.1)
Others	15 370	(11.0)	15 153	(7.8)
Other voluntary HEs				
All professionals†	126 923		152 856	
Physicians	26 523	(20.9)	45 680	(29.9)
Nurses	89 383	(70.4)	94 237	(61.6)
Others	11 017	(8.7)	12 939	(8.5)
Curative care (RC II)‡				
All professionals§	805 347		2 178 942	
Physicians	656 377	(81.5)	1 751 279	(80.4)
Nurses	111 423	(13.8)	335 779	(15.4)
Others	37 547	(4.7)	91 884	(4.2)

Services targeting workplaces are not included.
*All types of HEs, advice and guidance, work ability negotiations, remote HEs and other RC I-categorised remote services.
†All physicians, nurses, physiotherapists, psychologists, social service experts and medical specialist consultants.
‡Appointments, remote appointments, other RC II-categorised remote services and prescription renewals.
§All physicians, nurses, general practitioners and medical specialist consultants.
HEs, health examinations; OHSs, occupational health services; RC, reimbursement category.

Table 2 Changes in reimbursable occupational health services per 1000 individuals per month after the reimbursement reform on 1 January 2020

OHS type and professionals	ITS ANOVA/change (b_1)				ITS linear model/level change ($\beta_{immediate}$)				ITS linear model/slope change ($\beta_{gradual}$)			
	Total time spent on OHS activities in hours (95% CI)	P value	Number of OHS activities (95% CI)	P value	Total time spent on OHS activities in hours (95% CI)	P value	Number of OHS activities (95% CI)	P value	Total time spent on OHS activities in hours (95% CI)	P value	Number of OHS activities (95% CI)	P value
Preventive OHS (RC I)												
All professionals*	−4.1 (−15.1 to 7.0)	0.456	−0.9 (−16.7 to 14.8)	0.903	1.1 (−17.6 to 19.8)	0.904	−0.8 (−29.2 to 27.6)	0.953	**1.2 (0.04 to 2.3)**	**0.043**	1.3 (−0.5 to 3.0)	0.146
Physicians	**4.2 (0.8 to 7.6)**	**0.016**	**8.1 (2.7 to 13.5)**	**0.005**	1.4 (−3.7 to 6.5)	0.578	4.2 (−4.0 to 12.4)	0.351	0.2 (−0.1 to 0.5)	0.170	0.1 (−0.4 to 0.6)	0.810
Nurses	**−5.4 (−10.2 to −0.6)**	**0.029**	−4.3 (−12.3 to 3.8)	0.285	−0.9 (−7.4 to 5.7)	0.783	−3.6 (−15.9 to 8.7)	0.550	**0.6 (0.2 to 0.9)**	**0.009**	**0.9 (0.2 to 1.7)**	**0.017**
Curative care (RC II)												
All professionals†	**−14.3 (−25.5 to −3.1)**	**0.015**	**−32.4 (−64.7 to −0.1)**	**0.049**	−9.7 (−29.8 to 10.4)	0.329	−18.7 (−84.5 to 47.1)	0.564	−0.3 (−1.7 to 1.0)	0.617	−2.3 (−7.1 to 2.4)	0.320
Physicians	**−11.2 (−20.5 to −1.9)**	**0.021**	−25.0 (−51.9 to 1.9)	0.068	−7.6 (−24.4 to 9.2)	0.362	−18.5 (−72.3 to 35.3)	0.486	−0.4 (−1.6 to 0.7)	0.430	−2.9 (−6.7 to 0.9)	0.132
Nurses	−1.7 (−3.7 to 0.3)	0.098	−4.5 (−10.8 to 1.8)	0.158	1.1 (−3.0 to 5.3)	0.585	4.1 (−9.2 to 17.4)	0.535	0.2 (−0.3 to 0.8)	0.392	0.8 (−1.0 to 2.7)	0.368
All services (RC I+RC II)												
All professionals*†	**−25.3 (−44.8 to −5.7)**	**0.013**	**−48.6(−92.8 to −4.5)**	**0.032**	−13.6 (−46.8 to 19.5)	0.406	−34.8 (−118.9 to 49.3)	0.402	0.6 (−1.2 to 2.4)	0.505	−1.6 (−7.1 to 3.8)	0.544
Physicians	**−11.1 (−21.1 to −1.0)**	**0.032**	−25.2 (−54.2 to 3.9)	0.087	−8.5 (−27.6 to 10.5)	0.365	−19.7 (−78.1 to 38.6)	0.493	−0.3 (−1.5 to 0.9)	0.596	−3.0 (−7.0 to 0.9)	0.127
Nurses	**−8.8 (−15.3 to −2.3)**	**0.010**	−11.9 (−25.4 to 1.7)	0.084	−4.8 (−13.3 to 3.6)	0.248	−12.9 (−35.3 to 9.4)	0.245	**0.7 (0.2 to 1.2)**	**0.011**	**1.5 (0.05 to 2.9)**	**0.043**

b_1, $\beta_{immediate}$, $\beta_{gradual}$, 95% CI and p values from the ITS analyses.
Remote services are also included.
Statistically significant results are presented in bold.
*All physicians, nurses, physiotherapists, psychologists, social service experts and medical specialist consultants.
†All physicians, nurses, general practitioners and medical specialist consultants.
ANOVA, analysis of variance; ITS, interrupted time series; OHS, occupational health service; RC, reimbursement category.

in the ITS ANOVA). Figure 1B indicates that even before the reform, an equivalent amount of time was spent on preventive OHS and curative care. However, after the reform, more time was allocated to preventive OHS than to curative care. The moving averages also showed that the time spent on curative care decreased from 2019 to the end of the follow-up period. Furthermore, the reform was associated with a decrease of 14.3 hours per 1000 individuals per month in time spent on curative care by all professionals (p=0.015 in the ITS ANOVA) (table 2). Following the reform, there was a notable increase in preventive OHS provided by all professionals, accompanied by a positive slope change (p=0.043 in the ITS linear model) (table 2). This meant a total increase of approximately 770 hours per 1000 individuals in preventive OHS as a whole due to the reimbursement reform during the follow-up period.

As shown in the moving averages in figure 1A,B, the upward trend in preventive OHS and the downward trend in curative care by all professionals continued from the reform to the end of the follow-up period. Figure 1C shows similar trends, especially among physicians. Moreover, the ITS ANOVA revealed a decrease in curative care (p=0.021 for time) and an increase in preventive OHS (p=0.016 for time and p=0.005 for the number of activities) provided by physicians, although no statistically significant changes were detected in the ITS linear model (table 2). For physicians, the time spent on curative care was double that spent on preventive OHS even at the end of the follow-up period (51.0 vs 27.2 hours per 1000 individuals per month), which differed from the proportions observed among nurses (figure 1C,D). The trend of preventive OHS provided by nurses turned from declining to ascending after the reform (slope change p=0.009 for time and p=0.017 for numbers in the ITS linear model) (figure 1D, table 2). In fact, the impact of this explained the results of preventive OHS provided by all professionals (data not shown).

Work ability HEs and other voluntary HEs

Figure 2 and table 3 show the changes in the voluntary HEs from 2018 to 2022. In figure 2, moving averages represent trends during the study period, and the regression lines represent the results of the ITS linear model (effect of the interruption, ie, the reimbursement reform), with the exact values in table 3.

During the follow-up period, notable trends were observed in the moving averages of the voluntary HEs (figure 2). The total time spent on work ability HEs conducted by all professionals increased, whereas the total time spent on other voluntary HEs decreased (figure 2A). The ITS ANOVA also indicated postreform reductions in other voluntary HEs, evident in both time (p=0.004) and number of HEs (p<0.001), with a specific decline of 6.5 in other voluntary HEs per 1000 individuals per month (table 3).

As seen in figure 2B, the monthly time spent on work ability HEs increased by approximately 70% for both

Table 3 Changes in work ability HEs and other voluntary HEs per 1000 individuals per month after the reimbursement reform on 1 January 2020

HE type and professionals	ITS ANOVA/change (b_1)				ITS linear model/level change ($\beta_{immediate}$)				ITS linear model/slope change ($\beta_{gradual}$)			
	Time spent on HEs in hours (95% CI)	P value	Number of HEs (95% CI)	P value	Time spent on HEs in hours (95% CI)	P value	Number of HEs (95% CI)	P value	Time spent on HEs in hours (95% CI)	P value	Number of HEs (95% CI)	P value
Work ability HEs												
All professionals*	1.3 (−0.4 to 3.0)	0.130	1.6 (−0.7 to 4.0)	0.167	−0.4 (−3.6 to 2.8)	0.813	−1.4 (−5.9 to 3.0)	0.512	0.2 (−0.01 to 0.4)	0.059	0.1 (−0.2 to 0.4)	0.408
Physicians	**1.8 (0.03 to 3.6)**	**0.047**	**2.5 (0.01 to 4.9)**	**<0.05**	0.4 (−2.2 to 2.9)	0.781	−0.2 (−4.0 to 3.5)	0.904	0.1 (−0.1 to 0.3)	0.307	0.03 (−0.2 to 0.3)	0.811
Nurses	0.1 (−0.1 to 0.3)	0.153	0.1 (−0.1 to 0.4)	0.221	−0.1 (−0.4 to 0.1)	0.267	−0.2 (−0.6 to 0.2)	0.340	**0.03 (0.01 to 0.04)**	**0.003**	0.02 (−0.01 to 0.05)	0.168
Other voluntary HEs												
All professionals*	**−4.2 (−7.0 to −1.4)**	**0.004**	**−6.5 (−10.0 to −3.0)**	**<0.001**	−0.4 (−4.1 to 3.3)	0.806	−2.6 (−6.4 to 1.2)	0.167	0.2 (−0.03 to 0.4)	0.092	0.1 (−0.1 to 0.3)	0.387
Physicians	**−1.0 (−1.6 to −0.5)**	**<0.001**	**−1.9 (−2.9 to −0.9)**	**<0.001**	−0.5 (−1.1 to 0.1)	0.090	**−1.2 (−2.3 to −0.1)**	**0.030**	0.0 (−0.04 to 0.03)	0.864	−0.02 (−0.1 to 0.1)	0.604
Nurses	**−3.0 (−4.7 to −1.3)**	**0.001**	**−3.8 (−5.6 to −2.0)**	**<0.001**	−0.9 (−2.9 to 1.2)	0.386	−1.8 (−3.9 to 0.2)	0.074	0.01 (−0.1 to 0.1)	0.879	0.0 (−0.2 to 0.1)	0.544

b_1, $\beta_{immediate}$, $\beta_{gradual}$, 95% CI and p values from the ITS analyses.
Remote HEs are also included.
Statistically significant results are presented in bold.
*All physicians, nurses, physiotherapists, psychologists and social service experts.
ANOVA, analysis of variance; HE, health examination; ITS, interrupted time series.

physicians (from 7.4 to 12.9 hours per 1000 individuals) and nurses (from 0.8 to 1.3 hours per 1000 individuals) during the follow-up period. Concurrently, the time spent monthly on other voluntary HEs decreased for both professionals, from 2.9 to 1.9 hours per 1000 individuals for physicians and from 11.0 to 5.7 for nurses. Similar changes in HEs were also observed in the results regarding the number of HEs (data not shown).

As shown in table 3, work ability HEs conducted by physicians saw a rise of 1.8 hours per 1000 individuals per month (p=0.047 in the ITS ANOVA) and an increase of 2.5 in number (p<0.05 in the ITS ANOVA). Among work ability HEs carried out by nurses, a positive slope change was identified (p=0.003 in the ITS linear model) (table 3). This meant a total increase of approximately 10 hours per 1000 individuals in work ability HEs conducted by nurses due to the reimbursement reform during the follow-up period. As for other voluntary HEs, decreases were observed in the ITS ANOVA for both professional groups in terms of time and numbers (p≤0.001) (table 3).

In the ITS analyses of the impact of the COVID-19 pandemic, which excluded the March–June 2020 data points, the statistically significant results observed remained significant (data not shown).

DISCUSSION

This study revealed declining trends in the time spent on reimbursable curative care and other voluntary HEs by a Finnish OHS provider during the years 2018–2022. Among OHS physicians in particular, there was also an increasing trend in the time spent on work ability HEs.

The reimbursement reform of 2020 had an effect on these trends, as it shifted the focus from curative care to preventive OHS. We used two different ITS analyses to obtain a more comprehensive understanding of the dependencies. ITS models showed similar results, although the statistical significance differed between the models. After the reform, there was a decrease in curative care seen in the ITS ANOVA, particularly among physicians. Conversely, preventive OHS provided by physicians saw an increase in both the duration and number of activities in the ITS ANOVA, and a slope increase was observed among nurses in the ITS linear model. Work ability HEs underwent a positive change among physicians in the ITS ANOVA and a slope increase among nurses in the ITS linear model. The differences in results were due to the non-linear dependency identified by the ITS ANOVA, as it operates recursively, while the regression of the ITS linear model only detects linear dependencies. A limitation of ITS ANOVA is that it is not as sensitive in detecting linear dependencies as the ITS linear model, particularly in cases with high random variation.

These results suggest that the reimbursement reform has had positive, goal-aligned effects on OHS, promoting a shift towards work ability HEs and preventive OHS overall. This is significant because previous studies have indicated that work ability HEs,[12] along with advice and guidance, can effectively enhance employees' work ability.[23]

The differences in results between physicians and nurses were expected, as in Finnish OHS, physicians traditionally take the primary responsibility for supporting the return-to-work process of employees on sick leave, while nurses handle most other voluntary HEs. The increase in the time spent on work ability HEs conducted by nurses after the reform was a favourable finding in this study.

When discussing the impact of the reimbursement reform in this study, other concurrent occurrences, notably the COVID-19 pandemic, should be considered. Kela's statistics show a slight downward trend in curative care from 2011 onwards and a steep decline in 2020 when the reform entered into force.[15] Similarly, in our study, all types of OHS activities decreased in the spring of 2020, which could have been due to the COVID-19 pandemic, as it abruptly reduced all non-emergency healthcare appointments.[24 25] However, in our study, when testing the ITS analyses, excluding the most COVID-19-affected data points (March–June 2020) caused no significant changes in the results. Hence, the influence of the COVID-19 pandemic might not be relevant to our study design, possibly due to the rapid adoption of remote services in the spring of 2020.

Yet, some additional factors beyond the impact of the reform contributed to the trends observed. For instance, there was a consistent upward trend in health insurance coverage provided by companies to their employees,[26] which may have reduced reimbursable curative care in OHS. The declining trend in other voluntary HEs may also be due to them being replaced by questionnaires, which, as they are not covered by the reimbursement system, were excluded from this study. However, the ITS analyses revealed that reform had also played a part in the descending trend of other voluntary HEs seen in our study. This may be due to limited OHS resources: as work ability HEs increased, fewer resources were left for other activities, that is, other voluntary HEs.

Moreover, the numerous reforms aiming to support work ability over recent decades may have changed the classification of OHS appointments. Some appointments previously classified as curative care (RC II) may now be classified as preventive OHS (RC I). Work ability support is also part of curative care, and the distinction between preventive and curative care may not always be clear.[27] It is conceivable that in the postreform period, appointments pertaining to work ability are more frequently categorised as RC I than they would have been before the reform.[28] This is likely the reason why a single legislative change in the long-term course appeared as a statistically significant factor in our study. OHS operations have probably not changed substantially during the years 2018–2022, but the recording practices for RC I and RC II have, with the reimbursement reform accelerating the change in these practices.

The shift from curative care to preventive OHS after the reform can also be seen in Kela's statistics. In 2021,

the cost of preventive OHS was higher than the cost of curative care for the first time at least since 2006.[15] The share of the costs of curative care decreased from 63% in 2009 to 52% in 2019 and further to 48% in 2021.[15] After the reform, the number of curative care appointments declined from 4.3 million in 2019 to 3.4 million in 2020 and to 3.1 million in 2021.[15] The number of HEs also noticeably increased during the 2000s.[15]

In Finland, Kela has reliable and comprehensive statistics on reimbursable OHS activities. However, these statistics do not distinguish work ability HEs and work ability support activities from other OHS activities, which is why the more detailed content of the OHS activities supporting work ability and their development has remained unclear. The time spent on appointments and HEs also remains unclear in statistics. This is the first study to separate HEs related to work ability from other voluntary HEs, as well as the duration of OHS activities, enabling a more accurate perspective on the content of OHS.

Some limitations need to be taken into account. First, as the reform was nationwide, no reference group could be created. It would have helped to distinguish the effects of the reimbursement reform from other potential simultaneous influences. However, to our knowledge, no other changes occurred simultaneously in OHS in Finland, except for the COVID-19 pandemic, whose challenges in interpreting the results were discussed earlier.

Second, employee demographic data and working conditions have a considerable impact on the use of OHS, but our dataset did not include this information. Third, we only had registered data from one OHS provider, which limits the generalisability of the results. In addition, 2018 was a significant period of growth for the company. During the integration of operations, there may have been differences in registration practices and delays, which could be reflected in the data from 2018 to 2019 as variations. However, the OHS provider's customers cover almost 10% of employed individuals receiving OHS in Finland. Pihlajalinna is a typical, large Finnish OHS provider, serving a diverse range of organisational customers of varying sizes and types. Therefore, the study setting used in this research can be deemed appropriate for examining trends in OHS in Finland.

In conclusion, our results show that changes in the reimbursement system can steer OHS in the desired direction. In this study, the focus was on OHS used by individuals. Future studies could investigate whether the reimbursement reform also had an impact on activities targeting workplaces and OHS agreements.

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ORCID iD

Katri Oksanen http://orcid.org/0009-0008-2878-8756

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