14-year trend of care use before death in Finland.

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Background: The Finnish population has been ageing for decades (1), and is among the oldest populations in Europe. Only in the last 20 years, the number of people aged over 65 years increased by 430,000, passing from 16% of the total population in 2005 to more than 21% in 2018 (1). Some of the main concerns about an aging population are the potentially increasing demand for health and social care services, and the resulting increase in costs for society. However, two decades ago, it was suggested that what drives most the use of care services is the proximity to death rather than the chronological age of an individual (2). That is, people in their last years of life tend to consume more care resources than their surviving peers. Focus of research and policy on chronological age has been defined as a "red herring" (i.e., something misleading or distracting), diverting the debate from the impact of proximity to death (2). Assuming that the only driver of care spending is proximity to death, all individuals would eventually be faced with the same care spending. In an ageing population with increasing longevity, care use would only be moved later in life. The strong relationship between age and care spending would be present merely because older individuals are more likely to be in their last year of life than younger individuals. However, while this might be the case for more acute care, differences in the use of long-term care between deceased and survivors diminish with increasing age (3,4). In Finland, the use of long-term care increased between 2000 and 2011 as a result of two contrasting phenomena (5). First, long-term care use between survivors and deceased became more similar, and the reliance on long-term care was more compressed at the end of life, resulting in a reduction of overall use. Second, survivors aged 90 or older increased in number and their use of long-term care rose, resulting in a total increase in care demand. Other drivers than chronological age and closeness to death also affect care use. In particular, cause of death heavily affects the use of care services, with dementia patients being the most intensive users (3). However, a full assessment of recent trends in patterns of care use by age, proximity to death and cause of death is lacking. The Finnish context offers a unique opportunity to study trends in hospital and social care use at the end of life. This is because of exhaustive population registration data, which covers the total population without self-report bias or loss to follow-up.

Main goal: To analyze the trends of decedents' care use over time by age at death, sex, proximity to death, type of care used, and causes of death in Finland between 2005 and 2018.

Study population: Using Finnish register data, we gathered information about individuals who died aged 65 and over between 2005 and 2018. For each individual, we observed the age at death, sex, date of death, ICD-10 cause of death, and the days spent in care facilities per each of their last seven years of life.

Descriptive analyses: We calculated the average number of days in care stratifying by combinations of sex, 10-year age group, type of care used, year of death, cause of death, and the calendar year before death.

Planned analysis: We will implement multilevel linear models stratified by sex and type of care used to account for the individuals' repeated observation over time.

Preliminary results: Between 2005 and 2018, a total of 315,400 females and 263,700 males aged 65 or older died in Finland, increasing respectively from 20,300 and 16,200 deaths in 2005 to 24,700 (+22%) and 21,900 (+35%) in 2018. The groups that mainly drove these increases were the older, namely, females aged over 90 (+3,400) and males who died at 80 or older (+4,500). For these two groups, we also observed an increase in deaths attributable to dementia. While, in 2005, 3,300 people older than 80 died of dementia (9% of deaths), the number increased to 8900 in 2018 (19%). Despite this increase, which happened over a reduction in deaths due to cardiovascular diseases, the average days spent in care by decedents in their last seven years of life remained stable in the study period.

As shown in **Figure 1**, the days spent in care per each year prior to death remained very similar between 2005 and 2018. Females spent, on average, more days in care than males in every age group. Approaching death increased care use for both sexes. The increase was more gradual and rapid for older age at death, while for younger ages, care use increased sharply only in the very last years of life. Care use by proximity to death changed only little over time for each combination of age group and sex. Age groups moved the level of care utilization, with the youngest having care utilizations in their last year of life, comparable to the one of the oldest six years prior to death.

The cause-of-death-specific care use in the last seven years of life is visible in **Figure 2**. Per each combination of age at death and sex, dementia patients were always the most intensive care users. While females who died with dementia spent roughly three of their last seven years in care facilities, peer males always spent one year less. On the contrary, those who died of cancer were always the least-intensive users of care services. For both sexes, the time spent in care for causes of death different from dementia was always less than two years, apart from those who died at 90 or older. Regardless of the cause of death, older age groups always had higher average use of care.

Despite the stability in person-average care use over time, we observed an increase at the population level brought by the increasing number of decedents, and mainly decedents at older ages. As an example, for people aged 80 or older at death, the average use of care in the last seven years of life increased from 530 days in 2005 to 583 in 2018 (+10%), after peaking at 631 days in 2012. At the same time, the stable increase in the number of deaths (from 21,700 to 30,200; +39%) drove the population-total from 11.5 million days (31,500 years) to 17.6 million days (48,200 years; +53%).

Figure 3 shows the changes in type of care for those who died between 2005 and 2018. We plotted the average days spent in health care versus the average days spent in social care in each year preceding death by sex, age group, and year of death. Despite the mostly stable trend in average care use, there was a constant shift towards the Y axis across the study period, representing a switch from health to social care over time for all combinations of age groups and sex. For both sexes, there was a higher consumption of care for older ages, while, for all age groups, females were the most intensive users. In those aged 65-69 at death, the increase in care use approaching death remained mainly due to an increase in health care use, despite it partially moved towards social care. In older age groups, by contrast, a strong shift from health to social care was observed.

Expected further results: Multilevel linear models will give greater insights into what drove the trends and patterns in average days in care use, giving information about the forces underlying their stability.

Conclusions: The preliminary results showed two important trends that shaped care use in Finland between 2005 and 2018. The first was the increase of total care use at the population level. This was mainly driven by an increase in the number of deaths occurring in older age groups rather than by an increase in average use or by use in the last years of life. Average care use by cause of death remained also constant during the study period and mostly determined by sex and age at death. The second phenomenon we showed was the shift from health to social care underlying the stable trend of average use. The change in type of care was stable, reflecting the cut down of long-term care provided in the bed wards of health centers (6). Our preliminary results show that, in the recent Finnish context, the increase in care use was driven by an increase in number of deaths in the older age groups rather than by an increase in use in the last years of life.

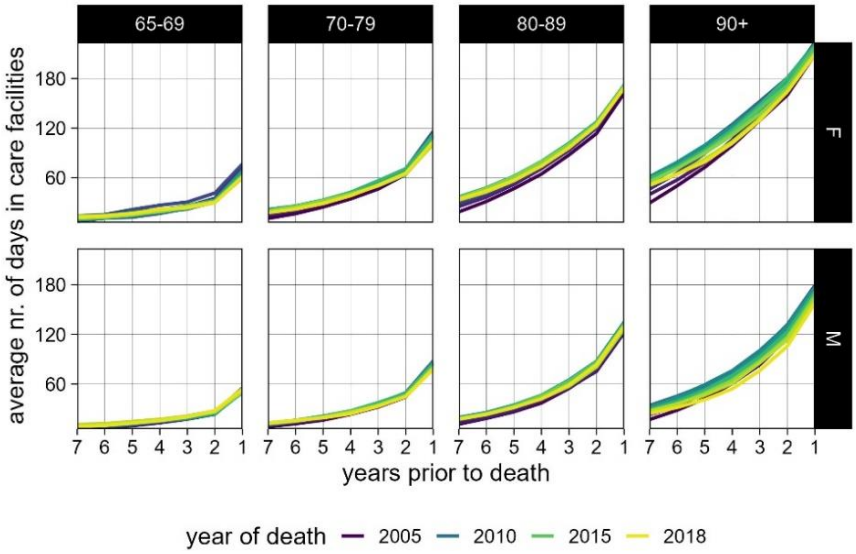

***Figure 1**: Average number (nr.) of days spent in care facilities in the last seven years of life by age at death, sex, year of death, and year prior to death. Decedents in Finland aged 65 or older who died between 2005-2018.*

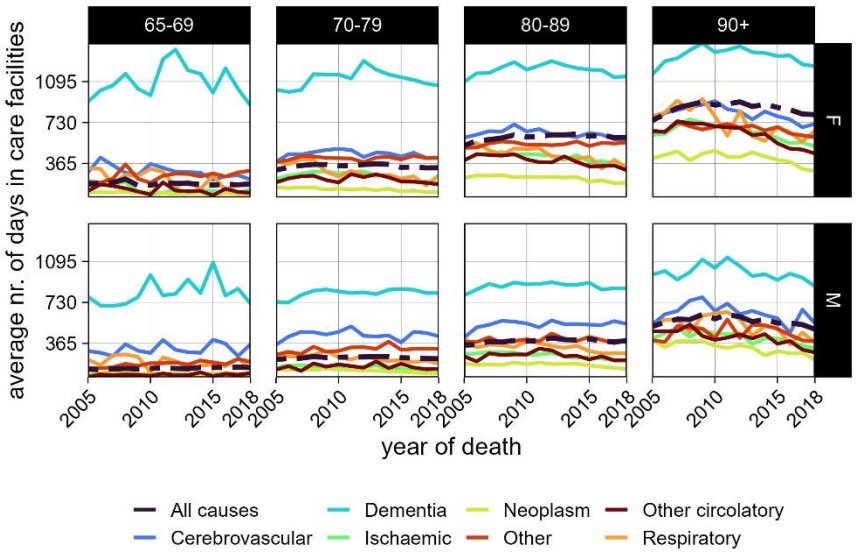

***Figure 2**: Average number (nr.) of days spent in care facilities in the last seven years of life, by age at death, sex, year of death, and cause of death. Decedents in Finland aged 65 or older who died between 2005-2018.*

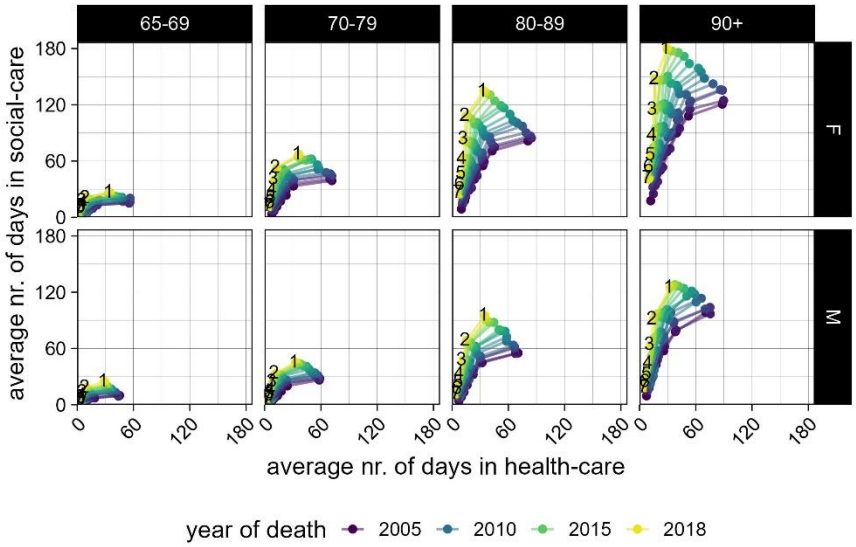

***Figure 3**: Average number (nr.) of days spent in health and social care facilities in the last seven years of life, by age at death, sex, year of death, and year prior to death. Decedents in Finland aged 65 or older who died between 2005-2018.*

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