Toward Realizing Improved Employee Well-Being through Data-Driven Health and Productivity Management

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This article describes activities for resolving employee health management-related issues facing companies through the realization of data-driven health and productivity management. Companies are struggling to keep track of the health status of employees working remotely. Fujitsu has developed algorithms that draw the optimal advice based on individual health status through industry-university joint research with the University of Tokyo. We aim to combine these with Fujitsu Laboratories' AI technology to offer a new health information solution.

1. Introduction

The spread of the novel coronavirus (hereafter, COVID-19 pandemic) has driven the world into the new normal era. Employees working for companies are often found to have gone through a significant shift to telework-based work styles and even lifestyle changes. Meanwhile, companies are struggling to keep track of the health status of employees working at home or other remote locations.

Fujitsu provides a health information solution that digitizes and manages health information for employees to support the promotion of health and productivity management and occupational health activities in order to improve the productivity and well-being of employees. In addition, Fujitsu has been recognized for its activities promoted by the related departments as a team and has been selected under the Health and Productivity Management Outstanding Organization "White 500" for five years running. We were also selected for the 2021 Health and Productivity Stock Selection for the first time.

This article describes how the development of a system to support remote occupational health, an advanced form of the health information solution offered by Fujitsu, leads to the resolution of issues companies are faced with that relate to employee health management and how Fujitsu is striving to realized data-driven health and productivity management.

2. Health management in the new normal era

This section presents the current situation and issues regarding employee health management, which companies are now facing in the new normal era.

2.1 Mental and physical impact of telework

In a questionnaire survey conducted by Omron Healthcare Co., Ltd., the following answers were given on the mental and physical impact felt by those with telework experience. It shows that telework has some impact, both mentally and physically. This includes not only mental stress but also discomfort such as stiff shoulders and lower-back pain apparently caused by maintaining the same posture for prolonged periods [1].

1. Stiff shoulders (68.1%)
2. Mental stress (61.3%)
3. Lower-back pain (54.6%)
4. Poor posture (52.7%)
5. Eye strain (50.5%)

Prolonged telework generally causes a lack of communication and makes employees less able to seek support from superiors and colleagues, which leads to concern about increased burdens on the mind and body because of the physical impacts resulting from lifestyle changes in addition to the impacts on mental health such as increased feelings of anxiety and depression.

Self-care —when employees recognize their own

health status and take care of themselves—is critical with telework.

2.2 Relationship between telework and stress

In the Fujitsu Group, an annual stress check based on the Industrial Safety and Health Act was conducted from December 14, 2020 to January 12, 2021. During this check, we also asked the telework rate of employees. **Table 1** compares the results of the stress check with those of the previous fiscal year.

With "Physical and mental responses to stress (stress responses)," "Problematic" judgment has decreased except for Anxiety. In particular, the decrease is significant for Irritability, Tiredness, and Physical complaints. As the Fujitsu Group aims to achieve a telework rate of 75%, one reason for the decrease is assumed to be freedom from the physical burden of office work, including commuting.

Table 2 shows the results of the stress check for

Table 1
Results of stress check (YOY).

Health risk	Causes of stress								
	Work burden (quantitative)	Work burden (qualitative)	Degree of physical burden	Stress from interpersonal relationships in the workplace	Stress due to workplace environment	Low degree of job control	Low degree of skill utilization	Low degree of job suitability	Lack of job satisfaction
Result	26.7%	29.8%	10.4%	20.5%	21.7%	16.1%	28.3%	29.2%	32.8%
	+1.6%	+1.2%	-4.8%	-4.5%	-8.4%	-1.2%	-2.9%	-1.3%	-2.7%

Health risk	Physical and mental response to stress (stress responses)						Factors affecting stress responses			
	Energy	Irritability	Tiredness	Anxiety	Depression	Physical complaints	Support from supervisor	Support from colleague	Support from family & friends	Degree of satisfaction with job and life
Result	30.2%	22.7%	24.4%	21.8%	23.6%	30.5%	32.2%	46.7%	28.8%	16.5%
	-0.7%	-2.4%	-3.2%	+0.2%	±0.0%	-2.3%	-0.8%	+0.6%	+0.1%	-2.6%

- Result: Percentage of "Problematic" or "Slightly problematic" judgments out of the aggregated results of the employee stress check.
- Bottom row showing changes from the previous year: +: "Problematic" increased (worsened) / -: "Problematic" decreased (improved)
- Number of respondents (in the entire Fujitsu Group): 85,121

Table 2
Results of stress check for different telework rates.

Telework rate	High stress rate	Difference from company-wide average		
		Workload control	Support from supervisor & colleague	Overall health risk
0%	+4.8%	+5	+2	+8
10%	+2.8%	+7	-2	+5
20%	+0.9%	+4	-5	-2
30%	+2.5%	+3	-5	-1
40%	-0.5%	+1	-4	-3
50%	-0.2%	+2	-4	-2
60%	-0.3%	+1	-5	-4
70%	-1.7%	0	-5	-5
80%	-2.6%	-1	-4	-5
90%	-1.3%	-1	0	-1
100%	-1.9%	-3	+6	+3

*Company-wide average telework rate: 71%

different telework rates. Note that the group with the telework rate of 0% was excluded from the discussion because it has no element of telework.

In the group with a telework rate of 80%, the overall health risk is at the low level of -5 as compared with the company-wide average. At 100%, however, the overall health risk is again higher than the average at +3 and the health risk due to less available support from the workplace is also higher than the average at +6.

This suggests that a higher telework rate leads to less availability of support from superiors and colleagues including lack of communication, making employees more psychologically isolated.

2.3 Remote implementation of occupational health activities

Interview guidance by occupational physicians was commonly provided in the form of face-to-face interviews before the COVID-19 pandemic, but a notice from the Ministry of Health, Labour and Welfare in November 2020 indicates that guidance can be implemented remotely [2]. However, interviews by occupational health staff such as occupational physicians and public health nurses via video conferencing, etc., provide less information showing mental states such as behavior during the conversation, facial expressions, and gestures as compared with face-to-face interactions. The occupational health staff conducting the interviews also struggle to grasp the health status of employees working remotely.

Remote occupational health activities during the COVID-19 pandemic are needed, such as the promotion of self-care by employees themselves and remote occupational health services suited for the new normal era, rather than simple measures such as changing follow-up from face-to-face interactions to remote consultations.

3. Data-driven health and productivity management

This section describes Fujitsu's approach to the realization of data-driven health and productivity management, which is required to resolve issues relating to employee health management facing companies in the new normal era, as mentioned in the previous section.

3.1 Relationship between health and productivity management and occupational health

Health and productivity management means to see health management of employees as a management issue and to strategically put it into practice.

Occupational health is an activity focused on ensuring the maintenance and promotion of safety and health of employees, the base of corporate activities, with the central role played by occupational health staff, thereby leading to improved corporate value and productivity.

In the practice of health and productivity management, the key is active involvement by occupational health staff with the health management promotion system based on gaining the understanding of upper management [3].

3.2 Examples of health information solutions

For occupational health staff to grasp the health status of employees, health information such as medical examination results must be digitized and managed.

Since April 2020, Fujitsu has been offering as software as a service (SaaS) the healthcare management support system FUJITSU Healthcare Solution LifeMark HealthAssist, which helps digitize and manage employee health information to support health and productivity promotion as well as occupational health activities [4].

Fujitsu plans to release in Fiscal 2021 the Health and Productivity Management Solution (tentative name) as a mechanism to visualize the progress in the promotion of health and productivity management by using the results [5, 6] of the joint research with the Kawakami Laboratory of the University of Tokyo (Kawakami Laboratory).

Utilizing a combination of these solutions enables companies to digitize and aggregate employee health information and grasp the systematic health risk, thereby facilitating the promotion of health and productivity management.

3.3 Development of remote occupational health support system

Health and productivity management requires

not only an organized group approach but also an individual approach tailored to the characteristics of employees through occupational health activities [7]. Therefore, occupational health activities in the new normal era require a mechanism to digitally keep track of the health status of employees working remotely. Accordingly, Fujitsu started joint research in October 2020 with the Kawakami Laboratory, aiming to develop a system to support remote occupational health [8]. **Figure 1** shows a conceptual diagram of this system.

The remote occupational health support system is composed of two new data-driven algorithms that utilize the employee health data aggregated in the cloud and the Health Portfolio function, which visualizes the mental and physical health status of employees and gives optimal advice.

The following outlines the joint research.

1) Development of a data-driven algorithm fordetermining mental and physical health

Based on Kawakami Laboratory's knowledge of cognitive behavioral therapy, the pulse survey function—a simple questionnaire feature of the workplace stress check system FUJITSU Healthcare Solution: Organizational Stress Assessment e-Diagnosis@Mental Health—is combined with an AI facial expression recognition technology [9] developed by Fujitsu Laboratories to develop a data-driven algorithm (Figure 1 a.). This is intended to be used for judging the mental and physical health of employees and analyzing health risk factors based on survey data on mental and physical health status and facial expression data.

2) Development of a data-driven algorithm to provide optimal advice

The mental and physical health status of employees obtained in 1) and the details of behavior that had an influence on the health status will be combined with attribute information such as gender, age, and personality traits of each employee to conduct an analysis to develop an algorithm that leads to advice best suited to the individual (Figure 1 b.).

In addition, a health portfolio (Figure 1 c.), which records and aggregates the feedback of the results derived from the algorithms and the state of self-care based on the advice, is implemented.

3) Internal application of health portfolio

To verify the effectiveness of the algorithms developed in 1) and 2) and the health portfolio in employee self-care and remote occupational health during telework, a demonstration is conducted on some of our employees.

4) Expected effects

If the effectiveness is confirmed by the demonstration in 3), the optimal advice derived from the

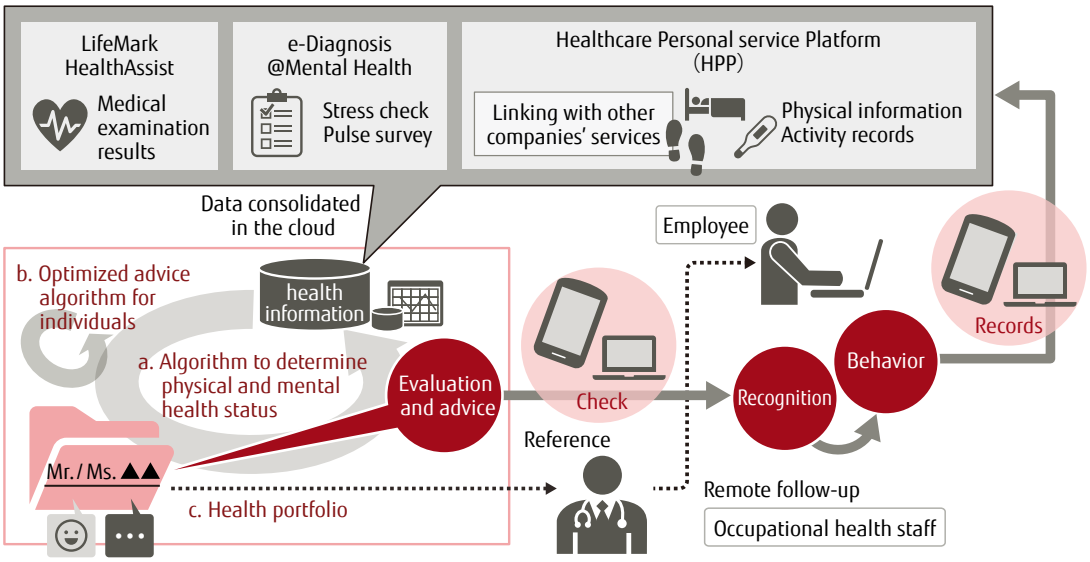

Figure 1
Remote occupational health support system using ICT in new normal era.

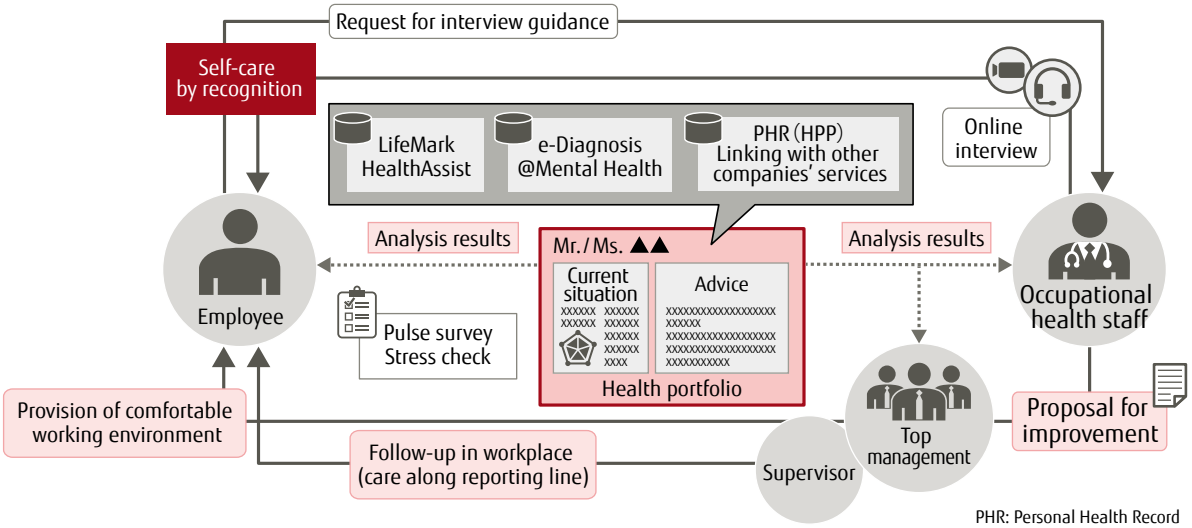

Figure 2
Image of health portfolio utilization.

algorithms in the health portfolio can be expected to enable employees to recognize their own health status, leading to more effective self-care, as shown in **Figure 2**. At the same time, the occupational health staff can also confirm the health risks and the state of self-care of employees through the health portfolios and grasp their health status before online interviews with the employees, which raises expectations for more efficient follow-up.

In addition, management and supervisors can make use of the results of group analyses of the health portfolios for environmental improvements and care along the reporting line, which can be expected to allow employees to continue to work with peace of mind and maintain better mental and physical health.

4. Future issues

4.1 Acquisition of lifestyle-focused health information

Attendance data as well as lifestyle information and vital data that can be acquired on a daily basis through smart devices owned by employees, in addition to information from fixed-point observations such as stress checks and medical examinations, should be used to grasp the mental and physical condition of employees and improve the accuracy of advice.

In doing so, making effective use of AI and cloud technology to deal with increased amounts of data and analyzing risk factors will allow early prevention to be achieved.

4.2 Self-management support

Independent actions, such as activities for a change of pace and resting, are required even if self-care helps individuals grasp their own health status [10].

In addition to recognizing and taking action based on advice derived from the system supporting remote occupational health, it is important in the new normal era to put in place a self-management support mechanism to improve the physical and mental health of employees, facilitate further positive change, and increase the well-being of employees.

5. Conclusion

This article first presented issues in the new normal era related to the health management of employees working remotely. In addition, it described activities aimed at resolving those issues in order to realize data-driven health and productivity management by utilizing industry-university joint research to develop a system that supports remote occupational health activities.

For health and productivity management in the new normal era, it is increasingly necessary for employees to grasp their own health status and implement

self-care. On the part of companies, remote occupational health follow-up that makes use of ICT is key because face-to-face follow-up is difficult under the circumstances.

Acquisition of daily lifestyle information in addition to pulse surveys to detect changes in mental and physical health status in a data-driven manner allows measures (for dealing with pre-symptomatic states) to be taken early on.

Results of analysis obtained by a data-driven means must be utilized for systematic follow-up and environmental improvements by managers and supervisors in addition to self-care by employees.

By expanding the scope covered by ICT and linking various systems in this way, the realization of data-driven health and productivity management that quickly digitizes and visualizes employees' health status raises expectations for improved well-being and sustainable growth of companies through the maintenance of employees' mental and physical health in the new normal era.

References and Notes

[1] Omron Healthcare Co., Ltd.: [Urgent Questionnaire for 1,000 Workers Now Working Remotely]. (in Japanese). *https://www.healthcare.omron.co.jp/corp/news/2020/0428.html*

[2] Ministry of Health, Labour and Welfare: Implementation of Face-to-Face Guidance by Physicians Based on the Provisions of Article 66-8 (1), Article 66-8-2 (1), Article 66-8-4 (1) and Article 66-10 (3) of the Occupational Safety and Health Act Using Information and Communications Devices (November 19, 2020). (in Japanese). *https://www.mhlw.go.jp/hourei/doc/tsuchi/T201124K0010.pdf*

[3] Ministry of Health, Labour and Welfare: A Collection of Practical Examples for Promoting Occupational Health Activities in Teams. p. 25. (in Japanese). *https://www.mhlw.go.jp/content/000492931.pdf*

[4] Fujitsu: Fujitsu Launches LifeMark HealthAssist, a Cloud-based Health Management Support System to Support Health and Productivity Management Initiatives. (in Japanese). *https://pr.fujitsu.com/jp/news/2020/04/21.html*

[5] Fujitsu: Fujitsu Embarks on Joint Research with the Kawakami Laboratory of the University of Tokyo on a Demonstration Program to Predict Health and Productivity Management Evaluation. (in Japanese). *https://pr.fujitsu.com/jp/news/2017/12/19.html*

[6] A. Sakuraya et al.: A Review of Literature on Health and Productivity Management Outcomes and Their Risk Factors. Occupational Health Journal 42 (3), pp. 62–68 (2019-05). (in Japanese).

[7] M. Shimazu: An Overview of the Implementation of the Stress Check Program: From the Viewpoint of Occupational Health Staff. Japanese Journal of Preventive Psychiatry, 2018 Volume 3 Issue 1, pp. 106–113. (in Japanese).

[8] Fujitsu: Fujitsu Embarks on Joint Research with the Kawakami Laboratory of the University of Tokyo to Realize a System That Supports Remote Occupational Health in the New Normal Era. (in Japanese). *https://pr.fujitsu.com/jp/news/2020/10/22.html*

[9] Fujitsu Laboratories et al.: Fujitsu Develops AI-based Facial Expression Recognition Technology to Accurately Detect Subtle Changes in Expression. *https://www.fujitsu.com/global/about/resources/news/press-releases/2019/1015-01.html*

[10] M. Ogawa: Stress Management From the Perspective of Mental Health Literacy. Journal of Information Science and Technology Association, 2017 Volume 67 Issue 3, pp. 104–109. (in Japanese).

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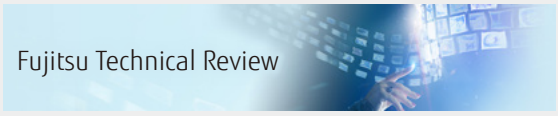

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