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A comparative study of the role of disease severity in drug reimbursement decision making in four European countries

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ABSTRACT

Considerations beyond cost-effectiveness are important in reimbursement decision making. We assessed the importance of disease severity in drug reimbursement decision making in Belgium, France, The Netherlands and Sweden. We investigated scientific literature and policy documents and conducted three interviews in each country (four in The Netherlands) with persons involved in drug reimbursement. Disease severity is an important consideration, especially where the level is high. The Netherlands operationalizes disease severity using the proportional shortfall approach. Sweden uses categories to give an indication of the level of severity. In The Netherlands and Sweden, severity only implicitly plays a role in the decision whether to reimburse a drug, whereas in Belgium and France it also explicitly plays a role in determining the willingness to use public resources. Interviewees acknowledged that as well as a qualitative description of the disease, quantitative information may also be useful as input for decision making. None of them, however, considered this to be of decisive importance. Although disease severity is important in drug reimbursement decision making in all four countries, all seem to struggle in explicitly specifying its actual role. Belgium and France are the most explicit by using levels of severity in setting reimbursement levels; all four countries could, however, improve the transparency of its actual importance relative to the other criteria in the decision-making process.

1. Introduction

Considerations beyond cost-effectiveness and safety are important in reimbursement decision making [1–6]. One such consideration is disease severity or any other operationalization of 'medical need'. Velasco-Garrido et al. [7] found the 'need' aspect to be one of the most considered criteria in nine European countries. Similarly, other studies reported that the more severe a disease, the more valuable a treatment [8–10]; this reflects the equity objective of most health care systems. On the other hand, healthcare interventions may not be reimbursed for diseases of low levels of severity as it indicates a limited 'need'. Many stakeholders and analysts agree on the fact that the level of severity may play a role in reimbursement decision making. However, the way disease severity contributes to the decision-making process is often not transparent and may also differ between countries [4,11].

Previous studies investigated the importance of considerations beyond cost-effectiveness, for example, by

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eliciting policymakers' preferences [12,13], or by eliciting public preferences regarding the social value of the quality adjusted life year (QALY) [14–16], preferences for severity of illness [10,17,18], for end-of-life treatment [19,20], or for the rule-of-rescue [21]. These studies provided insights into the (relative) importance of the severity of the disease. There is still a lack of clarity, however, regarding the implementation in actual practice. A comparison across countries on the role of disease severity in reimbursement decision making may provide important insights into actual policymaking. It may, therefore, provide guidance to policymakers on how to incorporate this criterion in health care resource allocation as many countries seem to experience difficulties in doing so.

We investigated the role of disease severity and its operationalization in drug reimbursement decision making in four European countries: Belgium, France, The Netherlands and Sweden. We explored concepts of disease severity and assessed how information on disease severity is used in everyday drug reimbursement decision making. This paper addresses the following questions: (i) is disease severity considered in drug reimbursement decision making; (ii) if considered, how or by which method or indicator is it presented; and (iii) in what way is this information used in practice and how does it affect decision making.

2. Context

All four countries have a national drug reimbursement agency. Within the agency, a technical department prepares the assessment and preliminary reports. An independent pharmaceutical expert advisory committee assesses and appraises the evidence and is responsible for advising the final decision maker (i.e., the minister of health). Notably, the ministers hardly ever deviate from the advice [5]. In Sweden, the expert advisory committee also makes the final decision. Only The Netherlands has a separate appraisal committee which has an advisory function. All four countries use drug effectiveness and cost-effectiveness as reimbursement criteria. In France the use of cost-effectiveness as a criterion has only recently been introduced. This paper focuses on the role of disease severity in decision making. For more detailed information on the four systems regarding their (other) reimbursement criteria, reimbursement process, and their health technology assessment (HTA) models, we refer to Franken et al. [5] and le Polain et al. [11]. Table 1 provides an overview of the four drug reimbursement systems.

3. Concepts of disease severity

Need principles are commonly discussed in academic literature concerning health care rationing decisions [22]. A drug is valuable when it fills a specific need; this may be a medical, therapeutic, or societal need [23]. These needs depend on factors such as treatment necessity and disease severity (medical need), the availability and the effectiveness of alternative treatments (therapeutic need), and the prevalence of the disease and inequalities in health (societal need) [11]. As such, disease severity is part of the 'need principle'; the more severe a disease, the higher the (medical) need.

A large number of empirical studies acknowledge the concept of 'severity' as a prioritising principle [10]. Several approaches to determine 'who are the worst off' are described in the literature to operationalize the concept of severity. According to the '*fair innings*' approach, everyone is entitled to some 'normal' span of health achievement [24]. This implies that treatments for patients who have not yet had their fair innings are valued higher than treatments for patients who have had their fair share. The second group are 'living on borrowed time' according to Williams [24]. This approach considers life time health achievement including the quality as well as the length of a life, thus also including past health (losses). The '*severity-of-illness*' approach prioritises persons with the worse off initial condition based on the severity of the initial health state as well as the expected (prospective) health should no treatment be available [25,26]. This approach does not consider past health. In contrast to the previous two 'absolute' approaches, the '*proportional shortfall*' approach, considers the worse off in relative terms. This approach bases the need on the proportion of health lost due to the disease as compared to the expected health (i.e., level of health and remaining life expectancy) without the disease [27]. Finally, *the rule of rescue'* approach prioritises identifiable individuals facing avoidable death, regardless of the costs [28]. It should be noted that, if used for priority setting, all approaches can identify a group of people (or an individual) who are the worst off. The last approach, however, deviates because it concerns '*identifiable*' individuals who are worst off irrespective of the medical diagnosis (e.g. identifiable by television or media), whereas the others concern '*non-identifiable'* groups of individuals per disease and concern a measure of loss. Therefore, only the first three approaches facilitate a numerical expression of the levels of severity of a disease that could be used in reimbursement decision making at the national level.

4. Methods

We compared the role of disease severity and its operationalization in drug reimbursement decision making in Belgium, France, The Netherlands and Sweden. The selection of these countries was based on our previous research on European drug reimbursement systems [4,5,11,29]. All four countries have established HTA agencies using reasonably comparable reimbursement processes.

To obtain insight into the role of disease severity in actual decision making, we first evaluated the reimbursement processes and criteria. Second, we explored scientific literature describing concepts of disease severity. Third, we conducted face-to-face interviews; three in each country (four in The Netherlands because of the existence of the appraisal committee). Fourth, using data triangulation we combined the information from the literature, policy documents and the interviews to assess the role of disease severity and its operationalization in drug reimbursement decision making.

Table 1
Summary characteristics of the four drug reimbursement systems.

	Belgium	France	The Netherlands	Sweden
System characteristics				
National reimbursement agency	INAMI/RIZIV	HAS	ZINL	TLV
Pharmaceutical expert advisory committee	CTG/CRM	CT	WAR-CG	PBB
Appraisal committee	n/a	n/a	ACP	n/a
Final decision maker	Minister	Minister	Minister	PBB
Expert committee report publicly available	Yes	Yes	Yes	Yes (No, if applicant withdraws request)
Assessment and appraisal criteria				
Medical, therapeutic and societal need	Yes	Yes	Yes	Yes
Added therapeutic value	Yes	Yes	Yes	Yes
Cost effectiveness	Yes	Yes (for new drugs since 2012)	Yes	Yes
Explicit threshold for cost/QALY	No	No	No	No
Budget impact	Yes	Yes	Yes	No
Disease severity	Yes	Yes	Yes	Yes
Other	Price and reimbursement basis	Public health, treatment properties	Rarity of the disease, own responsibility, accessibility, societal affordability, public health	All effects on a person's health and quality of life, human value, need and solidarity

ACP = AdviesCommissie Pakket; CRM = Commission de Remboursement des Médicaments; CT = Commission de la Transparence; CTG = Commissie voor Tegemoetkoming Geneesmiddelen; HAS = Haute Autoritée Santé; INAMI = Institut National d'Assurance Maladie-Invalidité; n/a = not applicable; PBB = Nämnden för läkemedelsförmåner; QALY = quality adjusted life year; RIZIV = Rijksinstituut voor Ziekte- en Invaliditeitsverzekering; TLV = Tandvårds- och läkemedelsförmånsverket; WAR-G = Wetenschappelijke AdviesRaad Geneesmiddelen; ZINL = Zorginstituut Nederland [previously CVZ = College voor Zorgverzekeringen]

All interviews were tape-recorded. Citations were reported anonymously (no corrections were made in language) and were translated by the authors if the interview was not in English (i.e., interviews in The Netherlands and Belgium were in Dutch, interviews in France and Sweden were in English). The selection of interviewees was based on their specific involvement in drug reimbursement. They were either a representative of one of the reimbursement agencies, an expert from one of the pharmaceutical expert (advisory) committees or one of the appraisal committee. In each country, we interviewed at least one person with an economic background and one person with a medical or pharmaceutical background. Interviews were semi-structured; questions addressed topics such as explicit versus implicit use of disease severity, operationalization(s) of disease severity, reimbursement levels, qualitative versus quantitative information on disease severity, published versus unpublished reimbursement information, and assessment and appraisal considerations that might be related to or interact with disease severity (e.g., age, child versus adult, fair innings, past health, future health, absolute versus relative health status, health gain, quality of life, rarity of the disease, availability of alternative treatments, end-of-life treatment, rule of rescue, medical need, life-style, own responsibility, necessity to insure, and personal versus societal affordability).

All interviewees had the opportunity to comment on the final draft of the paper. Although the reflections made are based upon information from the interviews, it should be noted that the reflections are strictly ours and do not necessarily reflect the views of the interviewees.

5. Results

5.1. Is disease severity considered in drug reimbursement decision making

All interviewees acknowledged that the severity of the disease is considered in drug reimbursement decision making, especially in cases of, more severe diseases. One interviewee replied "*yes definitively, oh yes*" to the question whether disease severity played a role.

5.2. How or by which method or indicator is disease severity presented

In all four countries reimbursement information contains a qualitative description of the disease and in addition most often also contains information on survival, progression free survival, and sometimes on quality of life. This information is prepared by the reimbursement agency and presented to the pharmaceutical expert committee, and in The Netherlands also to the appraisal committee. Published reimbursement information most often also contains a qualitative description of the disease.

The Swedish agency indicates whether the disease is 'highly', 'moderately' or 'less' severe. This information is always available for the pharmaceutical expert committee, but not always available in the published memorandum. In The Netherlands, the proportional shortfall approach is presented to operationalize the concept of disease severity in policy documents [30,31]. However, numerical outcomes based on the proportional shortfall approach were not available for the pharmaceutical expert committee

until now, and have only been made available a few times recently for the appraisal committee as well as in published reimbursement information (i.e., for the first reassessments of expensive inpatient drugs). Moreover, members of the appraisal committee have indicated that they preferred to be provided with more information than only the proportional shortfall calculations, for example, also with information based on the fair innings approach.

In France, disease severity is currently one of the five criteria that is used as a basis for the reimbursement decision (the other four *Service Médical Rendu* [SMR] criteria are efficacy and adverse events, place of the drug/availability of alternative treatment, treatment properties and public health benefit). The *Amélioration du Service Medical Rendu* (ASMR) is currently used as the basis for a decision in relation to price. Disease severity is, however, no criterion of the newly proposed relative therapeutic benefit (RTB) criterion (the RTB has been proposed as a single criterion to replace both the SMR and the ASMR criteria). Furthermore, France has special regulations for thirty serious and chronic diseases (i.e., the *Affections de Longue Durée* (ALD) List), certain irreplaceable and costly drugs (e.g., cancer or AIDS), costly drugs for diseases that constitute a progressive or disabling disorder with a previous treatment period over six months (i.e., the so-called '31st disease'), and multiple diseases of over six months (i.e., the so-called '32nd disease') [11]. Drugs that fall under these regulations are fully reimbursed (no co-payments).

Belgium uses reimbursement categories which reflect the necessity of the drug, and thus partly reflect levels of severity of the disease. The categories are category A (and Fa) for vital drugs for life-threatening diseases (e.g., diabetes and cancer), category B (and Fb) for therapeutically significant drugs for non-life threatening diseases (e.g., antibiotics), category C for therapeutically less significant drugs for systemic treatment–symptomatic treatments-, category Cs for chronic illnesses, and category Cx for contraceptives and antispasmodics [32].

5.3. In what way is information on disease severity used in practice and how does it affect decision making

All interviewees acknowledged that disease severity affects drug reimbursement decision making. An interviewee stated *"if you talk about disease severity, you have of course the implicit as well as the explicit weighing."* Interviews revealed that disease severity often plays an implicit role and sometimes an explicit role in the consideration of whether or not society is willing to pay for a particular treatment.

5.3.1. The role of disease severity in decision making as to whether or not to reimburse a drug

Disease severity or reflections of disease severity can be found in all four countries' policies as a prioritising principle. All share similar objectives: equitable access, quality of care and sustainability of the system [5]. For example, the Swedish Health and Medical Service Act (1982:763) emphasises equal access to health services on the basis of need and a vision of equal health for all. Accordingly, the three Swedish prioritising principles are human value, need and solidarity (i.e., those in greatest need of health care should be given priority access to care), and cost effectiveness [33]. Article R163-1.6.3 of the French Code de la SećuriteŚociale' states that drugs should not be reimbursed in case of absence of severity of the disease they address [34]. In The Netherlands, necessity (i.e., whether the severity of the illness or the care needed justifies solidarity) is one of the four criteria for determining the basic benefit package (including drugs) [30].

Effectiveness, safety, and cost-effectiveness are formal and explicit reimbursement criteria. All interviewees, however, agreed that, implicitly, the more severe a disease, the higher the chances of obtaining reimbursement and/or a higher level of reimbursement. As indicated by interviewees "*the severity of the disease balances the benefit risk ratio"* and *"it is an issue for discussion for drugs that just go with the narrowest of margins."* Although disease severity is a formal appraisal criterion in The Netherlands, drugs are not often discussed in the appraisal committee, so far only a few reassessments of expensive inpatients drugs have been considered by this body. Although the French SMR classification seems straightforward, interviewees acknowledged being more lenient in cases of higher levels of severity. A French interviewee stated *"The importance of severity might be very high, you have the same type of evaluation, assessment of the efficacy and effectiveness, but since in one case it is a very severe disease and you want to give something to the patient, it is reimbursed, and it has a level of SMR that opens reimbursement and in the other case, I can tell the patient is not happy about that."* Regarding the effect of the list of diseases for full reimbursement, another French interviewee stated *"When a new drug is about one of these diseases so . . ..our thinking is only about the level of efficacy . . ..we are sure that when you give 15% the patient will be full reimbursement, but if we give a bad score the pricing will be difficult."* This seems to imply that the French committee not only aims to ensure reimbursement for severe diseases, but also, simultaneously, aims to influence the price to ensure value for money.

Seven out of thirteen interviewees (i.e., four Dutch, two Swedish and one Belgian interviewee(s)) were familiar with at least one of the disease severity concepts. Confronting interviewees with elements from these concepts revealed that interviewees did not consider age as criterion in the decision making. Swedish interviewees even mentioned that it would be illegal to use age as criterion. However, all acknowledged being more lenient towards drugs provided for children. Past health was also not seen as criterion. Consequently, the *'fair innings'* approach does not seem to fit well in actual practice. Also *'the rule of rescue'* approach does not fit in actual practice because the agencies make national decisions and, therefore, could not consider identifiable individuals. However, media attention in specific (individual) cases may lead to (ad-hoc) decisions based on *'the rule of rescue'* when policymakers are under societal pressure. Moreover, decisions on (ultra) orphan drugs can also be influenced by *'the rule of rescue'* considerations. Interviewees stated that the absolute gain in health or quality of life (future health effects) is most important, and also the current (absolute) health status is important. This reasonably fits with Nord's *'severity-of*

-illness' approach. Even though it is Dutch policy to use the *'proportional shortfall'* approach, interviewees acknowledged that this approach may be insufficient in some cases; its usefulness may depend on the type of disease.

All interviewees indicated that they would like to have a qualitative description of the disease at the very least. Only six out of thirteen stated a preference for numerical expressions of disease severity. However, such figures were only appreciated if presented in addition to a qualitative description of the disease, and, if appropriate, in addition to an incremental cost effectiveness ratio. One interviewee explained *"if you compute all information including disease severity into one cost-effectiveness estimate, then it will become very opaque, something we will not do so quickly, it is more that we come to a decision by putting cost-effectiveness, disease severity and other arguments side by side."* Other interviewees expressed concerns regarding the validity of using quantitative information on disease severity in decision making: *"you think is it possible, is it easy to do it in a reliable way?"* and *"cost-effectiveness, now it is accepted in principle, but still, ... medical people are still suspicious about it, ... the speed in these developments goes too fast, the rest of the society is not there"* and *"using numbers between one and zero is at odds with the complexity of the reality,"* and *"they (i.e., expert committee members) would prefer more qualitative and not too formal information, with possibility of discussing, ... they would prefer to feel more free."*

All interviewees agreed that the severity of the disease affects the decision whether or not to reimburse a drug, but could not give an indication of its relative importance compared to other decision criteria. Nevertheless, one Belgian interviewee indicated that budgetary impact may be even more important than disease severity. All interviewees agreed that it remains a balancing exercise. One interviewee explained *"Another discussion is our willingness to pay, ... I personally do think that we are willing to pay more for severe disease compared to for example an erectile dysfunction."* Although formally using the proportional shortfall approach in The Netherlands, the relative importance of disease severity remains unclear. Similarly, the classification used in Sweden (i.e., low, moderate, and high levels of severity) does not explicate how important disease severity is relatively to other criteria in the decision making. A Swedish interviewee stated *"in some dossiers it is (i.e., published scoring of the level of severity), we probably could and should publish it more frequently those statements, but it is available in some, ... if it is relevant . . .. you still have a balancing there (i.e., in the public memorandum), but it is not as clear."* Nevertheless, previous research (i.e., a comparative study of Dutch and Swedish published reimbursement information [29]) found that in four out of eleven cases the severity of the disease was explicitly mentioned. Although the relative importance of disease severity was not stated, all four drugs obtained reimbursement, three of them concerned indications in cancer.

Regarding other decision criteria, all interviewees acknowledged taking into account *'end-of-life'* considerations (similar to the end-of-life criterion as applied in the United Kingdom) mainly in treatments in cancer, thus concerning treatments that most often obtain reimbursement. Nevertheless, all agreed that even in such cases a minimal absolute gain, without clearly indicating what kind of minimum would still be acceptable, was still important. Interviewees did not consider the fact whether the treated disease was self-inflicted or someone's 'own fault'. On the other hand, especially in case of low levels of severity and low treatment costs, interviewees agreed considering the necessity to reimburse a treatment and/or whether treatment costs could be a person's own responsibility. Furthermore, most interviewees agreed that rarity as such is fairly unimportant; most also indicated a correlation between severity, rarity and the availability of alternative treatments. As explained by an interviewee *"that is difficult, I think if all three elements are there, in case it concerns a rare disease, which is also severe and no other alternative treatment is available, that scores high, we are more lenient in such a situation."* Another interviewee stated "d*isease severity was number one . . .. now we are not thinking the same way, it is very rare, it is not a frequent situation that there is no other drug . . .. we are reluctant to give favourable opinion when the drug is not very, they are all efficacious because they have market authorisation of course, but the level is sometimes very thin."* This shows that disease severity correlates with the 'need principle', in this case a relation between the medical need and the therapeutic and societal need.

5.3.2. The role of disease severity in determining the level of reimbursement

Once drugs are granted reimbursement, they are fully reimbursed in The Netherlands and Sweden. In contrast, Belgium and France use levels of reimbursement which are partly based on disease severity (see Table 2). All Belgian and French interviewees agreed that the reimbursement levels partly reflect levels of severity of the disease. In France, the reimbursement levels (i.e., 65%, 30% and 15% [35]) depend on the SMR level. Additionally, drugs are fully reimbursed for patients with a disease included on the ALD list, 31st and 32nd diseases, or drugs classified as being irreplaceable and costly. Interestingly, disease severity is not considered within the new proposed RTB criterion, whereas it was for the SMR, implying that, in the future, the reimbursement level will no longer (partly) reflect disease severity. Nevertheless, a French interviewee stated *"if you have a severe disease you might admit a less important difference than in a non-severe disease"* and *"for a non-severe disease it is not justified to have a high level of reimbursement."*

Belgium's reimbursement levels (i.e., 100%, 75%, 50%, 40%, and 20%) depend on the reimbursement categories (i.e., the therapeutic necessity of the drug category) [32] which partly reflect the severity of the disease. Category B contains by far the largest group of drugs followed by Category A (i.e., 78.3% and 19.3% in 2009, respectively [36]). The decision base for the reimbursement level hardly ever gives rationale for discussion. As a Belgian interviewee stated: *"the category is usually not a discussion because the companies know very well, by analogy, where to place their product."*

6. Discussion

We investigated the role of disease severity and its operationalization in drug reimbursement decision

Table 2
Levels of reimbursement and cost sharing mechanisms.

	Belgium	France	The Netherlands	Sweden
Reimbursement level				
Level of reimbursement	100%; 75%; 50%; 40%; 20%	100% (ALD, 31st and 32nd diseases); 65%; 30%; 15%; 0% (SMR level)	100%	100%
Basis for the level of reimbursement	Category of treatment necessity: A (Fa), B (Fb), C, Cx and Cs	SMR level: important, moderate, weak, insufficient	n/a	n/a
Cost sharing	Product specific co-insurance	Product specific co-insurance; prescription fees	General healthcare deductible	Drug specific co-payment

Category A (and Fa): vital drugs for life-threatening diseases (e.g., diabetes and cancer); B (and Fb): therapeutic significant drugs for non-life threatening diseases (e.g. antibiotics); C: therapeutic less significant drugs for systemic treatment–symptomatic treatments-; Cs: chronic illnesses; Cx: contraceptives and antispasmodics; ALD: affections de Longue Durée; SMR: Service Médical Rendu;n/a: not applicable.

making in Belgium, France, The Netherlands and Sweden. As expected, the severity of the targeted disease is an important, but often implicit, consideration in drug reimbursement decision making; the more severe the disease the higher the chance to get the treatment reimbursed (and at a higher reimbursement rate). In The Netherlands and Sweden disease severity only implicitly plays a role in the decision whether or not to reimburse a drug, whereas in Belgium and France it also explicitly plays a role in determining the percentage of costs society is willing to reimburse for a specific treatment targeting a more or less severe condition. About half of the interviewees (7 out of 13) were familiar with at least one of the concepts of disease severity. However, all four countries seem to struggle in operationalizing disease severity and making its actual role explicit.

A limitation of our study is that we only conducted thirteen face-to-face interviews in four countries. However, as expert committee meetings are not public it is impossible to attend such meetings and observe the deliberations in actual practice. Nevertheless, we conducted interviews with persons involved in everyday decision making and observed many similarities between the four countries. We therefore believe that saturation was achieved and that our study provides important insights into the role of disease severity in actual drug reimbursement decision making in Belgium, France, The Netherlands and Sweden and yields valuable lessons for policymakers and HTA researchers.

National reimbursement agencies are responsible for appraising whether a drug is worth reimbursing by society and are thus accountable to society. According to Daniels and Sabin [37], a fair and legitimate prioritising procedure must satisfy four conditions: (i) transparency of the decision-making process; (ii) relevance of the decision criteria; (iii) revisability of the decision in light of new evidence and arguments; and (iv) enforcement of the existing criteria. Our study shows that disease severity is a relevant decision criterion. However, our study also shows that the enforcement of disease severity as reimbursement criterion is lacking in all four countries. Policymakers experience difficulties in employing the concept explicitly, and its importance relatively to other decision criteria is not transparent.

The governance structure to safeguard legitimacy of reimbursement decision making differs in our four countries. The Swedish, Dutch and French system are more 'assessment-driven' compared to a more 'deliberation-driven' system in Belgium in which stakeholders are part of the discussion [11]. This does not, however, result in differences regarding the lack of transparency of the role of disease severity in the reimbursement decision-making process. Even though The Netherlands has a separate appraisal committee and formally uses the proportional shortfall approach and Sweden classifies the severity in categories, it remains unclear how important disease severity is relatively to other criteria in the decision-making process.

Using levels of reimbursement, which depend on the level of severity of the disease, as in Belgium and France, can be a legitimate way of incorporating disease severity into the decision as to how much society is willing to pay out of public sources for treating a specific condition. However, other countries may be averse to the use of co-payments, and using levels of reimbursement may therefore be seen as inappropriate or inequitable. In such cases, the severity of the disease may play a role in the decision as whether or not to reimburse the health care intervention as in The Netherlands and Sweden. Moreover, it can also be used for determining subgroups of patients for whom the interventions will be reimbursed (e.g., only for severely ill patient subgroups) and for price setting.

Other studies [3,20,38] found strong support for '*fair innings*' arguments in the general public. In contrast, our study revealed that age is not important to policymakers and that using age as criterion as advocated by '*fair innings*' arguments may even be against the law in some countries (e.g., Sweden). For example, in case of a similar treatment, interviewees did not indicate considering only granting reimbursement for younger people and rejecting reimbursement for elderly. Interestingly however, interviewees also indicated that they were more lenient in cases where a treatment was designed specifically for children or younger people (all other things being equal). Similarly to findings

by Nord and Johansen [8], our study revealed that past health is not important. In contrast, absolute future health gains as well as the current health status are important in decision making. This fits with '*severity of illness*' arguments. Although identifiable individuals may not be considered in national decision making, media attention and societal pressure may appeal to '*the rule of* rescue' arguments. Cookson [39] analysed eleven potentially relevant justifications for the NICE 'end-of-life' premium; he concluded that none of them provided sufficient ethical justification. Interestingly, our interviewees indicated that even in case of end-of-life treatment a minimal absolute gain is still important. Such findings have previously been advocated by Kvamme et al. [40].

Nord and Johansen [8] note an increasing interest in formal numerical information on the severity of the disease. Based on a review, they reported that the size of the severity gradient greatly varies across studies [8]. As a result of this great heterogeneity, current literature does not provide sufficient guidance to policymakers on the relative weight of disease severity. Interestingly, our study shows that policymakers prefer to have, at least, qualitative information on the severity of the disease and, above all, prefer to maintain their discretionary decision power and implicitly weigh all decision criteria. It remains the question as to why policymakers have such difficulties in explicating their decision base. It could be that using an explicit criterion and instrument not only leads to favourable decisions at one end of the scale (i.e., high levels of severity lead to granting reimbursement), but also may enforce making and/or explicating unfavourable decisions at the other end of the scale (i.e., low levels of severity lead to rejecting reimbursement). The latter may be a less comfortable position. Nevertheless, we believe that policymakers could enhance the transparency of the actual role of disease severity and/or underlying considerations (e.g., future health, past health, age, end-of-life considerations and medical, therapeutic and societal needs) in their decision making. This could be achieved by using classifications (as in Sweden) or numerical expressions of disease severity (as in The Netherlands), but, more importantly, more information on the weighing exercise could be provided. For example, published information can explain that because of the high levels of severity (e.g., remaining life expectancy of 6 months), the absolute gain of two months in life expectancy is acceptable. Policymakers may (re)consider the use of additional HTA evidence; for example, evidence derived from the disease severity concepts, and/or evidence from multi criteria decision analysis (MCDA) including evidence from obtained (public) preferences (e.g., social value of the QALY [14–16], preferences for severity of illness [10,17,18], end-of-life treatment [19,20]). This may help to improve consistency in their deliberations and increase the legitimacy of their decision-making process.

On the other hand, it is important that academic and HTA researchers realise that HTA and/or MCDA evidence will most likely not be decisive and only be informative to policymakers. Although many studies aim to elicit QALY weights, our study reveals that policymakers may not be interested in explicitly weighing QALYs. Many policymakers do not prefer using quantitative information on disease severity and prefer implicitly weighing all decision criteria and, above all, prefer maintaining discretionary decision power. However, to further advance evidence based and legitimate decision making, it will be important to continue developing the theoretical concepts of disease severity and investigating different ways of operationalization. Information on and the use of (operationalization of the) disease severity approaches may provide additional quantitative information on the levels of severity in a more structured way. Therefore, (HTA) researchers and policymakers should closely work alongside each other, and make use of each other's expertise to fine tune the most useful way to operationalize disease severity in order to enhance the legitimacy of societal decision making.

7. Conclusions

Our study showed that the severity of the disease is an important consideration in drug reimbursement decision making, especially in case of high levels of severity. However, all four countries seem to struggle in making the actual role of disease severity explicit compared to other criteria. Belgium and France are the most explicit by using the level of severity in setting reimbursement levels. However, all four countries could improve the transparency of the actual importance of disease severity in relation to other criteria in the decision-making process.

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