Type of retirement as a determinant of pre- and post-retirement hospital in-patient care use: a prospective study

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ABSTRACT

Background We examined prospectively the use of all-cause hospital in-patient care among public sector employees by using a 3-year pre- and post-retirement study window.

Methods A total of 5269 participants of the Finnish Longitudinal Study of Municipal Employees had retired during January 1984 and July 2000. They had register-based data on retirement (non-disability retirement n = 3411, men 40%, and diagnose-specific disability retirement n = 1858, men 50%) and all-cause hospital in-patient admissions and discharges. Analyses were conducted using Generalized Estimating Equation model.

Results The prevalence of hospital care use for non-disability retirees remained stable during the 6-year study window. The rate ratio (RR) for hospital care use increased in the year prior to retirement for men and women who transitioned into disability retirement due to cardiovascular disease and for women with disability due to mental disease. The RRs for hospital care use in the post-retirement year decreased for men who retired due to cardiovascular disease or mental disorders and for women who retired due to cardiovascular or musculoskeletal diseases.

Conclusions An increase in hospital care preceding retirement in major diagnosis-specific disability retirement groups was followed by various patterns of decrease in the need of care indicated a beneficial health effect of retirement.

Keywords aging, hospital care, retirement

Introduction

Despite improved global health in the last decades,1 the growing rate of early retirement due to disability burdens the economy of many OECD countries.2 In addition to the increasing numbers of employees exiting the labour force, population aging is one of the drivers of growing health care expenditures, such as human resource costs.3,4

Retirement is a major life event and is likely to affect health, life-style and general well-being.5 In 2011, 65% of Finnish pensioners retired due to non-disability and 32% due to disability at an average age of 59.7 (statutory retirement age between 63 and 68 years).6 Previous findings on the effect of retirement on subjective and objective health remain inconsistent,4 whereas positive,7–13 negative14–16 or no effects17–19 of retirement on self-rated health, mental health, use of antidepressant medicine and mortality have been reported. Only few studies have investigated changes in pre- and post-retirement use of hospital care. In a 13-year population-based follow-up study, Wallman et al.15

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reported increased health care utilization, which remained high during the follow-up among prematurely retired men compared with the general population reference group.

Knowledge on retirement-related health effects is needed for developing pension systems. Our aim was to study objectively the effects of retirement on health among disability and non-disability retirees. Longitudinal data on 5269 public sector employees from midlife to old age with corresponding register-based data on retirement and hospital in-patient admission and discharge dates enabled us to analyse prevalence in use of hospital care 3 years before and after retirement. Based on previous findings, we hypothesized that disability retirement in the main diagnose groups would be associated with increased prevalence of pre-retirement hospital in-patient care use. Furthermore, we expected to find a decline in use of hospital care after disability retirement.

Methods

Participants

The Finnish Longitudinal Study on Municipal Employees by the Finnish Institute of Occupational Health included 6257 public sector employees aged 44–58 years chosen randomly from all Finnish municipal employees at baseline in 1981 and followed-up thereafter. The study is ongoing with register-based data until 31 July 2009. We included all participants with data on type and date of formal retirement and hospital in-patient care use 3 years before and after retirement, thus leaving us with a sample of 5269 participants (43.2% men). Sixty-one per cent resided in cities with citizens of >30 000. Of those excluded from this study, 129 participants died before completing the 6-year study window, 480 participants retired before completing the 3-year pre-retirement time, 309 had missing data on retirement (due to e.g. migration before retirement) and 70 had missing data on hospital care. Compared with the sample in the current study, those with missing register data on either retirement or hospital care, other than being more frequently men (53%, $\chi^2 = 30.611$, df = 1, $P < 0.001$) and blue-collar (versus upper or lower white-collar) employees (58%, $\chi^2 = 66.506$, df = 2, $P < 0.001$), did not differ from participants of this study. Compared with the study participants, those who died either before retiring or before completing the 6-year study window were typically men (73%, $\chi^2 = 43.777$, df = 1, $P < 0.001$), working in blue-collar positions (64%, $\chi^2 = 18.612$, df = 2, $P < 0.001$), reported more cardiovascular disease (CVD) (34%, $\chi^2 = 15.263$, df = 1, $P < 0.001$), metabolic disease (14%, $\chi^2 = 15.737$, df = 1, $P < 0.001$) and adverse life-style factors, such as smoking (73%, $\chi^2 = 40.859$, df = 1, $P < 0.001$). Finnish Institute of Occupational Health Ethical Committee approved this study, and it conforms to the principles of the Declaration of Helsinki.

Non-disability and diagnose-specific disability retirement

Date and type of retirement and primary diagnosis for disability retirement was provided by the Finnish Centre for Pensions and linked to the survey data using a unique personal identification number. Study participants retired during January 1984 and July 2000, at ages 52 to 68. During that time, statutory retirement age for municipal employees was 63 years, with the exception of special groups (e.g. pre-school teachers, bus drivers and nurses). Besides statutory retirement, employees could apply for an individual early retirement at the age of 58 years. This was usually done for various reasons and meant that the pension was permanently reduced. Together these two forms of retirement comprised the non-disability retirement group in the current study. Transitioning into retirement was a permanent decision, with no possibility to further participate in paid work.

Before reaching the statutory retirement age, employees can apply for disability pension if they are due to a medically confirmed illness unable to continue working even after periods of rehabilitation, re-education or assistance. We classified disability retirements according to International Classification of Diseases (ICD 8–10) into the following groups: diseases of the musculoskeletal system (ICD 8–9 codes 710–739 and ICD 10 codes M00–M99), diseases of the circulatory system (ICD 8–9 codes 390–459 and ICD 10 codes I00–I10), mental disorders (ICD 8–9 codes 290–319 and ICD 10 codes F00–F99) and all other diagnoses which included, e.g. diseases of the respiratory ($n = 78$) or nervous systems ($n = 44$) and injuries or poisoning ($n = 54$).

All-cause hospital in-patient care use

All-cause hospital in-patient admission and discharge dates which took place between 1 January 1981 and 31 July 2003 were extracted from the Finnish Hospital Discharge Register for the participants by using a personal identification code that all Finnish citizens have had since 1971. Hospital in-patient care use was defined as an overnight stay or day surgery in a central, district, or university hospital or health centre, which had an admission and discharge date and lasted for 1 day or more. Mortality dates were obtained from the Finnish National Population Register.

Covariates

Respondents’ age at retirement was calculated by using the date of retirement. Occupational class was measured by
Results

During the study window, 65% (n = 3411, 40% men) of the participants transitioned into non-disability retirement, whereas 35% (n = 1858, 51% men) retired due to disability (diseases of the musculoskeletal system n = 908, 49%, diseases of the circulatory system n = 353, 19%, mental disorders n = 258, 14% and all other diagnoses n = 339, 18%). Due to gender differences in type of retirement, the rates for use of hospital inpatient care were calculated separately for men and women. Sixty nine per cent of those who retired due to CVD and 34% of those who retired due to mental disorders were men. Baseline characteristics are presented in Table 1. Compared with non-disability retirees, those who retired due to disability were younger at baseline, retired at a younger age, were likely to be more often men and blue-collar employees. Furthermore, they suffered more frequently from major chronic illnesses, smoked more, used alcohol more frequently and were physically less active. There were no statistical differences in the prevalence of pre- or post-retirement hospital care according to the size of the population in the living region.

In-patient hospital care use during the retirement transition

Prevalence of pre- and post-retirement hospital in-patient care use according to type of retirement during the study window is shown in Figs 1 and 2. In contrast to the non-disability retirement group, pre-retirement hospital care use increased in all four diagnose-specific disability retirement groups. The amount of hospital care was particularly high for the cardiovascular, mental and other diagnose-specific disability retirement groups 1 year prior to retirement. Post-retirement use of hospital care decreased in all disability retirement groups, while remaining stable for non-disability retirees.

Longitudinal differences in use of in-patient hospital care according to retirement type

The RRs for pairs of consecutive years according to type of retirement, adjusted for baseline age and retirement age, are presented in Tables 2 and 3. We observed a steep increase in the RRs for hospital care use 1 year before retirement among women who transitioned into disability retirement due to CVD (RR = 0.22, 95% CI = 0.13 to 0.38), due to mental disorders (RR = 0.42, 95% CI = 0.24 to 0.77) and due to musculoskeletal diseases (RR = 0.67, 95% CI = 0.51 to 0.88). For men during the year before retirement, the highest increase in the use of hospital care was found in the disability retirement due to CVDs and other diagnoses groups, as the RRs were 0.19 (95% CI = 0.12 to 0.28) and 0.23 (95% CI = 0.14 to 0.36), respectively.
Use of hospital care decreased after participants transitioned into disability retirement. When comparing the year of retirement to 1 year after retirement, RR for use of hospital care decreased strongly for women in all diagnose-specific disability retirement groups, except for those retired due to mental disorders. The steepest decline was found among those who retired due to musculoskeletal diseases [RR = 2.15 (95% CI = 1.53 to 3.03)] and other diagnoses [RR = 2.07 (95% CI = 1.13 to 3.79)]. For men, use of hospital care decreased in the year following retirement.

### Table 1 Baseline characteristics according to the type of retirement and main medical cause of disability retirement (percentages unless stated otherwise)

<table>
<thead>
<tr>
<th></th>
<th>All participants (n = 5269)</th>
<th>Non-disability retirement (n = 3411)</th>
<th>Disability retirement, all causes (n = 1858)</th>
<th>Disability retirement, musculoskeletal (n = 908)</th>
<th>Disability retirement, cardiovascular (n = 353)</th>
<th>Disability retirement, mental disorder (n = 258)</th>
<th>Disability retirement, others (n = 339)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at baseline, years (mean, SD)</td>
<td>50.1 (3.4)</td>
<td>50.6 (3.5)</td>
<td>49.2 (3.1)</td>
<td>49.1 (3.0)</td>
<td>49.4 (3.1)</td>
<td>48.6 (2.9)</td>
<td>49.2 (3.2)</td>
</tr>
<tr>
<td>Age at retirement (mean, SD)</td>
<td>58.3 (3.5)</td>
<td>58.7 (3.7)</td>
<td>57.5 (2.8)</td>
<td>57.6 (2.8)</td>
<td>57.3 (2.8)</td>
<td>57.8 (2.8)</td>
<td>57.5 (2.9)</td>
</tr>
<tr>
<td>Men</td>
<td>44</td>
<td>40</td>
<td>51</td>
<td>45</td>
<td>69</td>
<td>34</td>
<td>53</td>
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<tr>
<td>Occupational class</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Upper white-collars</td>
<td>21</td>
<td>23</td>
<td>17</td>
<td>10</td>
<td>19</td>
<td>37</td>
<td>24</td>
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<tr>
<td>Lower white-collars</td>
<td>34</td>
<td>38</td>
<td>27</td>
<td>28</td>
<td>21</td>
<td>35</td>
<td>23</td>
</tr>
<tr>
<td>Blue-collars</td>
<td>45</td>
<td>39</td>
<td>56</td>
<td>62</td>
<td>60</td>
<td>28</td>
<td>53</td>
</tr>
<tr>
<td>Musculoskeletal disease</td>
<td>37</td>
<td>31</td>
<td>46</td>
<td>54</td>
<td>38</td>
<td>36</td>
<td>39</td>
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<tr>
<td>CVD</td>
<td>20</td>
<td>17</td>
<td>25</td>
<td>23</td>
<td>42</td>
<td>21</td>
<td>18</td>
</tr>
<tr>
<td>Metabolic disease</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Mental disorder</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Cancer</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>3</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Never smoked</td>
<td>57</td>
<td>61</td>
<td>51</td>
<td>53</td>
<td>43</td>
<td>60</td>
<td>46</td>
</tr>
<tr>
<td>Alcohol consumption ≥1 occasion per week</td>
<td>10</td>
<td>8</td>
<td>13</td>
<td>13</td>
<td>15</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Vigorous physical activity ≥1 occasion per week</td>
<td>49</td>
<td>52</td>
<td>43</td>
<td>42</td>
<td>44</td>
<td>41</td>
<td>46</td>
</tr>
<tr>
<td>No hospital care during the study windowa</td>
<td>9.0</td>
<td>10.4</td>
<td>6.5</td>
<td>6.0</td>
<td>6.9</td>
<td>6.5</td>
<td>7.7</td>
</tr>
</tbody>
</table>

SD, standard deviation.

*Calculated for a 3-year pre-/post-retirement period.

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**Fig. 1** Pre- and post-retirement use of hospital care by type of retirement (non-disability and all-cause disability retirement). Participants were followed up for 3 years before and after retirement; vertical line indicates retirement.
Disability retirement due to musculoskeletal diagnosis (N = 911)  
Disability retirement due to cardiovascular disease (N = 356)  
Disability retirement due to mental disorders (N = 259)  
Disability retirement due to other disorders (N = 341)

Fig. 2 Pre- and post-retirement use of hospital care by type of disability retirement (musculoskeletal, cardiovascular, mental disorders and all other diseases). Participants were followed up for 3 years before and after retirement; vertical line indicates retirement.

Table 2 Longitudinal changes in pre- and post-retirement use of all-cause in-patient hospital care (RRs, 95% CI) for pairs of consecutive follow-up years according to the type of retirement (non-disability retirement and disability retirement according to main medical cause) for women

<table>
<thead>
<tr>
<th>Consecutive follow-up comparisons within retirement group*</th>
<th>Women</th>
<th>−2 versus −1 years (95% CI)</th>
<th>−1 versus 0 years (95% CI)</th>
<th>0 versus 1 years (95% CI)</th>
<th>1 versus 2 years (95% CI)</th>
<th>2 versus 3 years (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-disability pension (n = 2068)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR</td>
<td>0.97 (0.77 to 1.22)</td>
<td>0.79 (0.63 to 0.98)</td>
<td>0.97 (0.71 to 1.31)</td>
<td>1.25 (0.97 to 1.62)</td>
<td>0.77 (0.59 to 1.00)</td>
<td></td>
</tr>
<tr>
<td>Musculoskeletal disease (n = 495)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR</td>
<td>0.76 (0.44 to 1.33)</td>
<td>0.67 (0.51 to 0.88)</td>
<td>2.15 (1.53 to 3.03)</td>
<td>1.51 (0.97 to 2.37)</td>
<td>0.67 (0.38 to 1.17)</td>
<td></td>
</tr>
<tr>
<td>CVD (n = 112)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR</td>
<td>1.01 (0.42 to 2.39)</td>
<td>0.22 (0.13 to 0.38)</td>
<td>2.04 (1.14 to 3.64)</td>
<td>2.41 (1.15 to 5.04)</td>
<td>0.63 (0.31 to 1.27)</td>
<td></td>
</tr>
<tr>
<td>Mental disorder (n = 165)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR</td>
<td>0.79 (0.32 to 1.96)</td>
<td>0.42 (0.24 to 0.77)</td>
<td>1.57 (0.87 to 2.80)</td>
<td>1.08 (0.68 to 1.71)</td>
<td>2.07 (0.83 to 5.19)</td>
<td></td>
</tr>
<tr>
<td>Other diagnose (n = 156)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR</td>
<td>0.76 (0.42 to 1.37)</td>
<td>0.76 (0.40 to 1.44)</td>
<td>2.07 (1.13 to 3.79)</td>
<td>1.98 (1.08 to 3.60)</td>
<td>0.78 (0.41 to 1.47)</td>
<td></td>
</tr>
</tbody>
</table>

RR = $R_{\text{pre}} / R_{\text{post}}$, where $R_{\text{pre}}$ is the rate for the previous year of follow-up and $R_{\text{post}}$ is the rate for the following year.

CI, confidence interval.

*Adjusted for age at baseline, age at retirement.
comparisons revealed that RRs (the year of retirement versus 1 year after retirement) for those who retired due to CVD or other diagnosis were especially high. Following a slight increase during the year of retirement, there was a steep drop in use of hospital care 1 year after retirement among men who retired due to mental disorder (RR \(= 3.95, 95\% \text{ CI} = 1.91 \text{ to } 8.19\)). Adjusting all the models for occupational class, lifestyle factors and main chronic diseases had small attenuating effect on RRs for use of hospital care.

**Discussion**

**Main finding of this study**

A steep increase in the use of hospital care among disability retirees in the year before retirement was followed by a decrease during the first year of retirement for men and women. Corresponding trends were not found among non-disability retirees. While transitioning into disability retirement appeared to bring notable reductions in hospital care, especially among men who retired due to mental disorder (RR = 3.95, 95% CI = 1.91 to 8.19), adjusting all the models for occupational class, lifestyle factors and main chronic diseases had small attenuating effect on RRs for use of hospital care.

**What is already known on this topic**

While the majority of studies have reported a positive effect of retirement on various subjective and objective health measures, mixed results have also been found. Some of these inconsistencies may stem from structural and/or statistical endogeneity, which refers to a potential reversed causality in the relationship between timing of retirement and health and/or to the existence of an un-modelled effect from an observed or unobserved variable or variables on both health trajectories and the retirement decision per se.

As only few studies have investigated changes in pre- and post-retirement use of hospital care, this association also remains unclear. In a 13-year population-based follow-up study, Wallman et al. reported that disability retirement had limited effects on utilization of hospital care and that the deterioration of health seemed to be broader than reflected by the retirement diagnosis. Despite these findings, poor working conditions and excessive job strain, especially for those with low mental and physical resources, have been linked to adverse health effects in previous studies. Furthermore, physical and mental work strain and adverse psychosocial work factors seem to be a major cause of disability retirement.

**What this study adds**

Findings of the current study elaborate on the complex relationship between retirement and health by showing a positive effect of retirement on use of hospital care among disability retirees. Furthermore, we show that the patterns of hospital care use vary according to disability diagnoses and gender.
Use of hospital in-patient care can be considered a reliable indicator of, e.g. fatal and non-fatal CVD.\textsuperscript{33} To control for structural endogeneity,\textsuperscript{26,27} we analysed separately use of pre- and post-retirement hospital care in both disability and non-disability retirement groups. Some recent studies have indicated that use of hospital care, e.g. among individuals with mental disorders, may vary according to regions.\textsuperscript{34} In the current study, the prevalence of pre- or post-retirement hospital care did not differentiate according to the size of the population in the living region. Furthermore, attrition was minimal due to use of register-based retirement and use of hospital in-patient care.

Several factors may explain these findings. First, the general increase in hospital care in the year before retirement in disability retirement groups may partly be explained by the increasing prevalence of ill health. Earlier findings in this cohort show an increased prevalence of major disability causing diseases from baseline 1981 to follow-up in 1985,\textsuperscript{35} around the time the majority of the cohort transitioned into retirement. Second, employees’ perceptions of excessive strain of the working life may increase with age due to declining resources.\textsuperscript{36} These feelings of excessive strain typically initiate the 1-year-long process of applying for disability retirement.

We found notable decreases in hospital care use in the years after retirement in the disability retirement groups. First, these potentially beneficial health effects may be associated with the absence of job strain,\textsuperscript{28–30} which may have exacerbated the symptoms of the underlying chronic illness, leading to lower use of hospital care. Second, exiting working life due to disability can enable individuals to focus energy on health promoting activities, such as exercise and other leisure time activities.\textsuperscript{37} Third, the decrease in use of hospital care among disability retirees may be due to the ceased need to further diagnose the debilitating illness after receiving a disability retirement decision,\textsuperscript{15} or fourth, this may be due to successful treatment of the respective disease.

The prevalence of use of hospital in-patient care in the musculoskeletal disability retirement group was lower compared with all other disability retirement groups. This may possibly be due to the different treatment practices of the underlying chronic illnesses. While CVD and mental disorders, such as schizophrenia, typically require longer hospital stays (14 and 38 days in average, respectively), the corresponding number of days is lower for musculoskeletal diseases (6 days in average).\textsuperscript{38} This trend in hospital care is also reflected in hospital discharges, which were lower for musculoskeletal diseases (1.3 per 100 000 population) compared with diseases of the circulatory system (2.7 per 100 000 population) and mental disorders (1.4 per 100 000 population).\textsuperscript{38}

Present results suggest that disability retirement decreases the need for use of all-cause hospital in-patient care and thus is beneficial for individuals’ health. For women who retired due to mental disorders, the health benefits brought about by retirement seem to be limited. Thus, there is a need to monitor closely the health of these retirees. More information is also needed on the effect of job strain in the association between retirement and need of hospital care. The need to prolong

**Limitations of this study**

The first limitation to the current study is that we used all-cause instead of diagnose-specific hospital in-patient care, which meant that some of the treatment respondents received was unrelated to the retirement process. We chose to analyse the use of all-cause hospital care, as previous studies have indicated that there may not be significant differences in the main discharge diagnosis between non-disability and disability retirees beyond admission frequency.\textsuperscript{15} Furthermore, the chronic illness underlying disability retirement could cause individuals to be treated for a plethora of conditions. Second, some of the hospital in-patient care use might have been caused by the need to diagnose a chronic illness for the purposes of applying for disability retirement. Decrease in use of hospital care would in this case not indicate better objective health. Further, we cannot dismiss the possibility that this decrease was related to successful treatment of the respective disease. Despite relying on population-based data set representing a wide variety of municipal occupations and with both genders represented, study participants were occupationally active public sector employees, which should be considered when generalising the results on a population level. Finally, we acknowledge that the selective mortality and missing information may have affected current results. Those who died either before retiring or before completing the 6-year study window (2% of participants) were at baseline in poorer health and reported more frequent smoking compared with the participants. Furthermore, the prevalence of hospital care use was higher among those who retired due to CVD, compared with other disability groups.

**Conclusions**

Present results suggest that disability retirement decreases the need for use of all-cause hospital in-patient care and thus is beneficial for individuals’ health. For women who retired due to mental disorders, the health benefits brought about by retirement seem to be limited. Thus, there is a need to monitor closely the health of these retirees. More information is also needed on the effect of job strain in the association between retirement and need of hospital care. The need to prolong
working careers is becoming more evident in the future. As there was little variation in the pre- and post-retirement hospital care use of those who transitioned into non-disability retirement, our study indicates that this could be achieved without increasing the need for hospital in-patient care.

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**References**