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Exploring the Impact of the New NICE Disease Severity Modifier on HTA Oncology Submissions: A Retrospective Analysis of Technology Appraisals

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Background

- The National Institute for Health and Care Excellence (NICE) has replaced the end-of-life (EoL) premium with a disease severity modifier in its decision-making since 2022. [1]
- NICE previously used the EoL premium to allow a higher cost-effectiveness threshold to be applied to treatments targeting patients with very short life expectancy. [2] Specifically, the EoL premium allowed a higher price to be paid for life-extending treatments in patients with less than 24 months of life expectancy, with a cost-effectiveness threshold of up to £50,000 per Quality-Adjusted Life Year (QALY) gained. [3] The EoL approach focused primarily on oncology treatments for terminally ill patients and many technologies were approved on this basis. [2]
- The disease severity modifier is assessed using two measures: the absolute and proportional QALY shortfall. [1] [4]
  - Absolute QALY shortfall (AS) quantifies the total amount of future health a person is expected to lose due to their condition. This is calculated by subtracting the modeled total QALYs on the standard of care (SoC), from the expected total QALYs of a sex- and age-matched sample of the general population.
  - Proportional QALY shortfall (PS) measures the proportion of future QALYs a person is expected to lose due to their condition. It is calculated by dividing the absolute QALY shortfall by the expected total QALYs from an age- and sex-matched sample of the general population.
- These shortfalls determine one of three severity levels, each associated with QALY weights of 1.0x (PS<0.85 or AS<12), 1.2x (0.85<PS<0.95 or 12<AS<18), or 1.7x (PS≥0.95 or AS≥18), where 1.0x depicts low disease severity and 1.2x and 1.7x depict medium and high disease severity, respectively. [5]
- The disease severity modifier enables flexible cost-effectiveness thresholds based on disease severity, prioritising more severe conditions, especially in oncology. For instance, a 1.2x multiplier raises the maximum willingness-to-pay (WTP) threshold to £36,000 per QALY, while a 1.7x multiplier increases it to £51,000 per QALY. [2]
- Shifting from an EoL premium to a disease severity modifier marks a major policy change for NICE, potentially impacting the healthcare system, future research priorities, and investment strategies in the UK. Many advanced oncology treatments historically gained approval through the EoL premium, despite having incremental cost-effectiveness ratios (ICERs) exceeding NICE's typical thresholds for other patient groups. [6] [7] [8] The new disease severity modifier policy raises concerns about whether these treatments will maintain their priority status and how it might affect future access to innovative oncology treatments in the UK. Furthermore, the new disease severity modifier could reshape investment patterns, potentially redirecting resources towards technologies that qualify under this criterion.
- This study explores how outcomes of past oncology health technology assessment (HTA) submissions might have been affected by the introduction of the disease severity modifier, and whether any have benefitted from the new disease severity modifier. The study's outcomes are anticipated to illustrate the aforementioned concerns.

Method

- A targeted review of all oncology NICE single technology appraisals (TAs) for any intervention published on the NICE website from May 2023 to May 2024 was conducted. [9]
- Published committee papers were independently screened. The analysis encompassed reassessments or reconsiderations of previous TAs, including cancer drug fund (CDF) rapid reconsiderations. Appraisals were excluded if they had been terminated, and only appraisals that applied the disease severity modifier were included in the data extraction.
- Data extraction was performed in Microsoft Excel. The following data was extracted from each TA: appraisal number; publication year; indication; intervention or drug evaluated; baseline demographics of the modelled population; QALY accrued by patients on current SoC; absolute and proportional QALY shortfall; disease severity modifier applied in the TA; median overall survival (OS) of current SoC and median OS gain of the intervention compared to the current SoC; and NICE committee recommendations (Table 1).
- The severity modifier applied in the TA was categorized as 1.0x, 1.2x, or 1.7x, in alignment with the updated methods guide. [1]
- A hypothetical EoL premium (£50,000 WTP threshold) was assumed if the reported median OS was ≤24 months in the SoC arm and the median OS gain was ≥3 months with the intervention arm.
- Descriptive summary statistics were generated for the quantitative items, e.g. number of previous TAs qualifying the hypothetical EoL premium.

Table 1: Information extracted from NICE appraisals review

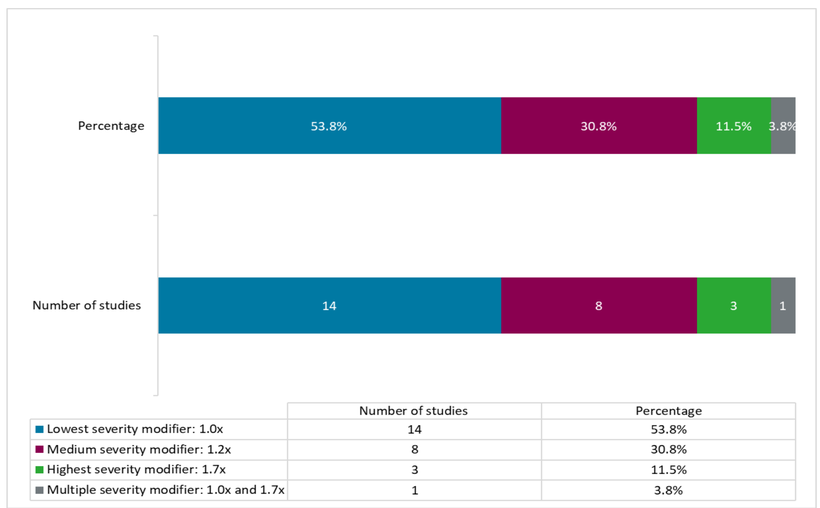
Category	Extracted Information
Disease-specific	Indication, Intervention
Severity modifier	Baseline age and sex, expected QALY for the general population, QALYs accrued by patients on SoC, absolute shortfall, proportional shortfall, severity modifier applied in the TA
EoL criteria	Median OS of current SoC, median OS gain of the intervention compared to the current SoC
Other	NICE drug recommendation and comments on the severity modifier applied in the TA

EoL: End of life; NICE: National Institute for Health and Care Excellence; OS: Overall survival; QALY: Quality-adjusted life years; SoC: Standard of care; TA: Technical appraisal

Results

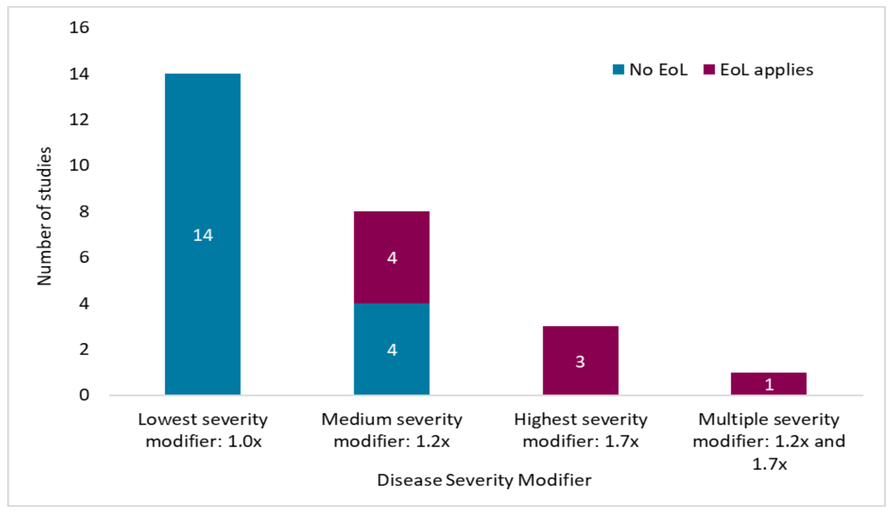
- A total of 43 oncology TAs were conducted between May 2023 and May 2024. Three TAs had been terminated and the other two TAs were not in oncology. Among the remaining 38 TAs screened, 26 TAs applied the severity modifier in the submission and were included in the analysis.
- The 26 TAs were distributed across different cancer types as follows: carcinoma (n = 13); lymphoma (n = 5); leukaemia (n = 4); and myeloma (n = 4).
- The distribution of the severity modifier applied across the included 26 TAs is shown in Figure 1.
  - Fourteen (53.8%) TAs applied a severity modifier of 1.0x
  - Eight (30.8%) TAs applied a severity modifier of 1.2x
  - Three (11.5%) TAs applied a severity modifier of 1.7x
  - One TA applied different disease severity modifiers in different subpopulations, with a severity modifier of 1.7x in subpopulations of gastric, small intestine and cholangiocarcinoma and a severity modifier of 1.2x in subpopulations of colorectal and endometrial cancer.
- Among the 26 appraisals, only eight of them would have been qualified for an EoL premium. The distribution of the studies that would have been qualified for an EoL premium is shown in Figure 2.
  - None of the fourteen TAs with a severity modifier of 1.0x would have qualified for the EoL premium.
  - Half of the eight TAs with a severity modifier of 1.2x would have qualified for the EoL premium.
  - All three TAs calculated a severity modifier of 1.7x would have qualified for the EoL premium.
  - The one TA applied different disease severity modifiers in different subpopulations; it would also have qualified for the EoL premium in all subpopulations.
- Among all 26 TAs, most (89%) TAs resulted in a positive recommendation with commercial arrangement.
  - All the Fourteen TAs with a severity modifier of 1.0x would not have qualified for the EoL premium. Thus, implementing the severity modifier for these three TAs has not altered the outcomes, as it would not have provided additional leeway for pricing considerations.
  - For the eight TAs with a severity modifier of 1.2x, only one resulted in a negative recommendation. However, since half of them would have been qualified for the EoL premium, implementing the severity modifier for these TAs may have impacted the drug price, as it would have allowed additional flexibility on price (WTP threshold of previous £50,000 per QALY vs current £36,000 per QALY). On the other hand, the other half of the submissions may have slightly benefited from implementing the severity modifier as they faced a higher WTP threshold (previous £30,000 per QALY vs current £36,000 per QALY).
  - For the four TAs with a severity modifier of 1.7x in the full or subpopulations, all resulted in a positive recommendation with commercial arrangement. Implementing the severity modifier for these TAs had little impact on the drug price, as it only provided minimal additional leeway for pricing considerations (WTP threshold of previous £50,000 per QALY vs current £51,000 per QALY).

Figure 1. Disease Severity Modifier applied to previous NICE appraisals (N = 26)



	Number of studies	Percentage
Lowest severity modifier: 1.0x	14	53.8%
Medium severity modifier: 1.2x	8	30.8%
Highest severity modifier: 1.7x	3	11.5%
Multiple severity modifier: 1.0x and 1.7x	1	3.8%

Figure 2. Distribution of severity modifier and the hypothetical EoL qualification status (N = 26)



Conclusion

- The introduction of the disease severity modifier by NICE has effectively achieved its intended goals, as evidenced by the analysis of 26 TAs in oncology conducted between May 2023 and May 2024.
- The severity modifier has provided a more nuanced approach to WTP thresholds, bridging the gap between the standard £20-30,00 WTP threshold and the previous EoL premium. Specifically, 15.4% of the appraisals benefited from a higher WTP threshold (severity modifier of 1.2x) despite not meeting the EoL criteria, allowing treatments for moderately severe diseases to be more favorably assessed. Conversely, another 15.4% saw their WTP threshold decrease from £51,000 to £36,000, indicating a stricter evaluation where the highest severity modifier did not apply. This balanced adjustment demonstrates that the severity modifier has refined the appraisal process to more accurately reflect disease severity.
- Manufacturers now need to adapt their NICE dossier submissions and pricing strategies to align with the new WTP thresholds introduced by the severity modifier. This may lead to price adjustments - both upward and downward - as companies strive to meet the revised criteria.
- Overall, the introduction of severity modifier has created a more balanced approach to health technology assessment, supporting more efficient resource allocation within the healthcare system while also potentially benefiting patients through improved access to treatments.

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