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## Differences in primary palliative care between people with organ failure and people with cancer: An international mortality follow-back study using quality indicators

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### ABSTRACT

**Background:** Measuring the quality of palliative care in a systematic way using quality indicators can illuminate differences between patient groups.

**Aim:** To investigate differences in the quality of palliative care in primary care between people who died of cancer and people who died of organ failure.

**Design:** Mortality follow-back survey among general practitioners in Belgium, the Netherlands, and Spain (2013–2014), and Italy (2013–2015). A standardized registration form was used to construct quality indicators regarding regular pain measurement, acceptance of the approaching end of life, communication about disease-related topics with patient and next-of-kin; repeated multidisciplinary consultations; involvement of specialized palliative care; place of death; and bereavement counseling.

**Setting/participants:** Patients (18+) who died non-suddenly of cancer, cardiovascular disease, or respiratory disease ( $n = 2360$ ).

Results: In all countries, people who died of cancer scored higher on the quality indicators than people who died of organ failure, particularly with regard to pain measurement (between 17 and 35 percentage-point difference in the different countries), the involvement of specialized palliative care (between 20 and 54 percentage points), and regular multidisciplinary meetings (between 12 and 24 percentage points). The differences between the patient groups varied by country, with Belgium showing most group differences (eight out of nine indicators) and Spain the fewest (two out of nine indicators).

Conclusion: People who died of organ failure are at risk of receiving lower quality palliative care than people who died of cancer, but the differences vary per country. Initiatives to improve palliative care should have different priorities depending on the healthcare and cultural context.

### **What is already known about the topic?**

- While a broad range of people may have palliative care needs at the end of life, the quality of palliative care is not the same for all patient groups—in particular, people with cancer may receive higher quality end-of-life care than people who die of other causes.
- Many people receive a substantial amount of care in primary care in their last year of life, which makes general practitioners one of the most important providers of end-of-life care.
- Measuring the quality of palliative care is difficult, especially internationally, and often relies on outcome measures rather than systematic quality indicators.

### **What this paper adds?**

- This article introduces a minimum set of quality indicators for primary palliative care suitable for international use.
- People who die of organ failure are at a risk of lower quality palliative care than people who die of cancer particularly with regard to pain measurement, the involvement of specialized palliative care, and regular multidisciplinary meetings.
- There is no clear pattern across countries in the differences in quality of primary palliative care between people who die of cancer and those who die of organ failure, but differences seem in part due to culture and healthcare systems.

### **Implications for practice, theory, or policy**

- Through the use of quality indicators, different countries or organizations can monitor the quality of care delivered in a systematic way over time.
- The variability in the type and magnitude of the differences between patient groups between countries show that there is no “one size fits all” to improving access to high-quality palliative care for non-cancer patients.

## BACKGROUND

It is estimated that of the nearly 5 million people who die in the European Union each year, between 63% and 69% may have palliative care needs.<sup>1,2</sup> Many of these people will receive palliative care in part or solely in primary care, often from their general practitioner (GP), a care model with distinct practical and financial advantages in line with both patients' and carers' expectations.<sup>3,4</sup> Unfortunately, research suggests that despite the commonalities in the type and prevalence of end-of-life-related problems, the quality of palliative care may not be the same for all patient groups, with particular differences between people who die with cancer and those without cancer.<sup>5</sup> For example, people who died of cancer receive specialized palliative care more often<sup>6</sup> and are more likely to die at home.<sup>7</sup> However, systematic measurement and international comparison of the quality of palliative care for cancer and non-cancer patients in primary care are still lacking.

Measuring the quality of palliative care is difficult due to the time and effort of caregivers involved; the multidimensional, multidisciplinary nature of care; and the involvement of many stakeholders.<sup>8,9</sup> In addition, most existing measures of quality of palliative care use outcome measures rather than quality indicators.<sup>10</sup> Quality indicators are explicitly defined, measurable items referring to the outcomes, processes, or structure of care, which can be used to capture the quality of care on an aggregated level.<sup>11</sup> Quality indicators can be used both for internal monitoring of the quality of services delivered over time, as well as providing performance indicators for policy makers and professionals.<sup>12</sup> Based on extensive literature review, expert consultation, and feasibility testing, Leemans et al.<sup>13</sup> produced a quality indicator set for use in specialized palliative care settings in Flanders, Belgium. However, in many countries, only a minority of people receive care in specialized palliative care settings. In order to also be able to systematically assess the quality of care for people who receive the bulk of their end-of-life care in primary care, we adapted these quality indicators through further expert consultations to produce a minimum indicator set for use in primary care in an international context.

In this study, we investigate the potential difference between quality of palliative care for people who died of cancer and others, in this case people who died of organ failure, using a multidimensional minimum quality indicator set for palliative care in primary care, in four European countries. The four countries chosen, the Netherlands, Belgium, Italy, and Spain, have all reached advanced integration of palliative care in their healthcare system, but in some (such as Italy) palliative care is still more focused on people with cancer than those with other serious diseases or terminal illnesses.<sup>14</sup> As such, including these countries in a comparison between people with cancer and people who died of organ failure, two of the biggest disease groups with different disease trajectories but a similar need for palliative care, can illuminate how different healthcare context and policies shape quality of palliative care for different target populations.<sup>5,15</sup>

## METHODS

This study uses data from Belgium, Italy (Tuscany region), the Netherlands, and Spain (Castile and León and Valencian Community regions) collected as part of the EURO SENTIMELC (European Sentinel Network Monitoring End-of-Life Care) study, designed to retrospectively monitor end-of-life care in population-based

samples of deaths in different countries. Data were collected through GP Sentinel Networks, epidemiological surveillance networks consisting of GP practices or community-based physicians. Deaths were registered weekly from 1 January 2013 to 31 December 2014, except for Italy (from 1 June 2013 to 31 May 2015). All GPs provided a weekly report of every patient in their practice who had died. In this way, we collected demographic characteristics, cause of death, and whether or not death was sudden and unexpected for every deceased patient in the practice of participating GPs in addition to information on care at the end of life. Differences in the healthcare systems as of 2012 (the year before data collection started) with regard to primary care and palliative care can be seen in [Table 1](#).<sup>14,16</sup> Further information on data collection can be found elsewhere.<sup>6,17,18</sup>

#### [TABLE 1.]

Data were collected on 2436 decedents in Belgium, 983 in Italy, 966 in the Netherlands, and 591 in Spain. All patients of the participating GP practices who died non-suddenly of cancer, cardiovascular disease (excluding cerebrovascular accidents), or respiratory disease were included in the study. Those who died of cardiovascular disease or respiratory disease were combined in the group “organ failure.” In the Netherlands, people who lived in specialist nursing homes are strongly underrepresented in the data, as they are normally cared for by elderly care physicians rather than GPs and these are not part of the GP Sentinel Network.

#### **Measurements: selecting quality indicators**

The quality indicators included in this study are based on the work of Leemans et al.<sup>13</sup> The international EURO SENTIMELC research team selected those quality indicators from the full set of Leemans et al. that they deemed applicable to primary care and reformulated these so that they could be answered by GPs. The resulting questions underwent expert review by members of the research consortium in the four countries. Those with a score of at least 7.5 on a scale of 1 to 10 were included in the next EURO SENTIMELC registration form (in 2013), ensuring that there was at least one question per domain of quality indicators of palliative care.

From the indicators included in the registration form, nine were eventually selected to calculate quality indicators in the following multistep process. An overview of the selected questions for each domain and quality indicator can be seen in [Table 2](#).

- Each question was analyzed for data quality. Any question with missing values of 10% or more was excluded, as it was apparently difficult for GPs to answer this question.
- Each question was analyzed for usability as a quality indicator by ascertaining possible ceiling or floor effects, as well as variability between disease groups and countries. A question was excluded if it was answered positively for more than 90% or less than 10% of patients in both patients who died of cancer and patients who died of organ failure in all countries.
- Where necessary, the question and answer categories were adapted to form indicators as follows:
  - Indicator 1.1: Percentage of patients whose pain was known by the GP to be monitored regularly during the last 3 months of life: the indicator was

scored positively if the GP knew pain to be measured “often” or “very often.”

- Indicator 2.1: Percentage of patients known by the GP to have accepted that they were nearing the end of their life: the indicator was scored positive if the GP thought the patient had accepted their approaching end “completely” or “for the most part.” When the GP answered “don’t know,” they were not counted in this indicator (*n* reported separately in [table 4](#)).
- Indicators 3.1 and 4.1: Extent to which patients/family receive information from the GP about diagnosis, prognosis, disease progression, advantages and disadvantages of the treatments, and palliative care options: the indicator was scored positive if the GP communicated about at least three of the five disease-related topics.
- Indicator 3.2: If the GP answered “don’t know” to the question, “Did the patient ever express specific wishes about a medical treatment that he or she would or would not want in the final phase of life?” this was scored as “no,” as the quality indicator specifically targets discussion between GP and patient.
- Indicator 5.1: Repeated (on several occasions) formal multidisciplinary consultation with and between care providers (including GP) about the patient’s care goals and palliative care options: the indicator was scored positive if the multidisciplinary consultation occurred “once a week” or “once a day or more.”
- Indicator 7.1: To allow for deaths in palliative care units, which are indicative of high-quality palliative care, we changed this indicator from “percentage of people who died at home” to “percentage of people who did not die in a regular hospital unit.”

## [TABLE 2.]

### Analyses

To account for clustering within GPs, cluster-weighted chi-square values were calculated to test for differences in patient characteristics between groups with intra-cluster correlation estimated by analysis of variance (ANOVA) models, correcting for imbalanced clusters. ANOVA was used to test for differences in patients’ age between disease groups. Logistic regression analyses were used to test for differences in score on quality indicators between patient groups controlling for demographic differences and using robust error clustering to control for clustering within GPs. All analyses were performed using Stata Statistical Software: Release 12 (StataCorp., 2011).

### Ethics, consent, and permissions

Ethics approval for this study was obtained from the Ethical Review Board of Brussels University Hospital of the Vrije Universiteit Brussel and for Italy from the Ethical Committee of the city of Florence in Tuscany (11 April 2013). Formal approval for this research project by a medical ethics committee was not required in the Netherlands according to the Medical Research (Human Subjects) Act (WMO), but permission for the study was sought and obtained from the board of the Netherlands institute for health services research (NIVL) network. The NIVEL

Primary Care Database extracts data according to strict guidelines for the privacy protection of patients and GPs. No formal ethical approval is necessary to collect posthumous data in Spain.

## RESULTS

We included 1044 decedents in Belgium (638 who died of cancer and 406 who died of organ failure), 458 in Italy (217 cancer, 241 organ failure), 497 in the Netherlands (383 cancer, 114 organ failure), and 252 in Spain (178 cancer, 74 organ failure). In Belgium and Spain, this was roughly equal to the proportion of deaths by cancer and organ failure (cardiovascular and respiratory, excluding cerebrovascular accidents) in the population; Dutch GPs reported proportionally fewer deaths by organ failure possibly due to the exclusion of nursing home residents; and Italian GPs reported a higher proportion of organ failure than seen on a population level.<sup>19</sup> Across the four countries, the mean age at time of death of people who died of cancer was between 72 and 75 years old, significantly lower than that of people who died of organ failure (between 84 and 89 years old;  $p < 0.001$  for all countries; [Table 3](#)); consequently, people who died of organ failure were more likely to have had dementia ( $p < 0.001$  for all countries) in up to 46% of cases (Italy). In line with population-level statistics, the most common malignancy type for those who died of cancer was lung cancer and the majority of those who died of organ failure died of cardiovascular disease in all countries.<sup>16</sup> The longest place of residence in the last year of life was most often home. Those who died of organ failure were more likely than those who died of cancer to have spent the majority of their last year of life in a care home in Belgium (42% vs 14%), the Netherlands (34% vs 8%), and Spain (25% vs 4%;  $p < 0.001$  for all three countries), while residing in a care home in Italy was rare for both groups (10% and 5%, respectively).

[Table 3. ]

### Quality of palliative care—differences between patient groups

After controlling for demographic differences between disease groups—age, gender, longest place of residence, and dementia—significant differences between the two patient groups showed patients who died of organ failure consistently scoring lower than those who died of cancer ([Table 4](#)). However, different patterns of palliative care provision were seen in each country.

[TABLE 4. ]

In Belgium, people who died of cancer scored higher on all quality indicators except “GP thinks patient was able to accept their approaching end completely or for the most part.” The largest differences were found in frequent pain measurement (37% of those who died of organ failure vs 58% of those who died of cancer; odds ratio (OR) = 0.38, 95% confidence interval (CI) = 0.28–0.52), the likelihood of the GP discussing at least three illness-related topics with the patient (42% vs 68%; OR = 0.45, 95% CI = 0.34–0.599), and the involvement of specialized palliative care services (48% vs 74%; OR = 0.26, 95% CI = 0.18–0.37).

In Italy, patients who died of organ failure scored lower on four out of eight quality indicators, including both questions measuring continuity of care. The differences between patients who died of organ failure and those who died of cancer were

particularly large for frequent pain measurement (9% vs 44%; OR = 0.16, 95% CI = 0.08–0.32) and the involvement of palliative care services (17% vs 71%; OR = 0.11, 95% CI = 0.05–0.21).

In the Netherlands, there were also differences on four of the eight quality indicators. The differences were particularly large in the case of frequent pain measurement (4% vs 21%; OR = 0.16, 95% CI = 0.07–0.39) and the likelihood of the GP having communicated with the patient about at least three illness-related topics (74% vs 95%; OR = 0.17, 95% CI = 0.07–0.42).

In Spain, there was a difference between people who died of organ failure and people who died of cancer on only two indicators: frequent pain measurement (44% vs 74%; OR = 0.33, 95% CI = 0.15–0.71) and the involvement of palliative care services (75% vs 95%; OR = 0.16, 95% CI = 0.04–0.69).

The radar charts in [Figure 1](#) provide a visual overview of the scores of the quality indicators in the different countries for both patient groups.

[Figure 1.]

## DISCUSSION

In this study, we found that people who died of organ failure received lower quality palliative care according to their GP than people who died of cancer particularly with respect to frequent pain measurement, involvement of specialized palliative care, and likelihood to die in a regular hospital ward. However, which quality indicators showed differences between the groups and how large these differences were varied by country?

This study introduces a minimum quality indicator set, which has several benefits. The short questionnaire—nine questions—is easily implemented in general practice. The indicators have been chosen to be applicable in an international context, meaning the indicator set can easily be implemented in new countries with a primary care structure comparable to one of the four included countries. The set has been shown to be sensitive enough to distinguish between care delivered to different patient groups. The study uses a mortality follow-back design, which has been widely used in end-of-life care research as an appropriate way of gaining insight into the last phase of life from a population-based perspective.<sup>17,20</sup>

There are also limitations to this study. Only the GP is asked for their input, meaning that if the GP was not involved in certain decisions or the final days of care, the quality of palliative care may be underestimated. While the analytical methods used did control for clustering within GPs—that is, whether there is a higher than expected correlation between the scores of patients from the same GP—collecting data from only the GP may still present a biased picture. A comprehensive monitoring of quality of primary palliative care would ideally also take the views of other healthcare professionals as well as next of kin into account, and this should be considered for future studies. However, this study still provides a starting point for estimating the quality of palliative care delivered in primary care in four countries, with the possibility of implementing it further to determine the quality of palliative care in particular organizations or for different patient groups. Furthermore, while the set of quality indicators used encompasses eight domains of high-quality palliative care, it does not take all aspects of palliative care into account, for example, successful symptom management and concordance between treatment and patient

preferences. Finally, the percentage of all deaths included in our sample differed across the countries, suggesting differences in the assessment of death as sudden and completely unexpected, or the assessment of cause of death by the GP, as we were not able to collect these data from death certificates. This can be seen, for instance, in the high proportion of people who were reported to have died of organ failure in Italy, where GPs were considerably less likely to report cause of death as “other” than in the other countries (10% vs an average of 19%).

We did not report cutoffs for these quality indicators as these are dependent on many factors, including level of palliative care development and the particularities of the healthcare systems in the different countries.<sup>21</sup> For instance, what constitutes “specialized palliative care” as measured by indicator 6 varies across countries, as can be seen in [Table 1](#). The application of specialized palliative care also differs, as is reflected in the low score on this indicator in the Netherlands, which has a generalist approach to palliative care where most palliative care is provided by the GP.<sup>22</sup> This availability of different services may also impact the frequency of multidisciplinary meetings as measured by indicator 5. The palliative care needs of different patient groups may also differ, for example, the need for pain measurement may be higher in certain groups. The interpretation of the scores, and especially identifying a particular score as “low,” should therefore always take context into account. Each country or organization is encouraged to set their own goals that are reasonable for their context and to use quality indicators to monitor their own performance.

This study shows that differences in the quality of palliative care between cancer patients and non-cancer patients are persistent: people who died of organ failure were disadvantaged in several ways in each country. This suggests that although it is widely acknowledged that non-cancer patients are also in need of palliative care at the end of life, this knowledge is not always put into practice, even in countries that have achieved advanced integration of palliative care in regular healthcare for sometime.<sup>2,5,23</sup> People who die of organ failure may have a more unpredictable disease trajectory and prognosis than people who die of cancer, which can be barriers to communication about the end of life and initiating palliative care.<sup>24,25</sup>

Overall, Belgium showed most differences between the two patient groups, although some of these were relatively small (such as discussion of illness-related topics with family). In Spain, on the other hand, most percentage differences between the two groups were non-significant after controlling for demographic characteristics with the exception of frequent pain measurement and the involvement of palliative care services. The differences between countries in the overall scores on the quality indicators, the aspects of care where people with organ failure are at a disadvantage, and the size of the difference between people who died of cancer and those who died of organ failure suggest that there is no “one size fits all” solution to improve access to high-quality palliative care for “non-traditional” patient groups (i.e. non-cancer patients). Cultural and healthcare system characteristics should be taken into account in any proposed solutions. Nevertheless, in all countries, it is important to continue to invest in the training and awareness of healthcare professionals, to provide them with the tools they need to effectively provide palliative care for all patients in need of it. One of these tools may be instruments such as the Supportive and Palliative Care Indicators Tool (SPICT), which allows healthcare professionals to make a needs-based assessment of all patients, including non-cancer patients.<sup>26</sup> The quality

indicator set introduced in this article may be a second tool to close the gap in quality of palliative care between patient groups, as the establishment of quality standards and outcome measures has been recommended for this purpose by, for example, the American Heart Association/American Stroke Association.<sup>27</sup>

## **Conclusion**

While the quality of palliative care in primary care for people who died of organ failure is lower than for people who died of cancer in all four European countries studied, the nature of the differences—that is, which aspects of care show differences and how large these differences are—varies per country. Initiatives to improve palliative care should be context-specific. The minimum quality indicator set reported in this article may be a useful tool in monitoring the development of palliative care for different patient groups.

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## **Data management and sharing**

The data that support the findings of this study are available from the Belgian Scientific Institute of Public Health, the Dutch NIVEL Primary Care Database, the Italian Cancer Prevention and Research Institute, and the Spanish Regional Ministry of Health of Valencia and Castile and Leon, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are, however, available from the authors upon reasonable request and with permission of the appropriate institute.

## **Declaration of conflicting interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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**TABLES AND FIGURES**

**Table 1.** Healthcare system differences between Belgium, Italy, the Netherlands, and Spain in 2012.

	Belgium	Italy	The Netherlands	Spain
Healthcare system	Bismarck model	National Health Service system	Bismarck model	National Health Service system
Position of general practitioners	Solo or group practices	Solo or group practices	Solo or group practices; do not care for nursing home residents	Multidisciplinary primary care health centers
Palliative care education for general practitioners <sup>a</sup>	Principles of pain and symptom management at the end of life taught in basic education of physicians; additional postgraduate training available	No consistent palliative care training in the education of physicians	Dutch government considers palliative care as generalist care and does not recognize specific palliative care education; initiatives exist to provide additional postgraduate training (Volunteer) hospices, home palliative care support teams, palliative care units in hospital	Many medical schools include palliative care training for undergraduate students of medicine; many additional training initiatives exist
Organization of palliative care	Palliative care support teams in hospital, multidisciplinary palliative care units in hospital	Home palliative care support teams, inpatient hospice	Mostly reimbursed through health insurance. Limited additional financial support for palliative care dependent on life expectancy (<6 months)	Palliative care support teams at home and in hospital, palliative care units in hospitals, one inpatient hospice
Funding and reimbursement of palliative care <sup>a</sup>	Mostly reimbursed through health insurance. Limited additional financial support for palliative care dependent on life expectancy (<6 months)	Development of palliative care networks is funded by the government. No fee is required for palliative care consultations, hospitalization, or medication	Mostly reimbursed through health insurance. Palliative care consultation is funded by the government	No fee is required for palliative care services. Partial payment may be required for some medications
Availability of palliative care hospital support team <sup>b</sup>	1.08 per 100,000	None	Unknown	0.17 per 100,000
Availability of palliative home care services <sup>b</sup>	0.26 per 100,000	0.51 per 100,000	0.26 per 100,000	0.40 per 100,000
Availability of inpatient palliative care services <sup>b</sup>	0.47 per 100,000	0.29 per 100,000	0.24 per 100,000	1.27 per 100,000

<sup>a</sup>At the time of data collection, changes may have occurred since.

<sup>b</sup>Numbers indicate number of services, not number of beds.

**Table 2.** Quality indicators.

Domain	Numerator and denominator	Questions and answers
1. Physical aspects of care	Denominator: All patients for whom this question was answered (unless otherwise indicated) Numerator: Number of patients whose pain was measured often or very often in the last 3 months of life	Q: How often did you or another caregiver measure the patient's pain (with or without using a pain scale) in the last 3 months of life? A: Never, rarely, occasionally, often, very often
2. Psychosocial and spiritual aspects of care	Numerator: Number of patients who accepted death completely or for the most part Denominator: Number of patients for whom the GP answered anything but "I don't know"	Q: According to you, did the patient accept his or her approaching end? A: Yes, completely; yes, for the most part; no, not entirely; no, not all; I don't know
3. Information, communication, planning, and decision-making with the patient	Numerator: Number of patients with whom the GP discussed at least three of the listed topics	Q: Put a cross against topics you have discussed with the patient. A: Diagnosis, course of the disease/prognosis, the approaching end of life, advantages and disadvantages of the treatments, options in terms of end-of-life care
4. Information, communication, planning, and decision-making with family and friends	Numerator: Number of patients who expressed a specific wish about a medical treatment (i.e. "yes")	Q: Did the patient ever express specific wishes about a medical treatment that he or she would or would not want in the final phase of life? A: Yes, no, don't know
5. Information, communication, planning, and decision-making with other care providers	Numerator: Number of patients for whom the GP discussed at least three of the listed topics with a relative	Q: Put a cross against topics you have discussed with the relative. A: Diagnosis, course of the disease/prognosis, the approaching end of life, advantages and disadvantages of the treatments, options in terms of end-of-life care
6. Type of end-of-life care	Numerator: Number of patients for whom a multidisciplinary consultation took place approximately once a week or approximately every day	Q: How often in the last month of life did a pre-planned multidisciplinary consultation take place (face-to-face or via phone) between the care providers to discuss the care objectives and/or options in terms of palliative care? A: No such consultation/once in the last month of life/approximately once a week/approximately every day
7. Coordination and continuity of care	Numerator: Number of patients for whom at least one specialized palliative care initiative was initiated in the last 3 months of life Numerator: Number of patients who did not die in hospital (excluding palliative care unit)	Q: Which specialized palliative care initiatives were involved in the last 3 months of this patient's life? A: Country-specific specialized palliative care initiatives; other, namely, ...; none
8. Support for family/friends and informal carers	Numerator: Number of patients for whom the GP has contacted or plans to contact the relatives with regard to bereavement counseling	Q: Place of death? A: At home or living with family (including service flat); care home; home for elderly persons/nursing home; hospital (excluding palliative care unit); palliative care unit (hospital); elsewhere, please specify Q: After the death, did you have contact with any of the relatives with regard to bereavement counseling? A: Yes, once; yes, more than once; no, but has been planned; no and not planning to

GP: general practitioner.

**Table 3.** Demographics of people who died non-suddenly of cancer or organ failure in Belgium, Italy, the Netherlands, and Spain ( $n = 2360$ ).

	Belgium 2013–2014			Italy 2013–2015			The Netherlands 2013–2014			Spain 2013–2014		
	Cancer	Organ failure	p value	Cancer	Organ failure	p value	Cancer	Organ failure	p value	Cancer	Organ failure	p value
Age (mean, SD)	74 (14)	84 (14)	<0.001	74 (15)	86 (11)	<0.001	72 (13)	84 (8)	<0.001	75 (13)	89 (7)	<0.001
Gender												
Male	339 (53)	169 (42)	<0.01	106 (49)	88 (37)	<0.05	200 (52)	57 (51)	n.s.	117 (66)	35 (47)	<0.01
Female	298 (47)	235 (58)		109 (51)	149 (63)		182 (48)	55 (49)		61 (34)	39 (53)	
Malignancy type												
Lung	142 (22)	-	-	41 (20)	-	-	92 (26)	-	-	30 (17)	-	-
Breast	56 (9)	-	-	14 (7)	-	-	29 (8)	-	-	28 (16)	-	-
Colorectal	89 (14)	-	-	23 (11)	-	-	44 (13)	-	-	10 (6)	-	-
Prostate	46 (7)	-	-	23 (11)	-	-	20 (6)	-	-	8 (5)	-	-
Other	305 (48)	-	-	100 (50)	-	-	164 (47)	-	-	96 (56)	-	-
Organ failure type												
Cardiovascular	-	275 (68)	-	-	170 (71)	-	-	82 (72)	-	-	59 (80)	-
Respiratory	-	131 (32)	-	-	71 (29)	-	-	32 (28)	-	-	15 (20)	-
Dementia												
None	548 (87)	241 (59)	<0.001	202 (93)	127 (53)	<0.001	359 (96)	77 (86)	<0.001	156 (90)	46 (64)	<0.001
Mild	51 (8)	85 (21)		9 (4)	63 (26)		12 (3)	157 (17)		9 (5)	16 (22)	
Severe	33 (5)	80 (20)		6 (3)	50 (21)		3 (1)	8 (9)		8 (5)	10 (14)	
Longest place of residence in the last year of life												
Home	531 (84)	227 (56)	<0.001	203 (94)	215 (89)	n.s.	340 (89)	71 (63)	<0.001	164 (94)	54 (72)	<0.001
Care home <sup>a</sup>	89 (14)	172 (42)		11 (5)	24 (10)		32 (8)	38 (34)		7 (4)	19 (25)	
Other	15 (2)	6 (1)		2 (1)	2 (1)		8 (2)	3 (3)		3 (2)	2 (3)	

SD: standard deviation.

Missing for gender = 15, malignancy type = 54, dementia = 113, longest place of residence = 102.

<sup>a</sup>Includes care home in Belgium and Italy, residential home in Spain, and residential home and nursing home in the Netherlands.

Figure 1. Radar charts of quality indicators for people who died of cancer and people who died of organ failure per country.

