



Commonalities and differences in legal euthanasia and physician-assisted suicide in three countries: a population-level comparison

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Abstract

Objectives To describe and compare euthanasia and physician-assisted suicide (EAS) practice in Flanders, Belgium (BE), the Netherlands (NL) and Switzerland (CH).

Methods Mortality follow-back surveys among attending physicians of a random sample of death certificates.

Results We studied 349 EAS deaths in BE (4.6% of all deaths), 851 in NL (4.6% of all deaths) and 65 in CH (1.4% of all deaths). People who died by EAS were mostly aged 65 or older (BE: 81%, NL: 77% and CH: 71%) and were mostly diagnosed with cancer (BE: 57% and NL: 66%). Home was the most common place of death in NL (79%), while in BE and CH, more variation was found regarding to place of death. The decision to perform EAS was more frequently discussed with a colleague physician in BE (93%) and NL (90%) than in CH (60%).

Conclusions EAS practice characteristics vary considerably in the studied countries with legal EAS. In addition to the legal context, cultural factors as well as the manner in which legislation is implemented play a role in how EAS legislation translates into practice.

Keywords Euthanasia · Physician-assisted suicide · End-of-life decision-making · Belgium · The Netherlands · Switzerland

Introduction

Medical end-of-life decisions have become a substantial part of contemporary medical practice. These decisions increasingly include euthanasia, i.e., a physician intentionally ending a patient's life upon explicit patient request, or physician-assisted suicide, i.e., when a physician prescribes drugs to enable a patient to end his or her life.

Euthanasia or physician-assisted suicide is currently legal in the Netherlands, Belgium, Luxembourg, Colombia and Canada. Physician-assisted suicide, though not euthanasia, is legally possible in Switzerland and seven American states (California, Colorado, Montana, Oregon, Vermont, Washington and Hawaii) (Emanuel et al. 2016). In the Australian province of Victoria, a euthanasia law will come into force as of mid 2019.

Large-scale mortality follow-back studies on end-of-life decision-making have been conducted repeatedly in some countries, allowing the monitoring of developments in

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medical end-of-life practice, including euthanasia and physician-assisted suicide (EAS) (van der Heide et al. 2003, 2017; Chambaere et al. 2015; Bosshard et al. 2016). A study across six European countries conducted in 2001–2002 reported rates of EAS ranging from 0% of all deaths (Sweden) to 2.8% of all deaths (the Netherlands) (van der Heide et al. 2003). More recent studies have shown that in Belgium (Flanders), frequency of EAS was estimated in 2013 to be 4.6% of all deaths (Chambaere et al. 2015). In the Netherlands in 2015, this was also 4.6% (van der Heide et al. 2017). In the German-speaking part of Switzerland in 2013, EAS accounted for 1.4% of all deaths (Bosshard et al. 2016).

In this study, we focus on three jurisdictions with legal euthanasia and/or physician-assisted suicide for which there exist recent data collected using the same study design, i.e., Belgium (Flanders), the Netherlands and Switzerland (including all three Swiss language communities, i.e., German, French and Italian). Table 1 contains details on the assisted dying legislations in the studied countries. EAS legislation is very similar in Belgium and the Netherlands, where both euthanasia and physician-assisted suicide is an option, with large similarities in the legal substantive and procedural requirements for EAS (Smets et al. 2009). In contrast, only physician-assisted suicide and not euthanasia is legal in Switzerland. No legal framework has been created in Switzerland, and rather it is tolerated within the existing criminal code which states that aiding in suicide for non-selfish motives is not punishable.

As an increasing number of countries are considering EAS legalization, it is relevant to identify commonalities and differences in EAS practice in a context of legalized assisted dying (Orentlicher et al. 2014; Emanuel et al. 2016). Identifying commonalities in EAS practice between countries may enable countries with new EAS legislation or legislation in the making to proactively address certain issues regarding patient populations and EAS decision-making and performance. Additionally, a cross-country comparison of EAS case characteristics can shed light on the relation between EAS legislation on the one hand and the profile of people receiving EAS and clinical and decision-making characteristics on the other. If differences between countries are found, these may point to a possible impact of the way in which EAS practice is regulated and implemented on actual EAS practice.

This study aims to describe commonalities and differences in EAS characteristics in three different countries. The following research questions are addressed: (1) How do the socio-demographic characteristics of people receiving EAS differ across countries? (2) How do physician, decision-making and clinical characteristics of EAS differ between countries?

Methods

Study design and sample

We conducted mortality follow-back surveys in Flanders, the northern Dutch-speaking part of Belgium, from January to June 2013 ($N = 6871$), in the Netherlands from August to November 2015 ($N = 9351$) and in Switzerland between August 2013 and January 2014 ($N = 8963$). This robust study method was first developed in the Netherlands in 1990 and has since then been used in several countries to study the nationwide prevalence and characteristics of medical end-of-life decisions including euthanasia and physician-assisted suicide (van der Heide et al. 2003, 2017; Chambaere et al. 2015; Bosshard et al. 2016). A random stratified sample of all death certificates is selected. In Belgium and the Netherlands, stratification was applied based on underlying cause of death as indicated on the death certificate and the estimated corresponding likelihood of an end-of-life decision. In Switzerland, a random sample was drawn without stratification based on underlying cause of death, but the French and Italian regions in Switzerland were oversampled to compensate for the smaller population size. Physicians who certified a death certificate in the samples were sent a questionnaire about the end-of-life care and decision-making that had preceded the death of the patient. If the certifying physician was not the attending physician, he or she was asked to pass the questionnaire to the attending physician. Afterward, information from the death certificates was linked anonymously to the questionnaire data. Questionnaires were received for 3751 deaths in Belgium, 7761 deaths in the Netherlands and 5239 deaths in Switzerland. Response rates were 61% in Belgium, 78% in the Netherlands and 59% in Switzerland. (Region-specific response rates for Switzerland were: German: 64%, French: 52%, Italian: 62%.) More details on study design and sample can be found elsewhere (Chambaere et al. 2015; Schmid et al. 2016; van der Heide et al. 2017).

Questionnaire

Euthanasia and physician-assisted suicide

The questionnaires did not ask about EAS directly. Instead, EAS cases were identified based on affirmative answers of the physician on the following questions: (1) ‘Was death the consequence of the use of drugs prescribed, supplied or administered by you or another physician with the explicit intention of hastening the patient’s death or of enabling the patient to end his or her own life?’ and (2) ‘Was this decision made at the explicit request of the patient?’ If the

Table 1 Belgian, Dutch and Swiss legislation on euthanasia and physician-assisted suicide (Federale Controle- en Evaluatiecommissie Euthanasie 2016)

	Belgium	The Netherlands	Switzerland
Legal status of euthanasia	Euthanasia is permitted	Euthanasia is permitted	Euthanasia is not permitted
Legal status of physician-assisted suicide	Although physician-assisted suicide is not mentioned in the euthanasia law, it is treated as a form of euthanasia by the euthanasia review committee as long as all due care requirements are met (2016)	Physician-assisted suicide is permitted	Physician-assisted suicide is permitted
Year and method of legalization	2002, legislation (Act on euthanasia)	2002, legislation (Termination of life on request and assisted suicide act)	1942, penal code (Article 115)
Eligibility criteria	Legally competent adult or emancipated minor Minor with capacity of discernment (only physical suffering)	Patient is at least 12 years old and has decision-making capacity	None specified in the law. Most right-to-die organizations require the patient to be an adult of sound judgment
Due care requirements	Substantive requirements: The patient's request must be voluntary, well-considered and repeated and must not be the result of any external pressure The patient must be in a medically futile state of constant and unbearable physical or psychological suffering which cannot be alleviated, resulting from a serious and incurable condition caused by illness or accident The physician must inform the patient about his/her health condition and prospects The physician and patient must come to the belief that there is no reasonable prospect of improvement in the patient's situation Procedural requirements: The treating physician must consult another physician before proceeding The physician must notify the case of euthanasia for review to the Federal Control and Evaluation Committee Euthanasia	Substantive requirements: The patient's request must be voluntary and well-considered The patient's suffering must be unbearable and hopeless The physician must inform the patient about his/her health condition and prospects The physician and patient must come to the belief that there is no reasonable prospect of improvement in the patient's situation The physician must terminate life in a medically and technically appropriate way Procedural requirements: The treating physician must consult another physician before proceeding The physician must notify the case of euthanasia for review to one of five regional Euthanasia Review Committees	The law does not specify any due care criteria. The only requirement is that the person assisting does so without any 'selfish motives,' in other words in the absence of any self-interest (such as monetary gain)
Physician involvement for performance of EAS ^a	Required	Required	Not required

^aEAS = euthanasia and physician-assisted suicide

lethal drugs were administered by the patient, the act was classified as physician-assisted suicide, if not the act was classified as euthanasia.

Patient characteristics

For Belgium and the Netherlands, the patient's sex, age and underlying medical condition are obtained from the

death certificate, while place of death is asked in the questionnaire. For Switzerland, the patient's sex and age are obtained from the death certificate, and underlying medical condition and place of death are asked in the questionnaire.

Table 2 Incidence of euthanasia and physician-assisted suicide (EAS) in Belgium (2013), the Netherlands (2015) and Switzerland (2013)

	Flanders, Belgium (BE) 2013		Netherlands (NL) 2015		Switzerland (CH) 2013		<i>P</i> value
	<i>n</i>	% (95% CI)	<i>N</i>	% (95% CI)	<i>n</i>	% (95% CI)	
Total no. of studied deaths (<i>n</i>)	3751		7761		5239		
Deaths by EAS	349	4.6 (4.0–5.2)	851	4.6 (4.2–5.1)	65	1.3 (1.0–1.7)	< 0.001
Euthanasia	343	4.6 (4.0–5.2)	829	4.5 (4.1–5.0)	19	0.4 (0.2–0.6)	< 0.001
Physician-assisted suicide	6	0.05 (0.02–0.1)	22	0.1 (0.1–0.2)	46	1.0 (0.7–1.3)	< 0.001

Unweighted *n* and weighted percentages. Due to the weighting procedure, the percentages in the table cannot be derived from the unweighted absolute *n* in the table

Physician characteristics

Type of physician: whether the certifying physician was a general practitioner or a clinical specialist or elderly care physician. For Belgium and Switzerland, answer options were ‘general practitioner’ or ‘clinical specialist.’ In the Netherlands, an additional option was possible, namely ‘elderly care physician,’ who is not a clinical specialist working in a hospital but works in a nursing home.

Decision-making characteristics

Type of request: whether the request was expressed only orally, only in writing or both orally and in writing. Decision discussed with others: whether the decision to perform EAS was discussed with the patient’s relatives, colleague physicians or the nursing staff. Multiple answers were possible for this question.

Clinical characteristics

Shortening of life: physician’s estimation by how much time the patient’s life was shortened. Person who administered the lethal drugs: whether the lethal drugs were administered by a physician, a nurse, the patient and/or another person.

Statistical analysis

Data were weighted to correct for stratified sampling and non-response and adjusted to be representative in terms of age and sex (Belgium, the Netherlands, Switzerland), marital status, underlying medical condition and place of death (Belgium and the Netherlands), province of death (Belgium) and region of residence (the Netherlands) for all deaths that occurred in the sampling period (Chambaere et al. 2015; van der Heide et al. 2017).

We report weighted percentages and 95% confidence intervals of frequency of EAS and patient, physician, decision-making and clinical characteristics of EAS cases. Differences between countries were calculated using

Pearson’s Chi-square tests. Data were analyzed using the SPSS Statistics 25 complex samples procedure to control for the stratified sample design (Belgium), SPSS Statistics 22 (the Netherlands) and Stata (Switzerland).

Results

We studied 349 deaths by EAS in Belgium, 851 in the Netherlands and 65 in Switzerland (Table 2). The frequency of euthanasia was highest in Belgium (4.6% of all deaths, weighted percentage) and the Netherlands (4.5% of all deaths, weighted percentage) compared to Switzerland (0.4% of all deaths, weighted percentage) ($P < 0.001$). In Switzerland, frequency of physician-assisted suicide was highest (1.0%) in comparison with Belgium (0.05%) and the Netherlands (0.1%) ($P < 0.001$).

Patient characteristics of deaths by EAS

In Belgium and the Netherlands, EAS was slightly more common among men (51% and 54%, respectively) than women, while the reverse was true for Switzerland (43%) ($P = 0.238$) (Table 3). For both Belgium and Switzerland, the largest group of people receiving EAS was aged 80 or older (43% and 39%, respectively), while in the Netherlands, EAS was most common among people between 65 and 79 years old (42%). The most common underlying medical condition was cancer in Belgium (57%) and the Netherlands (66%). In 69% of Swiss deaths by EAS, the physician indicated suicide as cause of death. As no information was available on the underlying cause of death for these deaths, comparability with causes of death in Belgium and the Netherlands is limited. Home was the most common place of death in the Netherlands (79%) and, to a lesser extent, in Belgium (43%) but not in Switzerland (33%). Deaths by EAS occurred less frequently in the hospital setting compared to home in all three countries, i.e., the Netherlands (4%), Belgium (36%) and Switzerland (16%). In 44% of deaths by EAS in Switzerland, EAS occurred in a place other than at home, in hospital or in a

Table 3 Characteristics of people who died by euthanasia and physician-assisted suicide (EAS) in Belgium (2013), the Netherlands (2015) and Switzerland (2013)

	Flanders, Belgium (BE) 2013 (n = 349)		Netherlands (NL) 2015 (n = 851)		Switzerland (CH) 2013 (n = 65)		P value
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Sex							0.238
Male	174	51.0 (44.2–57.7)	447	53.8 (48.6–58.9)	28	42.5 (30.7–55.3)	
Female	175	49.0 (42.3–55.8)	404	46.2 (41.1–51.4)	37	57.5 (44.7–69.4)	
Age (in years)							0.221
18–64 ^a	73	18.9 (14.5–24.3)	219	22.8 (18.7–27.4)	17	28.7 (18.5–41.8)	
65–79	131	37.8 (31.5–44.7)	366	41.7 (36.7–46.9)	21	31.8 (21.3–44.6)	
80 or older	145	43.2 (36.8–49.9)	266	35.5 (30.7–40.7)	27	39.4 (27.9–52.3)	
Underlying medical condition ^b							0.010
Cardiovascular disease	34	14.3 (9.9–20.2)	32	4.8 (2.9–7.4)	3	10.8 (3.1–31.3)	
Cancer	211	57.4 (54.1–60.6)	605	65.9 (60.8–70.7)	14	58.2 (36.6–77.1)	
Respiratory disease	9	4.1 (1.8–8.8)	43	7.0 (4.7–10.1)	3	12.3 (3.6–34.7)	
Disease of the nervous system	26	7.4 (4.4–12.0)	78	8.7 (6.1–12.0)	2	6.0 (1.2–26.0)	
Other	69	16.9 (12.4–22.5)	93	13.5 (10.3–17.4)	3	12.6 (3.7–35.3)	
Place of death							< 0.001
Hospital	73	35.7 (29.1–42.8)	23	4.3 (2.5–6.7)	11	16.2 (8.9–27.7)	
Home	197	43.1 (36.7–49.8)	705	78.5 (74.0–82.5)	22	33.4 (22.6–46.3)	
Long-term care facility	56	12.8 (9.0–17.7)	56	8.8 (6.2–12.1)	5	6.7 (2.6–16.1)	
Other	23	8.5 (5.2–13.4)	60	8.5 (5.9–11.8)	26 ^c	43.7 (31.6–56.7)	

Unweighted n and weighted column percentages. Missing cases: cause of death $n_{CH} = 40$; place of death $n_{NL} = 7$, $n_{CH} = 1$

^a17–64 for NL

^bThe Swiss questionnaire includes the category ‘suicide’, and 40 cases of assisted suicide are marked as such regardless of the underlying disease. As no information is available on the underlying cause of death for these cases, the cases were coded as missing for cause of death. Comparability with cause of death in Belgium and the Netherlands is therefore limited

^cOther place of death is frequently a clinic of Swiss right-to-die organizations

long-term care facility. This other place is frequently a clinic of Swiss right-to-die organizations.

Physician, decision-making and clinical characteristics of deaths by EAS

The attending physician was a general practitioner in 93% of deaths by EAS in the Netherlands, in 60% in Belgium and in 71% in Switzerland (Table 4).

In 67% of deaths by EAS, the request was expressed both orally and in writing in Belgium, in 74% in the Netherlands and in 13% in Switzerland. In Switzerland, the request was most frequently expressed only orally (76%), while in Belgium 32% and in the Netherlands 22% was expressed only orally. The decision to perform EAS was discussed with a colleague physician in Belgium in 93%, in the Netherlands in 90% and in Switzerland in 60%. The decision was also frequently discussed with the patient’s relatives in all three countries, ranging from 64% in the Netherlands to 76% in Switzerland and 81% in Belgium.

Shortening of life as estimated by the attending physician was less than 24 h in 24% in Switzerland, 14% in

Belgium and 11% in the Netherlands. Shortening of life was in 41% of EAS cases in Belgium estimated to be between 1 and 7 days, in 26% in the Netherlands and in 26% in Switzerland. In the Netherlands, shortening of life was most often estimated at 1 to 4 weeks (36%), compared to 22% in Belgium and 5% in Switzerland.

The lethal drugs were administered by only a physician in the Netherlands in 87% of deaths by EAS, in Belgium in 71% and in Switzerland in 3%. The patient, with or without another person, administered the lethal drugs in 73% of deaths by EAS in Switzerland, in 1% in Belgium and in 3% in the Netherlands. A person other than the physician or the patient administered the drugs in 15% in Belgium, in 4% in the Netherlands and in 21% in Switzerland.

Discussion

This population-level comparative study found a number of commonalities as well as differences in EAS practice in Belgium, the Netherlands and Switzerland. Euthanasia was more prevalent in Belgium and the Netherlands, where it is

Table 4 Physician, decision-making and clinical characteristics of deaths by euthanasia and physician-assisted suicide (EAS) in Belgium (2013), the Netherlands (2015) and Switzerland (2013)

	Flanders, Belgium (BE) 2013 (n = 349)		Netherlands (NL) 2015 (n = 851)		Switzerland (CH) ^a 2013 (n = 65)		P value
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Physician characteristics							
<i>Type of physician</i>							
General practitioner	79	60.0 (52.9–66.6)	810	92.7 (89.6–95.0)	23	71.2 (51.7–85.1)	< 0.001
Specialist ^b	260	40.0 (33.4–47.1)	41	7.3 (5.0–10.4)	9	28.8 (14.9–48.3)	
Decision-making characteristics							
<i>Type of request</i>							
Only oral	61	32.3 (25.8–39.5)	104	21.5 (17.4–26.0)	24	76.4 (56.5–88.9)	< 0.001
Only in writing	11	1.3 (0.6–2.6)	44	4.6 (2.8–7.2)	3	10.8 (3.3–30.3)	
Oral and in writing	249	66.5 (59.2–73.0)	688	73.9 (69.1–78.3)	4	12.9 (4.5–31.6)	
<i>Decision discussed with others^c</i>							
Patient's relative(s)	280	81.3 (75.3–86.1)	501	63.6 (58.5–68.5)	25	76.0 (57.1–88.3)	< 0.001
Colleague physician ^d	328	92.6 (88.3–95.3)	792	89.7 (86.2–92.6)	20	59.5 (40.7–75.8)	< 0.001
Nursing staff	192	54.9 (48.0–61.6)	112	14.9 (11.5–18.9)	13	36.8 (21.3–55.6)	< 0.001
Clinical characteristics							
<i>Shortening of life as estimates by the physician</i>							
Less than 24 h	39	14.2 (9.9–19.9)	48	10.7 (7.7–14.2)	9	28.5 (14.9–47.6)	< 0.001
1–7 days	109	41.0 (34.4–48.0)	206	25.9 (21.5–30.7)	10	26.0 (13.4–44.2)	< 0.001
1–4 weeks	85	22.2 (17.1–28.2)	319	36.0 (31.1–41.2)	2	4.8 (1.1–18.7)	
More than 4 weeks	109	22.6 (17.6–28.5)	260	27.3	15	20.7 (12.7–31.8)	
<i>Person who administered the lethal drugs</i>							
Only physician	277	71.4 (64.3–77.5)	759	87.3 (83.5–90.5)	3	3.4 (1.1–10.4)	< 0.001
Patient with or without another person ^e	6	1.1 (0.4–2.9)	32	3.2 (1.7–5.6)	46	73.3 (60.9–82.9)	
Physician and another person ^f (excl. patient)	27	12.2 (8.2–17.8)	16	5.0 (3.1–7.7)	2	2.7 (0.6–1.1)	
Other ^g	25	15.4 (10.5–21.9)	10	4.4 (2.6–7.0)	14	20.7 (12.2–32.8)	

Unweighted n and weighted column percentages. Missing cases: type of physician $n_{BE} = 10$, $n_{NL} = 0$, $n_{CH} = 4$; type of request $n_{BE} = 25$, $n_{NL} = 15$, $n_{CH} = 34$; decision discussed with others $n_{BE} = 2$, $n_{NL} = 17$, $n_{CH} = 34$; shortening of life $n_{BE} = 7$, $n_{NL} = 18$, $n_{CH} = 31$; and person who administered the lethal drugs $n_{BE} = 14$, $n_{NL} = 34$

^aFor Switzerland, in 34 EAS cases, the physician filling in the questionnaire did not meet the patient before death, and therefore, information on the decision-making and/or clinical characteristics is missing in up to 34 cases (in some cases, the physician was notified of the circumstances of death)

^bFor the Netherlands, this includes elderly care physicians who are not clinical specialists in a hospital, but work in a nursing home

^cMultiple answers possible, therefore percentages do not add up to 100%

^dFor Belgium, this category includes palliative care professionals

^eOther persons were: BE: palliative team, NL: physician, CH: nurse, unspecified other person

^fOther persons were: BE: nurse, palliative team, NL: nurse, other physician, CH: nurse, unspecified other person

^gOther persons were: BE: nurse, palliative team, NL: nurse, other physician, CH: nurse, unspecified other person

legal, than in Switzerland where only physician-assisted suicide is legal. Similarities included that patients were most commonly aged 65 or older and were mostly diagnosed with cancer. Differences included that home was the most common place of death in the Netherlands, while in Belgium and Switzerland, more variation was found

regarding to place of death. The decision to perform EAS was more frequently discussed with a colleague physician in Belgium and the Netherlands than in Switzerland.

Data were collected using a robust population-based method in all three countries that provide representative data on end-of-life care and decision-making. This method

has been repeatedly applied across various countries and has proven to be a highly reliable method for studying end-of-life decisions (van der Heide et al. 2003, 2017; Chamberaere et al. 2015; Bosshard et al. 2016). Due to the use of the same questions regarding end-of-life decisions in all three countries, deaths by euthanasia and physician-assisted suicide could be identified in an identical manner in all three countries. This allows for reliable comparison of EAS practice between the studied countries. Also, strict anonymity procedures were used, precluding identification of participants or study subjects.

Some limitations should be taken into account when interpreting the study results. Due to differences in certification of causes of death between the studied countries, comparability of underlying cause of death in EAS is limited. Also, considering the sensitive topic of euthanasia and physician-assisted suicide socially desirable answering cannot be excluded. Use of descriptive questions instead of using the terms 'euthanasia' or 'physician-assisted suicide' and the strict guarantee of anonymity probably may have mitigated this bias. The fact that some physicians were honest about euthanasia acts in a country where it is illegal supports this assumption. Further, as with all retrospective research, there may be recall bias. Measures were taken to limit possible recall bias. For instance, physicians were encouraged to consult the patient's medical file when completing the questionnaire, and the time between the patient's death and the moment of sending the questionnaire was restricted. An additional limitation is the small number of cases in the Swiss sample, which complicates between-country comparison. Lastly, information on cause of death was gathered in different ways, i.e., either through the questionnaire or obtained from the death certificate.

Our study suggests that differences in legislation are accompanied by differences in practice. In Switzerland, only physician-assisted suicide is legal and not euthanasia which explains the much higher prevalence of physician-assisted suicide than of euthanasia in the country. Belgium and the Netherlands have a highly similar EAS legislation (Smets et al. 2009) with both euthanasia and physician-assisted suicide as legal options, and both countries also have a similar percentage of EAS (4.6% of all deaths). However, similar legislation does not imply similar practice. Our findings corroborate the previous research identifying the importance of cultural differences for EAS practice, despite the same legislation (Van den Block et al. 2009; Cohen et al. 2012; Hurst et al. 2018). These cultural factors include physicians' attitudes toward the necessity of existing legal safeguards for EAS practice, physicians' attitudes toward openly discussing and performing EAS, patients' attitudes toward requesting EAS.

We found, foremost, a striking difference in the place where EAS is carried out. In the Netherlands, EAS is

mostly performed at home by a GP, while in Belgium and Switzerland, the setting is more varied. Implementation of euthanasia legislation differed between Belgium and the Netherlands, with the Dutch SCEN organization focusing primarily on GP's, whereas LEIF in Flanders also focused on hospital specialist (Van Wesemael et al. 2009). Differing primary care cultures with a stronger GP role in end-of-life care in the Netherlands may also explain the difference (Abarshi et al. 2011). There also may be a tendency among Dutch clinical specialists to refer patients with a euthanasia request to their GP. Additionally, home is in general more frequently the place of death in the Netherlands compared to Belgium and Switzerland (Meeussen et al. 2011; Reich et al. 2013; Cohen et al. 2015). Also notable is that 44% of deaths by EAS in Switzerland are carried out elsewhere than the hospital, home or nursing home, as EAS in Switzerland is often carried out in the clinics of Dignitas and Exit (Fischer et al. 2008; Steck et al. 2014).

In the countries, where both euthanasia and physician-assisted suicide are legally available, physician-assisted suicide practice is remarkably limited: physician-assisted suicide is more prevalent in Switzerland (1.0%) compared to Belgium (0.1%) and the Netherlands (0.1%). A Dutch study found that in 75% of the studied EAS cases, euthanasia was preferred over physician-assisted suicide (Onwuteaka-Philipsen et al. 1997). Several factors may explain why euthanasia is chosen over physician-assisted suicide when both options are available. Firstly, euthanasia may be pharmacologically the preferred method as it allows more control to avoid possible complications (e.g., malabsorption of the barbiturate) and ensures a rapid death (Onwuteaka-Philipsen et al. 1997; Groenewoud et al. 2000). Secondly, while autonomy is probably an important motive in both decisions, patients may prefer a certain medicalization of a serious and difficult act (Onwuteaka-Philipsen et al. 1997; Bernheim et al. 2014). Thirdly, sometimes there may be no choice between euthanasia and physician-assisted suicide, for instance, when the patient is physically or psychologically unable to administer the lethal drugs themselves. On the other hand, physician-assisted suicide can be preferred over euthanasia as it is often considered to be less of a burden to the physician and lays the responsibility with the patient (Onwuteaka-Philipsen et al. 1997). Whatever the reason to prefer one option over the other, the ultimate decision should be in accordance with both the physician's and the patient's personal preferences.

In the USA, physician-assisted suicide currently accounts for approximately 0.4% of deaths in Oregon (2018) and Washington State (2017) compared to 1% in Switzerland found in this study. This difference may be explained by differing legal contexts. In Switzerland, no legal framework was created to legalize the practice, but rather it is tolerated within the existing criminal law. In the

USA, physician-assisted suicide is mainly legalized through legislation with clear regulations such as the requirement that the patient must suffer from terminal illness (Steck et al. 2013). An important factor for the difference in physician-assisted suicide rate is likely the longer history of physician-assisted suicide practice in Switzerland which started in the 1980s, while the first US state to legalize physician-assisted suicide was Oregon in 1997 (Bosshard et al. 2002). The higher incidence in Switzerland may also be linked to the strong visibility of Swiss right-to-die organizations that are also actively involved in physician-assisted suicide practice (Fischer et al. 2008).

In Switzerland, people who are not Swiss residents can access physician-assisted suicide. Each year, about 150–200 foreigners travel to Switzerland to access physician-assisted suicide, a phenomenon that is also known as ‘suicide tourism’ (Gauthier et al. 2015). In the present study, all decedents in the Swiss sample are Swiss residents, and therefore, based on our data, we cannot provide any information on foreigners accessing physician-assisted suicide. In Belgium and the Netherlands too, foreigners are allowed to invoke the euthanasia law. However, in these cases, it is more difficult to establish whether all due care criteria are adhered to. Additionally, the presence of a therapeutic relationship between patient and physician is highly important, particularly in case of a request for EAS. As a consequence, cases of foreigners accessing EAS in Belgium and the Netherlands remain exceptional.

The decision to perform EAS was more often discussed with fellow physicians in Belgium and the Netherlands than in Switzerland, which is likely due to the fact that this is not a legal obligation in Switzerland. Also, we found that for Swiss deaths by EAS, physicians more often estimated life-shortening to be less than 24 h. If the physician was of the opinion that the patient’s life was probably not shortened or shortened by less than 24 h, discussion of life-shortening may have been deemed needless. Differences in discussion with nursing staff are related to the place of death; as most deaths by EAS occur at home in the Netherlands, nursing staff are less frequently involved. Discussion of the decision to perform EAS with the patient’s relatives ranged from 64% (Netherlands) to 81% (Belgium). Involvement of relatives in the decision-making process should be encouraged, as this may have psychosocial benefits for both patient and relatives (Sullivan et al. 2015).

In conclusion, nationwide mortality follow-back studies on end-of-life decision-making provide important insights into EAS practice by allowing reliable between-country comparison. The findings of this study suggest that in addition to the legal context, cultural factors as well as the manner in which legislation is implemented play a role in

how EAS legislation translates into practice. Further cross-country comparison of EAS practice, including jurisdictions outside of Europe, is recommended to examine how EAS practice relates to specific legal and cultural contexts and interactions therein.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval For Belgium, ethical approval was obtained from the Ethical Review Board of the Brussels University Hospital of the Vrije Universiteit Brussel. In the Netherlands, ethical approval was not required for the posthumous data collection of anonymous patient data under the Dutch Medical Research Involving Human Subject Act. For Switzerland, the study was issued a waiver by the Zurich Cantonal Ethics Board (KEK-StV-Nr. 23/13) since the study did not fall under the regulations for human research acts.

Informed consent Participants were informed about the study in a cover letter. Questionnaire return was considered to imply consent to participate.

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