

# Health Economic Reference Cases and Costing Approaches

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Concepts, International Practices and  
Implications for Austria



# Appendix

## Extraction categories for information on the guideline's reference case

Country	Australia [1] [2] [3]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark [9] [10] [11] [12]	Denmark [11]
Document type <sup>1</sup>	Health Technology Assessment Guideline (HTAG) including Health economic evaluation guideline (HEEG) + Budget impact analysis guideline (BIAG) + Costing Manual	HEEG + BIA + Costing Manual (Hospital)	HEEG + BIA	HEEG + Costing Manual (in Danish)	HTAG <sup>2</sup>
Perspective	Healthcare system perspective	Healthcare system perspective	Healthcare system perspective (Publicly funded healthcare payer)	Societal perspective and Hospital perspective for BIA	Societal perspective and Hospital perspective for BIA
Stringency/General guideline or submission only	Mandatory guideline for submissions.	Mandatory guideline for submissions and universal guideline for the Belgian context.	De-facto mandatory <sup>3</sup> guidelines for submissions and universal guideline for the Canadian context.	Mandatory guideline for submissions	Mandatory guideline for submissions
Focus	Pharmaceuticals	All types of health technologies	All types of health technologies	Pharmaceuticals	Pharmaceuticals
Analysis	CUA/CMA <ul style="list-style-type: none"> <li>■ Trial-based HEE</li> <li>■ Model-based HEE</li> </ul>	CUA <ul style="list-style-type: none"> <li>■ Trial-based HEE (primary evidence)</li> <li>■ Model-based HEE</li> </ul>	CUA <ul style="list-style-type: none"> <li>■ Trial-based HEE (primary evidence)</li> <li>■ Model-based HEE<sup>4</sup></li> </ul>	CUA <ul style="list-style-type: none"> <li>■ Trial-based HEE (primary evidence)</li> <li>■ Model-based HEE</li> </ul>	CUA/CCA/CA <ul style="list-style-type: none"> <li>■ Trial-based HEE (primary evidence)</li> <li>■ Model-based HEE</li> </ul>
Data sources	Clinical effect: <ul style="list-style-type: none"> <li>■ RCTs (primary evidence)</li> <li>■ Indirect comparisons of RCTs</li> <li>■ Non-randomised trials</li> <li>■ Systematic reviews and meta-analyses</li> </ul>	Clinical effect: <ul style="list-style-type: none"> <li>■ RCTs (and meta-analyses)<sup>5</sup> (preferred)</li> </ul>	Clinical effect: <ul style="list-style-type: none"> <li>■ RCTs</li> <li>■ Observational studies/non-comparative studies</li> </ul>	Clinical effect: <ul style="list-style-type: none"> <li>■ All types of studies<sup>6</sup> (RCTs, observational studies etc.)</li> <li>■ Registries</li> </ul>	Clinical effect: <ul style="list-style-type: none"> <li>■ All types of studies (RCTs, observational studies etc.)</li> <li>■ Registries</li> </ul>
Other data sources	Other sources (esp. modelling): <ul style="list-style-type: none"> <li>■ Registries</li> <li>■ Administrative databases</li> </ul>	Other sources (esp. modelling): <ul style="list-style-type: none"> <li>■ (R)CTs</li> <li>■ Observational studies (prospective)</li> </ul>	Other sources (esp. modelling): <ul style="list-style-type: none"> <li>■ Administrative databases</li> <li>■ Fee schedules and formularies</li> </ul>	Other sources (esp. modelling): <ul style="list-style-type: none"> <li>■ Registries</li> <li>■ Administrative databases</li> </ul>	Other sources (esp. modelling): <ul style="list-style-type: none"> <li>■ Registries</li> <li>■ Administrative databases</li> </ul>

<sup>1</sup> The documents are classified according to the following categories: HEEG (Health Economic Evaluation Guideline), HEEG+BIA (Health Economic Evaluation Guideline including Budget Impact Analysis, either integrated into the HEEG or provided as a separate document), HTAG (Health Technology Assessment Guideline), and OTH (other documents). Costing Manuals (CM), which outline the use of resource items and corresponding unit costs, are reported separately.

<sup>2</sup> The Danish Health Technology Council's (DHTC) industry track is transitioning to the new Institute for Quality in Healthcare (established January 2025). It is unknown if the current HTA guideline will remain in effect. The DHTC guideline is based on the Danish Medicines Council's (DMC) HEEG and therefore has only marginal differences [13].

<sup>3</sup> The Canadian HEEG is not legally mandatory but are functionally mandatory for developers wishing to secure reimbursement from Canadian public payers.

<sup>4</sup> The Canadian guidelines refer primarily to model-based HEE; however, many guideline aspects such as choice of outcome apply equally to evaluations based on individual-level studies, such as RCTs.

<sup>5</sup> Per Belgian HEEG, observational data (registries/administrative databases) cannot be used to establish therapeutic benefit (due to the lack of randomisation); however, are considered valid for valuing economic inputs.

<sup>6</sup> Clinical efficacy and safety evidence should come from peer-reviewed journal articles, EMA EPARs, FDA reports, or HTAs. However, the DMC accepts unpublished sources if they enable the health economic analysis to better reflect the specific context of the application than would be possible using only published data.

Country	Australia [1] [2] [3]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark [9] [10] [11] [12]	Denmark [11]
	<ul style="list-style-type: none"> <li>Market data: Quantitative description of existing market/estimates of relative market shares</li> </ul>	<ul style="list-style-type: none"> <li>Registries/</li> <li>Administrative databases</li> <li>Patient records</li> </ul>	<ul style="list-style-type: none"> <li>Expert input</li> </ul>		
Costs included <sup>8</sup> (reference case)	<p>Direct healthcare costs:</p> <ul style="list-style-type: none"> <li>Direct treatment costs and pharmaceuticals to treat adverse reactions</li> <li>Medical services/procedures</li> <li>Hospital services</li> <li>Diagnostic and investigational services</li> <li>Community-based services</li> <li>Any other direct medical costs<sup>9</sup></li> </ul>	<p>Direct healthcare costs:</p> <ul style="list-style-type: none"> <li>Direct treatment costs</li> <li>Additional treatment costs/savings (e.g. preparatory examinations and tests, companion diagnostics, etc.)</li> <li>Costs/Savings of short-term (e.g. monitoring, follow-up examinations) and long-term consequences (e.g. reinterventions): impact within the targeted health condition and on other health conditions, e.g., due to (avoided) adverse events.</li> </ul>	<p>Direct healthcare costs:</p> <ul style="list-style-type: none"> <li>All relevant resources based on the perspective of the publicly funded healthcare payer<sup>10</sup></li> </ul>	<p>Direct healthcare costs:</p> <ul style="list-style-type: none"> <li>All treatment-related costs incurred by the patient, including costs due to adverse events of the treatment</li> <li>Treatment administration costs</li> <li>All hospital-related costs</li> <li>Costs covered by public health services</li> <li>Municipal costs</li> </ul> <p>Direct non-health care costs</p> <ul style="list-style-type: none"> <li>Time costs/value in connection with treatment for patients and relatives (including informal care)</li> <li>Travel costs</li> </ul>	<p>Direct healthcare costs:</p> <ul style="list-style-type: none"> <li>All costs within all sectors and areas concerned must be included, such as hospitals, general practice, specialist practice, home care, nursing homes and nurses and costs of aids and appliances, plus social care</li> <li>Costs of prescription drugs</li> </ul> <p>Direct non-health care costs</p> <ul style="list-style-type: none"> <li>Time costs/value in connection with treatment for patients and relatives (including informal care)</li> <li>Travel costs</li> </ul>
Handling of non-reference case costs excluded in reference case (non-health care, indirect costs, intangible costs)	<p>Indirect costs:</p> <ul style="list-style-type: none"> <li>Productivity changes only in supplementary analysis.</li> <li>For short-term absence, production will be made up on return to work.</li> <li>Employers usually have excess capacity in the labour force to cover absenteeism.</li> <li>For long-term absence, production will be made up by a replacement worker who would otherwise be unemployed.</li> </ul>	<p>Direct non-healthcare costs:</p> <ul style="list-style-type: none"> <li>Direct non-healthcare costs such as travel expenses to and from hospital, informal care, invalidity/incapacity allowances, social services, etc. are not included at all.</li> </ul> <p>Indirect costs:</p> <ul style="list-style-type: none"> <li>Indirect costs such as healthcare costs in life years gained (unrelated health care costs), and</li> <li>indirect non-healthcare costs such as productivity losses of the patient or informal caregiver are only included in supplementary analysis</li> </ul>	<p>Indirect costs:</p> <ul style="list-style-type: none"> <li>Indirect non-healthcare costs such as productivity losses of the patient or informal caregiver are only included in supplementary analysis (societal perspective) by using the friction cost approach.</li> </ul>	<p>Indirect costs:</p> <ul style="list-style-type: none"> <li>Production loss/gain (productivity), transfer incomes/payments, and future health costs and savings are never included, but if calculations of labour market consequences (indirect costs) are included, they must be presented separately.</li> </ul>	<p>Indirect costs:</p> <ul style="list-style-type: none"> <li>Production loss/gain (productivity), transfer incomes/payments, and future health costs and savings never to be included, but if calculations of labour market consequences (indirect costs) are included, they must be presented separately</li> </ul>
Other information on costs	<ul style="list-style-type: none"> <li>Use of natural units and quantification of these units (packs of medicine dispensed, general practitioner)</li> </ul>	<ul style="list-style-type: none"> <li>When using foreign data, conversions follow Dutch and Irish guidelines. For cost transfers, inflation is calculated</li> </ul>	<ul style="list-style-type: none"> <li>If multiple perspectives are relevant, results should be reported separately for the reference case and other relevant perspectives.</li> </ul>		

<sup>7</sup> A complete list of Belgian national databases for the measurement and valuation of resource use, along with information how to access them, can be found in the HEEG on page 85ff [4].

<sup>8</sup> Travel expenses (e.g., fuel, public transport fares) are not payments for medical services or resources consumed within the healthcare system, but rather ancillary expenses incurred by patients to access care. These costs mostly occur outside the formal healthcare sector (e.g., payment to transport providers rather than hospitals/clinics) and are borne by patients or their families, aligning with the definition of direct non-healthcare costs in standard frameworks like the ISPOR Good Practices for Outcomes Research and WHO guidelines [14].

<sup>9</sup> Wastage needs to be accounted for. For vaccine products, usage beyond the target population should be considered, if National Immunisation Programme (NIP) funding is sought.

<sup>10</sup> From a private payer perspective, costs not covered by public payers must be included. From a societal perspective, out-of-pocket expenses (e.g., copayments) reflecting actual individual payments should also be incorporated.

Country	Australia [1] [2] [3]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark [9] [10] [11] [12]	Denmark [11]
	consultations, episodes of hospital admission)	using the country's local CPI first, then conversion to EUR using PPP indices. <ul style="list-style-type: none"> <li>For the intervention under assessment, the official list price should be used in the base-case.</li> <li>Confidential price discounts for the comparator(s) and/or other relevant treatments impacting the incremental costs should be included in the base-case.</li> </ul>			
Modelling	Yes, but only if trials did not provide sufficient clinical and economic evidence.	Yes, if the available data are insufficient. Model should be based as much as possible on data from clinical studies, data from validated databases and/or data from literature.	Yes, the model should be validated, including an assessment of the face validity of the model structure, assumptions, data, and results.	Yes, if the relevant time horizon extends beyond the time horizon of the clinical study.	Yes, expert committee can set out technology-specific requirements in the evaluation design to inform the development of a representative health economic model.
Time horizon	The time horizon should reflect key cost and outcome differences between the intervention and comparator. A short horizon may suffice for non-mortality-affecting interventions (temporary effects), while a lifetime horizon is needed if the treatment impacts mortality or long-term quality of life.	The time horizon should reflect the intervention's duration of effect on costs and outcomes versus the comparator.	The time horizon should be long enough to capture all relevant differences in the future costs and outcomes associated with the interventions being compared.	Long enough to capture all important future differences in health and cost effects between the alternatives.	Long enough to capture all important future differences in health and cost effects between the alternatives.
Discount rate (Base-case)	Cost and outcomes: 5%	Costs: 3% Outcomes 1.5%	Costs and outcomes: 1.5%	Costs and outcomes: 4% (current socio-economic discount rate from the Ministry of Finance is used, 06/25)	Costs and outcomes: 4% (current socio-economic discount rate from the Ministry of Finance is used, 06/25)
Sensitivity/Uncertainty analysis <sup>11</sup>	Yes: <ul style="list-style-type: none"> <li>Different unit prices</li> <li>Time horizon (as appropriated)</li> <li>Discount rates (0%, 3.5%)</li> <li>One- or multi-way deterministic sensitivity analyses on all uncertain input parameters</li> <li>Scenario analysis for translational or structural uncertainty</li> </ul>	Yes: <ul style="list-style-type: none"> <li>One- or multi-way probabilistic sensitivity analyses</li> <li>Scenario and subgroup analyses for parameter uncertainty</li> <li>Discount rates (0%, 3% &amp; 5%)</li> </ul>	Yes: <ul style="list-style-type: none"> <li>One- or multi-way probabilistic sensitivity analyses</li> <li>Discount rates (0%, 3%)</li> </ul>	Yes <sup>12</sup> <ul style="list-style-type: none"> <li>One- and two-way deterministic sensitivity analysis and scenario analysis<sup>13</sup></li> <li>Probabilistic sensitivity analysis</li> <li>Adjustment of time horizon</li> </ul>	Yes <ul style="list-style-type: none"> <li>One- and two-way deterministic sensitivity analysis and scenario analysis</li> <li>Probabilistic sensitivity analysis</li> </ul>
Budget impact	Yes <ul style="list-style-type: none"> <li>Epidemiological<sup>14</sup> and market-share analysis for BIA</li> </ul>	Yes <ul style="list-style-type: none"> <li>Guidelines on cost calculation in HEE applies also to BIA</li> </ul>	Yes <ul style="list-style-type: none"> <li>Therapy costs can be taken from the HEE</li> </ul>	Yes <ul style="list-style-type: none"> <li>Hospital perspective/Estimation of the impact on regional hospital budgets</li> </ul>	Yes <ul style="list-style-type: none"> <li>Hospital perspective/Estimation of the impact on regional hospital budgets</li> </ul>

<sup>11</sup> Only parameters affecting the cost or resource component are listed here.

<sup>12</sup> The DMC may also decide to carry out individual sensitivity analyses or request the company to do so.

<sup>13</sup> Scenario analysis is a form of multi-way sensitivity analysis that can provide important information about the significance of the overall uncertainty (best case vs. worst case).

<sup>14</sup> A standardised Excel workbook and manual with the epidemiological approach is available on the PBAC guidelines website [3, 15].

Country	Australia [1] [2] [3]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark [9] [10] [11] [12]	Denmark [11]
	<ul style="list-style-type: none"> <li>■ Time horizon = 6 years</li> <li>■ No discounting</li> <li>■ Estimation of financial impact of new medicine, changes in use and financial impact of other medicines, financial impact for the PBS/RPBS or the NIP, and financial impact for the Australian government.</li> <li>■ Sensitivity and scenario analysis</li> </ul>	<ul style="list-style-type: none"> <li>■ Time horizon ≥3 years</li> <li>■ No discounting</li> <li>■ Additional one- or multi-way deterministic sensitivity analysis for (expert-based) assumptions</li> </ul>	<ul style="list-style-type: none"> <li>■ Time horizon 3 years (if therapy not fully implemented after 3 years, then a 4- or 5-year time horizon can be selected)</li> <li>■ No discounting</li> <li>■ Only reference vs. new drug scenario</li> </ul>	<ul style="list-style-type: none"> <li>■ Calculations of budget impacts must be made for various stakeholders, e.g. costs for regions (“fund analysis”) and for patients.</li> <li>■ Time horizon ≥5 years (annual reporting)</li> <li>■ No discounting</li> </ul>	<ul style="list-style-type: none"> <li>■ Time horizon ≥5 years (annual reporting)</li> <li>■ No discounting</li> <li>■ No overhead costs</li> </ul>

Country	England & Wales [16]	France [17]	Germany [18] [19]	New Zealand [20] [21]
Type1	HTAG	HEEG	HTAG	HEEG+BIA
Perspective	Healthcare system and personal social services perspective <sup>15</sup>	Societal (collective) perspective <sup>16</sup>	SHI-insured community perspective	Healthcare system perspective (Publicly funded health care payer)
Stringency/General guideline or submission only	Not mandatory	Mandatory guidelines for submissions <sup>17</sup>	De-facto mandatory <sup>18</sup> guidelines for submissions by pharmaceutical companies	De-facto mandatory <sup>19</sup> guidelines for submissions and universal guideline for the New Zealand context.
Focus	All types of health technologies	All type of health technologies	Pharmaceuticals (mainly <sup>18</sup> )	Pharmaceuticals
Analysis	CUA/CCA <sup>20</sup> <ul style="list-style-type: none"> <li>■ Trial-based HEE</li> <li>■ Model-based HEE</li> </ul>	CUA/CEA <ul style="list-style-type: none"> <li>■ Trial-based HEE</li> <li>■ Model-based HEE</li> </ul>	CUA/CEA <ul style="list-style-type: none"> <li>■ Trial-based HEE</li> <li>■ Model-based HEE (primary evidence)<sup>21</sup></li> </ul>	CUA <ul style="list-style-type: none"> <li>■ Trial-based HEE</li> <li>■ Model-based HEE</li> </ul>
Data sources clinical effect	Clinical effect: <ul style="list-style-type: none"> <li>■ Systematic reviews<sup>22</sup></li> <li>■ RCTs</li> </ul>	Clinical effect: <ul style="list-style-type: none"> <li>■ Systematic reviews and meta-analysis</li> <li>■ RCTs</li> </ul>	Clinical effect: <ul style="list-style-type: none"> <li>■ RCTs</li> <li>■ HTA reports</li> </ul>	Clinical effect: <ul style="list-style-type: none"> <li>■ Systematic reviews and meta-analysis</li> <li>■ RCTs</li> </ul>

<sup>15</sup> The perspective on costs is National Health Service (NHS) England and Wales and Personal Social Services (PSS).

<sup>16</sup> Choice of a healthcare system perspective in the reference case analysis must be justified.

<sup>17</sup> The guideline is binding for companies submitting a technology to HAS for reimbursement, but not for academic research or hospital internal decisions. However, it is considered the primary reference for methodological quality in France.

<sup>18</sup> The General Methods serve as a gold standard for evidence assessment in Germany and is also used by the IQWiG when conducting in-house health economic evaluations for Non-Drug Interventions (e.g., surgeries, screening, disease management programs) [18, 22]. “According to §139a (4) Sentence 1 SGB V, the Institute is legally obliged to ensure the “assessment of the medical benefit [of interventions] following the internationally recognized standards of evidence-based medicine and the economic evaluation following the relevant internationally recognized standards for this purpose, in particular of health economics”. Depending on the commission, the Institute determines the methods and criteria for the preparation of assessments on the basis of the international standards of evidence-based medicine (EBM) and health economics recognized by the relevant experts.” – Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen (IQWiG) [2025, p.4].

<sup>19</sup> The New Zealand HEEG is not legally mandatory, but it is highly authoritative and strongly recommended for all parties engaging with PHARMAC.

<sup>20</sup> Cost-comparison (CC) should be used only for technologies offering similar health benefits at similar/lower costs than NICE-recommended comparators for the same population.

<sup>21</sup> For the benefit assessment non-randomised intervention studies, observational studies and data collection from registries for routine practice (RPDC) can be used in justified exceptional cases. This data also goes in to the model-based HEE.

<sup>22</sup> Data on health effects should come from systematic reviews.

Country	England & Wales [16]	France [17]	Germany [18] [19]	New Zealand [20] [21]
	<ul style="list-style-type: none"> <li>■ Observational studies</li> <li>■ Registries</li> </ul>	<ul style="list-style-type: none"> <li>■ Network meta-analysis</li> <li>■ Observational studies</li> <li>■ Registries</li> </ul>	<ul style="list-style-type: none"> <li>■ Routine data GKV</li> <li>■ Guideline databases</li> <li>■ Expert opinions</li> </ul>	<ul style="list-style-type: none"> <li>■ Observational studies</li> <li>■ Expert opinions</li> <li>■ Case reports</li> <li>■ Post-surveillance studies</li> <li>■ Registries</li> </ul>
Other data sources	<p>Other sources (esp. modelling):</p> <ul style="list-style-type: none"> <li>■ Registries</li> <li>■ Administrative databases</li> </ul>	<p>Other sources (esp. modelling):</p> <ul style="list-style-type: none"> <li>■ Registries</li> <li>■ Administrative databases</li> </ul>	<p>Other sources (esp. modelling):</p> <ul style="list-style-type: none"> <li>■ Clinical information systems</li> <li>■ Price catalogues/directories</li> <li>■ Expert opinions</li> </ul>	<p>Other sources (esp. modelling):</p> <ul style="list-style-type: none"> <li>■ Registries</li> <li>■ Administrative databases</li> </ul>
Costs included <sup>8</sup> (reference case)	<p>Direct healthcare costs<sup>23</sup>:</p> <ul style="list-style-type: none"> <li>■ Costs of technologies, infrastructure changes, use and maintenance</li> <li>■ Staff training costs</li> <li>■ Cost differences due to different hospital stays, number of hospitalisations, outpatient or primary care consultations associated with the technology</li> </ul>	<p>Direct healthcare costs:</p> <ul style="list-style-type: none"> <li>■ Costs (resources consumed) for the intervention (e.g. acquisition costs, administrative costs, treatment of any adverse events associated with the intervention)</li> <li>■ Costs for care and for changes in the organisation of care (e.g. follow-up care, care linked to comorbidities, care provided by informal caregivers, concomitant treatments, end-of-life care)</li> <li>■ Costs for hospital care, outpatient care, medical goods, transport</li> </ul> <p>Direct non-healthcare costs:</p> <ul style="list-style-type: none"> <li>■ Other resources consumed in the medico-social and domestic spheres</li> </ul>	<p>Direct healthcare costs:</p> <ul style="list-style-type: none"> <li>■ Costs (resource use) resulting from the provision of the intervention and health care services financed by the SHI (costs of hospital stays, outpatient visits, drugs, and medical remedies and aids)</li> <li>■ Co-payments by patients (drugs, medical remedies and aids, outpatient visits)</li> </ul> <p>Direct non-healthcare costs:</p> <ul style="list-style-type: none"> <li>■ Travel costs for interventions</li> <li>■ Disease-related time of affected patients and relatives</li> </ul> <p>Indirect costs:</p> <ul style="list-style-type: none"> <li>■ Productivity losses from work incapacity or disability are included, losses from premature death excluded if mortality counted as a benefit.</li> </ul> <p>Future costs:</p> <ul style="list-style-type: none"> <li>■ Future costs (e.g., drug check-ups from additional life years gained) included in reference case if time horizon indicates relevant cost differences due to intervention.</li> </ul> <p>Investment cost:</p> <ul style="list-style-type: none"> <li>■ One-off costs for SHI-funded healthcare services should be included via sensitivity analyses.</li> </ul>	<p>Direct healthcare costs:</p> <ul style="list-style-type: none"> <li>■ Community and hospital pharmaceutical costs</li> <li>■ Hospital inpatient costs (DRG prices for inpatient diagnosis, treatment and/or procedures)</li> <li>■ Hospital outpatient costs (health care professional costs, DRG prices, laboratory and diagnostics)</li> <li>■ Direct patient healthcare costs (GP visits, co-payments, home or continuing care)</li> </ul>
Handling of non-reference case costs excluded in reference case (non-health care, indirect costs, intangible costs)	<p>Non-healthcare costs:</p> <ul style="list-style-type: none"> <li>■ Consideration of costs (or cost savings) in other sectors on agreement (in principle not included): Costs/savings should be presented in a disaggregated form and separately from the reference-case analysis.</li> </ul> <p>Indirect costs:</p>	<p>Indirect costs:</p> <ul style="list-style-type: none"> <li>■ Productivity losses, due to absenteeism or reduced productive activity of the population are excluded and only considered in a supplementary analysis.</li> </ul>	<p>Indirect costs:</p> <ul style="list-style-type: none"> <li>■ Reduced quality of leisure time due to the disease should be excluded and only be presented in a sensitivity analysis.</li> </ul> <p>Intangible costs:</p> <ul style="list-style-type: none"> <li>■ Costs incurred because of pain and suffering are not included.</li> </ul>	<p>Non-healthcare costs:</p> <ul style="list-style-type: none"> <li>■ Direct non-healthcare costs (costs to other sectors, direct and indirect taxes and transfer payments) are not considered at all.</li> </ul> <p>Indirect costs:</p>

<sup>23</sup> Only costs of resources under the control of the NHS England and Wales and PSS should be considered.

Country	England & Wales [16]	France [17]	Germany [18] [19]	New Zealand [20] [21]
	<ul style="list-style-type: none"> <li>Productivity costs should not be included at all.</li> </ul>			<ul style="list-style-type: none"> <li>Indirect non-healthcare (patient) costs, such as lost productivity, cost of premature mortality, and intangible costs, should not be included at all.</li> <li>Indirect health care costs and future health care costs should not be included at all.</li> </ul>
Modelling	Yes, to extrapolate costs and health benefits over an extended time horizon.	Yes, to meet certain methodological requirements such as the inclusion of all available scientific data in the analysis, the comparison of all relevant options, data extrapolation over time, and the exploration of uncertainty.	Yes, a decision-analytic model is usually developed as individual clinical studies rarely contain all the information needed to conduct an HEE.	Yes, to extrapolate from available data to best inform decision making at a particular point in time.
Time horizon	The time horizon for estimating clinical effectiveness and value for money should be long enough to reflect all important differences in costs or outcomes between the technologies being compared <sup>24</sup> .	The choice of the time horizon (lifetime or specific time horizon) should balance capturing all relevant differences in costs and health effects against the uncertainty generated by extrapolation over time when this is necessary.	Depending on the research question or commission, the available evidence and the perspective of the decision-maker, an appropriate time horizon is chosen that is sufficient to depict all relevant medical and economic consequences.	Long enough to capture all the major clinical and economic outcomes of the alternatives under assessment.
Discount rate (Base-case)	Costs and outcomes: 3.5%	Costs and outcomes: <ul style="list-style-type: none"> <li>2.5% for time horizons ≤ 30 years</li> <li>1.5% for time horizons &gt; 30 years</li> </ul>	Costs and outcomes: 3% for costs and benefits that last longer than 1 year	Cost and outcomes: 3.5%
Sensitivity/Uncertainty analysis <sup>25</sup>	Yes <ul style="list-style-type: none"> <li>One- or multi-way deterministic sensitivity analyses</li> <li>One- or multi-way probabilistic sensitivity analyses</li> <li>Scenario analyses<sup>26</sup></li> <li>Discount rates: 1.5% for costs and outcomes</li> </ul>	Yes <ul style="list-style-type: none"> <li>One- or multi-way deterministic sensitivity analyses identifying the parameters which have the greatest influence on the results</li> <li>One- or multi-way probabilistic sensitivity analyses</li> <li>Scenario analysis</li> <li>Discount rates: (0%, 4.5%)</li> </ul>	Yes <ul style="list-style-type: none"> <li>One- or multi-way deterministic sensitivity analyses</li> <li>One- or multi-way probabilistic sensitivity analyses</li> <li>Time horizon = 5 years</li> <li>Discount rates: variation between constant identical 0% and 5% for costs and outcomes and costs 3%, benefit 1.5%</li> </ul>	Yes <ul style="list-style-type: none"> <li>One- or multi-way deterministic sensitivity analyses</li> <li>One- or multi-way probabilistic sensitivity analyses</li> <li>Discounting between 0% and 5%</li> </ul>
Budget impact	Yes <ul style="list-style-type: none"> <li>Commissioner or provider perspective</li> <li>Time horizon = 5 years</li> <li>No discounting</li> <li>VAT included in BIA</li> </ul>	Yes <ul style="list-style-type: none"> <li>National health insurance perspective</li> <li>Time horizon between 3 and 5 years</li> <li>No discounting</li> </ul>	Yes <ul style="list-style-type: none"> <li>SHI perspective</li> <li>Guidelines on cost calculation in HEE applies also to BIA</li> <li>2 scenarios (Status quo vs. new intervention scenario)</li> <li>Time horizon = 3 years</li> </ul>	Yes <ul style="list-style-type: none"> <li>Healthcare system perspective (Publicly funded health care payer)</li> <li>Time horizon between 1 and 5 years</li> <li>No discounting</li> </ul>

<sup>24</sup> Many technologies impact costs and outcomes over a patient's lifetime. A lifetime horizon is typically required when treatments affect survival or provide lifelong benefits.

<sup>25</sup> Only parameters affecting the cost or resource component are listed here.

<sup>26</sup> Scenario analysis is a form of multi-way sensitivity analysis that can provide important information about the significance of the overall uncertainty (best case vs. worst case).

Country	Norway [23]	Scotland [24]	The Netherlands [25] [26]	USA [27] [28]
Type <sup>27</sup>	HTAG	HTAG	HEEG + Costing manual	HEEG + BIAG
Stringency/General guideline or submission only	Mandatory guidelines for submissions	Mandatory guideline for submissions.	Mandatory guideline for submission and for pharmacoeconomic assessments by the Dutch National Health Care Institute (Zorginstituut Nederland – ZIN)	Recommendatory guideline used by the ICER and its collaborators
Focus	Pharmaceuticals and medical devices <sup>28</sup>	Pharmaceuticals <sup>29</sup>	All types of health technologies	All types of health technologies
Perspective	Societal perspective	Healthcare system and personal social services perspective <sup>30</sup>	Societal perspective	Healthcare system and modified societal perspective
Analysis	CUA/CMA <sup>31</sup> <ul style="list-style-type: none"> <li>■ Trial-based HEE</li> <li>■ Model-based HEE</li> </ul>	CUA/CMA <sup>31</sup> <ul style="list-style-type: none"> <li>■ Trial-based HEE</li> <li>■ Model-based HEE</li> </ul>	CUA <ul style="list-style-type: none"> <li>■ Trial-based HEE</li> <li>■ Model-based HEE</li> </ul>	CUA <ul style="list-style-type: none"> <li>■ Trial-based HEE<sup>32</sup></li> </ul>
Data sources	Clinical effect: <ul style="list-style-type: none"> <li>■ Systematic reviews and meta-analysis</li> <li>■ RCTs (pref.)</li> <li>■ Observational studies</li> </ul>	Clinical effect: <ul style="list-style-type: none"> <li>■ Systematic reviews and meta-analysis</li> <li>■ RCTs</li> <li>■ Observational studies</li> <li>■ Expert opinion</li> </ul>	Clinical effect: <ul style="list-style-type: none"> <li>■ Systematic review and meta-analysis,</li> <li>■ RCTs (preferred)</li> <li>■ Observational studies</li> <li>■ Indirect comparisons</li> </ul>	Clinical effect: <ul style="list-style-type: none"> <li>■ Systematic reviews and meta-analyses</li> <li>■ RCTs</li> <li>■ Observational studies</li> </ul>
Other data sources	Other sources (esp. modelling): <ul style="list-style-type: none"> <li>■ Electronic health records</li> <li>■ Registries</li> <li>■ Administrative databases</li> </ul>	Other sources (esp. modelling): <ul style="list-style-type: none"> <li>■ Unit Costs of Community Care by Personal Social Services Research Unit</li> <li>■ Administrative databases (National Services Scotland)</li> <li>■ Hospital data</li> <li>■ Primary care databases</li> <li>■ Prescribing databases</li> <li>■ Drug reference databases (British National Formulary and Monthly Index of Medical Specialities)</li> </ul>	Other sources (esp. modelling): <ul style="list-style-type: none"> <li>■ Expert consultation if no other evidence is available</li> <li>■ Registries to check clinical plausibility</li> </ul>	Other sources (esp. modelling): <ul style="list-style-type: none"> <li>■ Administrative and claims databases (Medicare fee schedules, Healthcare Cost and Utilization Project (HCUP) data, commercial claims data)</li> <li>■ Hospital data (HCUP)</li> </ul>

<sup>27</sup> The documents are classified according to the following categories: HEEG (Health Economic Evaluation Guideline), HEEG+BIA (Health Economic Evaluation Guideline including Budget Impact Analysis) if BIA guidance is part of the HEEG or a separate document, HTAG (Health Technology Assessment Guideline) for HTA guidelines, and OTH for other documents. Costing Manuals (CM) are documents specifying the use of resource items and unit costs and are separately reported.

<sup>28</sup> The Norwegian Medicines Agency (NoMA) is the primary body for HTAs of pharmaceuticals – so called Single technology assessments (STAs) for medicinal products. Since January 2024, it also conducts HTAs for medical devices, but only when commissioned by the national New Methods (Nye metode) system. While the HTA process for devices shares core methods with medicinal products, slight differences exist in the submission guidelines, particularly regarding the costing of medical devices including diagnostic products and capital costs.

<sup>29</sup> Scottish Medicine Consortium's (SMC) assessment is limited to Prescription Only Medicines (PoMs). Devices containing medicines that lack marketing authorization by the Medicines and Healthcare products Regulatory Agency (MHRA) are excluded. Further exclusions include public health vaccines, generic medicines, blood products (with specified exceptions), diagnostics.

<sup>30</sup> The perspective on costs is National Health Service (NHS) Scotland and Personal Social Services (PSS) Scotland (social work).

<sup>31</sup> Cost-minimisation analysis is suitable when evidence shows the intervention and comparator have equivalent or non-inferior efficacy and safety.

<sup>32</sup> The focus of the guideline is on model-based HEE.

Country	Norway [23]	Scotland [24]	The Netherlands [25] [26]	USA [27] [28]
Costs included <sup>33</sup> (reference case)	<p>Direct health care costs:</p> <ul style="list-style-type: none"> <li>■ Treatment or prevention costs, paid by the health service or by the patient/caregiver</li> </ul> <p>Direct non-healthcare costs:</p> <ul style="list-style-type: none"> <li>■ Transport costs related to travelling to and from treatment, whether paid by the health service provider or by the patient/caregiver</li> <li>■ Patients and their caregivers use of time during patient treatment</li> </ul>	<p>Direct health care costs<sup>34</sup>:</p> <ul style="list-style-type: none"> <li>■ Costs of all NHS and PSS Scotland resources services</li> <li>■ Medicines</li> <li>■ Staffing and training/education costs</li> <li>■ Capital costs (annuitised)</li> </ul>	<p>Direct health care costs:</p> <ul style="list-style-type: none"> <li>■ All costs directly related to the condition</li> <li>■ All costs incurred during life years gains</li> </ul> <p>Direct non-health care costs:</p> <ul style="list-style-type: none"> <li>■ Travel expenses</li> <li>■ Own contributions</li> <li>■ Time-related costs</li> <li>■ Costs of informal care</li> <li>■ Costs in other sectors outside the healthcare system (municipalities, education, volunteers)</li> </ul> <p>Indirect costs:</p> <ul style="list-style-type: none"> <li>■ Productivity losses: costs of absenteeism or unproductivity during paid work (presenteeism) and unpaid work</li> </ul>	<p>Direct health care costs:</p> <ul style="list-style-type: none"> <li>■ Medical costs (Paid by third-party payers and paid by patients out-of-pocket, future related medical costs, future unrelated medical costs)</li> </ul>
Handling of non-reference case costs excluded in reference case (non-health care, indirect costs, intangible costs)	<p>Indirect costs:</p> <ul style="list-style-type: none"> <li>■ Cost not included at all are productivity changes resulting from the intervention, unrelated health service costs and savings, tax expenses for public financing, public benefits, pension payments, value-added tax, and other transfer payments, future costs: Consequences of patients' future use of public services and receipt of public benefits/pensions.</li> </ul>	<p>Non-healthcare costs and Indirect costs:</p> <ul style="list-style-type: none"> <li>■ In principle, non included, but if non-NHS/PSS costs and impacts are considered using explicit valuation in analyses, they must be reported separately from NHS costs.</li> </ul>		<p>Direct non-healthcare costs are included in supplemental analysis (societal perspective):</p> <ul style="list-style-type: none"> <li>■ Patient time costs</li> <li>■ Unpaid caregiver-time costs</li> <li>■ Transportation costs</li> <li>■ Cost of social services as part of intervention</li> <li>■ Legal/Criminal justice cost (cost of crimes related to intervention)</li> <li>■ Education costs (impact on educational achievement)</li> <li>■ Housing (cost of home improvements, remediation, production of toxic waste pollution by intervention)</li> </ul> <p>Indirect costs are included in supplemental analysis (societal perspective):</p> <ul style="list-style-type: none"> <li>■ Productivity losses (lost earnings, cost of unpaid lost productivity, cost of uncompensated household production)</li> <li>■ Future consumption unrelated to health</li> </ul>
Modelling	Yes, health economic model must allow extrapolation of all relevant scenarios (i.e., adjustability of time horizon, population/subgroups, parametric model for time-to-event data, and all other variables)	Yes, particularly when trial populations differ from real-world NHS patients, intermediate outcomes are used instead of survival/HRQoL, key comparators or subgroups are missing, or long-term effects extend beyond study data.	Yes, if the time horizon of a clinical trial is shorter than the relevant time horizon as defined in the PICOTS scheme, extrapolation techniques must be used.	Yes, the focus of the guideline is on model-based HEE deriving the cost-effectiveness for a lifetime time horizon.

<sup>33</sup> Travel expenses (e.g., fuel, public transport fares) are not payments for medical services or resources consumed by the healthcare system, but rather ancillary expenses incurred by patients to access care. These costs mostly arise outside the formal healthcare sector (e.g., paid to transport providers, not hospitals/clinics) and are borne by patients or families, aligning with the definition of direct non-healthcare costs in standard frameworks like the ISPOR Good Practices for Outcomes Research and WHO guidelines [14].

<sup>34</sup> Only costs of resources under the control of the NHS Scotland and PSS Scotland should be considered.

Country	Norway [23]	Scotland [24]	The Netherlands [25] [26]	USA [27] [28]
Time horizon	The time horizon should be long enough to capture all key cost and health outcome differences between alternatives. If the treatment affects mortality, it should cover the patient's lifetime.	The time horizon should be sufficient to reflect important cost and benefit differences between the medicines being compared.	The time horizon of an economic evaluation must be long enough to cover all relevant costs and effects. A model-based economic evaluation is frequently undertaken in the case of life-prolonging care interventions, then the time horizon is lifelong.	Lifetime (default), if shorter, should be long enough to capture all relevant differences in future costs and outcomes associated with treatments being compared, and rationale for shorter should be stated.
Discount rate (Base-case)	Cost and outcomes: <ul style="list-style-type: none"> <li>■ 4% for the first 40 years</li> <li>■ 3% for the next 35 years</li> <li>■ 2% thereafter</li> </ul>	Cost and outcomes: 3.5%	Cost: 3% Outcomes: 1.5%	Cost and outcomes: 3%
Sensitivity/Uncertainty analysis <sup>35</sup>	Yes: <ul style="list-style-type: none"> <li>■ One- or multi-way deterministic sensitivity analyses</li> <li>■ One- or multi-way probabilistic sensitivity analyses</li> </ul>	Yes: <ul style="list-style-type: none"> <li>■ One- or multi-way deterministic sensitivity analyses</li> <li>■ One- or multi-way probabilistic sensitivity analyses (optional)</li> <li>■ Discount rate: variation between 0% and 6%.</li> </ul>	Yes: <ul style="list-style-type: none"> <li>■ One- or multi-way deterministic sensitivity analyses</li> <li>■ One- or multi-way probabilistic sensitivity analyses (optional)</li> <li>■ Scenario analysis (no discounting, healthcare system/payer perspective, different sources for input parameters etc.)</li> <li>■ Value of information analysis (VOI): quantifying the uncertainty</li> </ul>	Yes: <ul style="list-style-type: none"> <li>■ One-way deterministic sensitivity analyses</li> <li>■ Probabilistic sensitivity analyses</li> <li>■ Threshold analysis (\$50,000-200,000 per evLYG/QALY)</li> <li>■ Scenario analysis (Stratified subgroups analysis, societal perspective, time horizons, etc.)</li> </ul>
Budget impact	Yes <ul style="list-style-type: none"> <li>■ National Insurance Scheme or Regional Health Authorities perspective</li> <li>■ Time horizon = 5 years</li> <li>■ No discounting</li> </ul>	Yes <ul style="list-style-type: none"> <li>■ Healthcare system and personal social services perspective</li> <li>■ Time horizon = 3 years</li> <li>■ No discounting</li> <li>■ VAT included in BIA</li> </ul>	Unclear <sup>36</sup>	Yes <ul style="list-style-type: none"> <li>■ Healthcare system perspective</li> <li>■ Time horizon = 5 years</li> <li>■ No discounting</li> </ul>

<sup>35</sup> Only parameters affecting the cost or resource component are listed here.

<sup>36</sup> The role of BIA is not yet fully established in the Netherlands [29].

## Extraction categories for the costing process

Domain	Australia [1]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark <sup>37</sup> [9] [10] [11] [12]
Costing approach and Identification of resources				
Costing approach <sup>38,39,40</sup>	<p>The approaches are not explicitly reported but opportunity cost approximation with a focus on change in resource use/provision including wastage using...</p> <ul style="list-style-type: none"> <li>■ Top-down macro-costing (not explicitly mentioned) for hospital services (episodes, events) in the National Hospital Cost Data Collection (NHCDC) [30]. (preferred approach)</li> <li>■ Bottom-up micro-costing (not explicitly mentioned) for specific items (pharmaceuticals, healthcare services, medical devices).</li> <li>■ Top-down micro-costing (not explicitly mentioned) for some further services (transport via ambulance).</li> </ul>	<p>The opportunity cost approximation is done using...</p> <ul style="list-style-type: none"> <li>■ Top-down macro-costing for healthcare services, pharmaceuticals, medical devices, and hospital services (tariffs, fees, and per diem prices from the National Institute for Health and Disability Insurance reimbursement schemes – RIZIV-INAMI<sup>41</sup>) (primary approach)</li> <li>■ Bottom-up micro-costing for cost components highly influential on the incremental cost-effectiveness ratio (ICER) and for which standard tariffs may not accurately reflect resource use (e.g., novel surgical procedures)</li> </ul>	<p>The approaches are not explicitly reported but opportunity cost approximation via a pragmatic and flexible approach that is fit for purpose and aligned with the perspective of the analysis using...</p> <ul style="list-style-type: none"> <li>■ Top-down macro-costing for broader healthcare such as outpatient healthcare services, (already covered) pharmaceuticals and medical devices and specifically for hospital services by allocating hospital expenditures to case-mix groups (CMGs).</li> <li>■ Bottom-up micro-costing for services that need high precision (novel pharmaceuticals and medical devices, complex procedures) and for individual patient-level services.</li> </ul>	<p>The approaches are not explicitly reported but opportunity cost approximation with a focus on change in resource use including wastage by a hierarchical and pragmatic hybrid approach using...</p> <ul style="list-style-type: none"> <li>■ Top-down macro-costing for hospital services by DRG tariffs, (primary) healthcare services with Danish Ambulatory Grouping System (DAGS) tariffs or official (negotiated) tariffs, and pharmaceuticals (preferred approach).</li> <li>■ Bottom-up micro-costing<sup>42</sup> is used when the specific resource use is not covered by standard tariffs (novel pharmaceuticals) or the costs are too imprecise not covered by DRG/DAGS tariffs.</li> </ul>
Identification <sup>43</sup> of resources	<ul style="list-style-type: none"> <li>■ Reference case (base case) should include only direct healthcare resources/costs from a healthcare system perspective<sup>44</sup>.</li> <li>■ Incremental cost focus (omit resources if costs are trivial or cancel out) in within-trial analyses: Identify healthcare resources with changed utilisation when substituting the intervention for the comparator.</li> </ul>	<ul style="list-style-type: none"> <li>■ Reference case (base case) should include only direct healthcare resources/costs from a healthcare system perspective.</li> </ul>	<ul style="list-style-type: none"> <li>■ Reference case (base case) should include all relevant resources, activities, and costs along the clinical or care pathway (prevention/diagnosis/treatment) for the health condition based on the perspective of the publicly funded healthcare payer.</li> <li>■ Incremental cost focus (omit resources if costs are trivial or cancel out) and estimates of net monetary benefit may also be provided.</li> </ul>	<ul style="list-style-type: none"> <li>■ Reference case (base case) should include directly relevant resources from a (limited<sup>46</sup>) societal perspective linked to the analysed pharmaceuticals</li> <li>■ Incremental cost focus (CMA in case of outcome indifference) as introduction leads to a change in resource use.</li> <li>■ BIA should follow either an epidemiological approach or a market-share approach to derive the potential population.</li> </ul>

<sup>37</sup> The costing aspects of the DMC's and the DHTC's and guidelines were combined due to the marginal differences.

<sup>38</sup> The costing approach informs the entire costing process – all three stages – and is not limited solely to the step of resource valuation.

<sup>39</sup> In health economic evaluations (HEE) and budget impact analyses (BIA), opportunity costs are approximated using market prices or financial cost data (e.g., reimbursement tariffs like Belgian hospital per diem prices). Micro-costing is used only if more appropriate. If official tariffs or prices are unavailable, estimate plausible costs from manufacturer input, protocols, comparable interventions, literature, (activity-based) micro- or macro-costing, administrative data, etc. [4].

<sup>40</sup> In HEE, identical resource use (consumption) is typically excluded if justified (e.g., omitting identical surgery costs for stent comparisons) and documented. The focus in HEE is on the incremental impact. In BIA, all costs are usually included for accurate financial planning. Some HEEG specify whether a provision or consumption focus is used.

<sup>41</sup> RIZIV-INAMI sets and publishes tariffs for medical treatments and services that are partly or wholly reimbursed by compulsory health insurance in Belgium.

<sup>42</sup> For precise economic impacts (e.g., drug-reduced hospitalisations), average cost proxies may lack precision and should be supplemented with micro-costing of individual service components [9].

<sup>43</sup> Identification means determining which resources are consumed or targeted for costing (e.g., types of services, drugs, or procedures) from a specific perspective.

<sup>44</sup> To reflect a broader societal perspective, a supplementary analysis incorporating impacts beyond the healthcare system can be presented in addition to the reference case analysis.

<sup>46</sup> Limited means that the focus is only on direct costs.

Domain	Australia [1]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark <sup>37</sup> [9] [10] [11] [12]
	<ul style="list-style-type: none"> <li>■ BIA should follow an epidemiological<sup>45</sup> approach (preferred) or a market-share approach to derive the potential population.</li> </ul>	<ul style="list-style-type: none"> <li>■ Incremental cost focus (omit resources if costs are trivial or cancel out): Captures all differential costs/savings vs. comparator(s), including Intervention costs (e.g., diagnostics, preparatory tests), short-term (monitoring, follow-up) and long-term effects (reinterventions, complications), and cross-condition impacts (e.g., avoided adverse events).</li> <li>■ BIA should follow an epidemiological approach as foundation dynamically adjusted using market share assumptions to derive the potential population.</li> </ul>	<ul style="list-style-type: none"> <li>■ BIA should follow an epidemiological approach (preferred) or a market-share approach to derive the potential population.</li> </ul>	
Measurement <sup>47</sup> of resources				
Data sources <sup>48</sup>	<ul style="list-style-type: none"> <li>■ The Pharmaceutical Benefits Advisory Committee (PBAC) strongly prefers clinical and economic evaluations that are based on (resource) data from direct randomised trials, but extrapolations are conducted to model beyond available direct evidence.</li> <li>■ Expert opinions, Australian-specific epidemiological studies and disease registries can supplement randomised or nonrandomised trial data (e.g., input parameters)<sup>49</sup>.</li> <li>■ Non-Australian data/literature on resource use must be validated by experts.</li> </ul>	<ul style="list-style-type: none"> <li>■ The Belgian Health Care Knowledge Centre (KCE) prefers systematic reviews of the relevant clinical and economic literature for comparative effectiveness and input parameters for economic models.</li> <li>■ Resource data should be sourced from clinical trials, national (administrative) databases<sup>50</sup>, patient charts or validated sources.</li> <li>■ Expert opinion/panels should only complement preferred sources<sup>49</sup>.</li> <li>■ Non-Belgian data and literature is validated for the Belgian context (process described in submission).</li> </ul>	<ul style="list-style-type: none"> <li>■ The Canadian Agency for Drugs and Technologies in Health (CADTH) primarily prefers RCTs and observational studies to inform clinical effectiveness.</li> <li>■ Canadian real-world data (administrative databases, claim data, hospital records) should be used for non-protocol resource measurement, but RCTs (clinical effects/resource use) may also capture protocol-driven resource use<sup>51</sup>.</li> <li>■ Expert opinion and surveys supplement analysis in the absence of sufficient data for informing parameter estimates data (e.g., input parameters).</li> <li>■ Product monographs, clinical practice guidelines, and the World Health Organisation (WHO) Defined Daily Dose (DDD) are also a recognised source to define the unit of measurement [38].</li> </ul>	<ul style="list-style-type: none"> <li>■ The Danish ministry of health, Danish Medicines Council (DMC) and the Danish Medicines Agency (DMA) prefer RCTs and meta-analysis to evaluate evidence of effectiveness and resource data should be sourced from the underlying clinical studies, real-world data, expert assessments, or a combination thereof.</li> <li>■ Resource data on non-Danish treatment practice must be discussed and replaced with Danish data to adapt to Danish conditions.</li> </ul>

<sup>45</sup> A standardised Excel workbook for use with the epidemiological approach is available on the PBAC guidelines website.

<sup>47</sup> Measurement means quantifying the amount/frequency of resources used (e.g., number of hospital days, drug doses).

<sup>48</sup> The Data sources domain serves to identify the origin of resources and provide information on their valuation. Note that sources for resource use and pricing data are frequently intertwined and not fully disentangled. The specific methodologies and sources for valuation are elaborated in the General principles of valuation section and are further detailed within each service domain (e.g., healthcare, hospital services).

<sup>49</sup> The Australian [2], Belgian [31], Canadian [6], English & Welsh [16], French [17], Scottish guidelines specify conditions for expert panel use in resource measurement (e.g., expert selection criteria or the detailed method to collect the expert opinions)..

<sup>50</sup> The Belgian HEEG provides an overview of all Belgian national databases for the measurement and valuation of resource use including information on accessibility. RIZIV-INAMI schedules for reimbursement tariffs, per diem prices, pharmaceutical and devices (publicly available) [32], Farmanet/Pharmanet as part of RIZIV-INAMI provides pharmaceutical reimbursement data (restricted access) [33], Technical Unit for the processing of data relating to hospitals (TCT) collects linked hospital clinical and billing data (restricted access) [34], InterMutualist Agency (IMA- AIM) collects individual reimbursement data (e.g., billing data) for insured patients (restricted access) [35], Minimum Hospital Data (MZG-RHM) by the Federal Public Service (FPS) Health, Food Chain Safety and Environment collects hospital discharge data (restricted access) [36], the Belgian Centre for Pharmacotherapeutic Information (BCFI-CBIP) provides drug prices for reimbursed and over-the-counter (OTC) drugs (publicly available) [37].

<sup>51</sup> RCTs and observational studies primarily inform clinical effectiveness but are also used for resource measurement, alongside administrative databases (claims/hospital records), surveys, and expert inputs. However, protocol-driven resource use in studies may not reflect Canadian practice and should be replaced with real-world data if mismatched.

Domain	Australia [1]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark <sup>37</sup> [9] [10] [11] [12]
Cost units	<p>Cost units:</p> <ul style="list-style-type: none"> <li>■ General: Natural units</li> <li>■ Healthcare services: Cost per service provided by medical or allied health practitioner or diagnostic/ investigational service (e.g., consultation, diagnostic test etc.)</li> <li>■ Pharmaceuticals: (Medicine and Comparator): Quantity of medicine dispensed</li> <li>■ Hospital services (Hospital admission): Episode of care.</li> <li>■ Other cost units: Cost per day/Aged Care Funding Instrument (ACFI) category (residential care), cost per day (Home care), cost per hour (Home nursing), Cost per trip (Transport e.g., ambulance services).</li> </ul>	<p>Cost units:</p> <ul style="list-style-type: none"> <li>■ General: Natural units</li> <li>■ Healthcare services: Cost per consultation, cost per test, cost per session.</li> <li>■ Pharmaceuticals: Cost per unit, cost per pack, cost per treatment cycle.</li> <li>■ Medical devices: Cost per device, cost per procedure.</li> <li>■ Hospital services: cost per day, cost per stay, cost per procedure.</li> <li>■ Other cost units: not reported.</li> </ul>	<p>Cost units:</p> <ul style="list-style-type: none"> <li>■ General: Natural units</li> <li>■ Healthcare services: Cost per visit, per consultation, per hour of service.</li> <li>■ Pharmaceuticals: Cost per unit (per tablet, per vial) or per defined course of therapy.</li> <li>■ Medical devices: Cost per device.</li> <li>■ Hospital services: Cost per case via case mix groups (CMG), per diem, per procedure.</li> <li>■ Residential care: Cost per day using Resource Utilisation Groups (RUG-III) with each group having a Case Mix Index (CMI<sup>52</sup>)</li> <li>■ Other cost units: cost per kilometre (travel/transport), time-based units, e.g., cost per hour of lost time (productivity), cost per hour for training time, equipment runtime, maintenance and repair time (e.g. for radiology services).</li> </ul>	<p>Cost units:</p> <ul style="list-style-type: none"> <li>■ General: Natural units</li> <li>■ Healthcare services: Cost per consultation/visit, per outpatient visit.</li> <li>■ Pharmaceuticals: Cost per unit tablet, cost per vial, cost per patient.</li> <li>■ Hospital services: Cost per admission, per procedure</li> <li>■ Medical devices: Cost per device unit or per use (amortised over expected usage) but medical device costs are included in the hospital care costs.</li> <li>■ Other cost units: time-based units, e.g., cost per hour (Transport/Travel, Home care, home nursing).</li> </ul>
Data Quality & Analysis	<ul style="list-style-type: none"> <li>■ Not reported</li> </ul>	<p>Data Quality &amp; Analysis:</p> <ul style="list-style-type: none"> <li>■ Database and source reliability must be verified (e.g., intervention identification, detail level).</li> <li>■ Acknowledge limitations (e.g., cross-sectional data, registration gaps) and discuss impact on cost estimates.</li> <li>■ Describe methods to handle missing data, especially in longitudinal studies (proportion, reasons, and imputation techniques).</li> </ul>	<p>Data Quality &amp; Analysis:</p> <ul style="list-style-type: none"> <li>■ Avoid double-counting (natural/time-based units vs. bundled units).</li> <li>■ Qualitative assessment (credibility, validity, consistency) of the data sources, model structure, (cost) parameters, and assumptions is conducted during conceptualisation and documented in a technical appendix.</li> <li>■ Acknowledge limited information on parameter estimates via uncertainty analysis.</li> </ul>	<p>Data Quality &amp; Analysis:</p> <ul style="list-style-type: none"> <li>■ Parameter choices (input data) and assumptions must be described and justified including disclosure of sources.</li> </ul>
Valuation of resources				
General principles	<p>General principles:</p> <ul style="list-style-type: none"> <li>■ Cross-references to prices and price calculations for distinct categories (medicines, medical services, hospital services, community-based services) are listed in the Manual of resource items [1] with associated unit costs.</li> </ul>	<p>General principles<sup>56</sup>:</p> <ul style="list-style-type: none"> <li>■ Standard reimbursement tariffs by the RIZIV-INAMI should be used, not categories like RVV-BIM<sup>57</sup> unless justified (e.g., targeted populations) [32].</li> <li>■ Belgian market prices for marketed products are preferred.</li> </ul>	<p>General principles<sup>59</sup>:</p>	<p>General principles</p> <ul style="list-style-type: none"> <li>■ Unit costs should reflect market prices excluding VAT or Danish (unit) costs (tariffs, fees, or average production costs) to the greatest extent possible (any deviation must be justified)</li> </ul>

<sup>52</sup> CMI reflects the within group complexity/resource use and RUG reflects between-group complexity/resource use.

<sup>56</sup> The Belgian Manual for Cost-Based Pricing of Hospital Interventions provides calculation examples for all relevant costing and resource domains [5].

<sup>57</sup> The Rechthebbende op Verhoogde Verzekeringstegemoetkoming – Bénéficiaire de l'Intervention Majorée (RVV-BIM)<sup>57</sup> is a Belgian enhanced reimbursement status for vulnerable populations under compulsory health insurance. It provides higher healthcare cost coverage (e.g., reduced copayments) to low-income individuals, retirees with small pensions, disabled persons, and other qualifying groups.

<sup>59</sup> The Canadian Guidance Document for Costing provides calculation examples for all relevant resource domains [8].

Domain	Australia [1]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark <sup>37</sup> [9] [10] [11] [12]
	<ul style="list-style-type: none"> <li>■ The Medicine Benefits Schedule (MBS)<sup>53</sup> covers fees for outpatient and community-based medical services including OOP fees and should be used to determine unit costs.</li> <li>■ The Public Benefit Scheme (PBS) Therapeutic Relativity Sheet<sup>54</sup> ensures compared medicines with similar therapeutic effects have comparable costs.</li> <li>■ Comparator costs must be specified with confidential pricing arrangement using the DPMQ or DPMA<sup>55</sup>.</li> <li>■ Expression of costs in values closest to submission date is required (use Australian price index published by the Australian Institute of Health and Welfare).</li> <li>■ Foreign cost adjustment: Exchange rate comparability must be justified.</li> </ul>	<ul style="list-style-type: none"> <li>■ If the intervention has no official market price, cost estimates using manufacturer input, treatment protocols, similar interventions, literature, or administrative data should be used.</li> <li>■ Expression of costs in the current year's values is required (use Harmonised Index of Consumer Prices (HICP)<sup>58</sup> with exceptions (e.g., non-indexed drug prices).</li> <li>■ Foreign cost adjustment: Adjustment of the foreign cost for inflation (using the foreign country's CPI, with HICP preferred) and then conversion to Euros using OECD PPP data. Validity and sensitivity analysis to check relevance for the Belgium context is necessary.</li> </ul>	<ul style="list-style-type: none"> <li>■ Federal fees and prices listed in schedules and formularies of Canadian ministries of health (e.g., British Columbia MSP Payment Schedule [42], Alberta Health: Medical price list [43]) or provincial lists of covered medications<sup>60</sup> should be used to value health care services and goods from a public payer perspective.</li> <li>■ In other instances, total average costs (including capital and allocated overhead costs) may be relevant.</li> <li>■ Copayments/OOP payments only included in a societal perspective analysis (non-reference case).</li> <li>■ Jurisdiction-specific data for local perspectives or national representative averages, with regional variations tested in sensitivity analyses</li> <li>■ Expression of inflation-adjust historical costs (CPI-adjustment).</li> <li>■ Foreign cost adjustment: Use of international costs or prices are not recommended but may be evaluated in sensitivity analyses.</li> </ul>	<ul style="list-style-type: none"> <li>■ DMC provides a catalogue of unit costs, methods for valuing unit costs<sup>61</sup> and references to sources [12] (only available in Danish)</li> <li>■ Expression of inflation-adjust historical costs (CPI-adjustment).</li> <li>■ Foreign cost adjustment: PPP-adjustment and conversion by adequate exchange rates from the Central Bank of Denmark.</li> </ul>
Future cost (changes)	<p>Future cost (changes):</p> <ul style="list-style-type: none"> <li>■ Future costs are not reported only that current costs (actual situation, no future inflation) must be used.</li> </ul>	<p>Future cost (changes):</p> <ul style="list-style-type: none"> <li>■ Current costs (actual situation, no future inflation) must be used.</li> <li>■ Potential future reductions (e.g., generics/biosimilars post-patent expiry, learning/scale effects) should be included only if evidence exists (otherwise, test in sensitivity analysis).</li> </ul>	<p>Future cost (changes):</p> <ul style="list-style-type: none"> <li>■ Future costs should be included for clinical, or care pathways with resource-intensive health states, or events that occur over long periods.</li> </ul>	<p>Future cost (changes):</p> <ul style="list-style-type: none"> <li>■ Future costs from extended lifespan should be included only for treatment-related expenses (e.g., drugs, hospitalisations).</li> </ul>

<sup>53</sup> The Medical Benefits Scheme (MBS) is the official schedule of government-subsidized medical services. It provides the standard unit costs (Schedule Fees) for health economic evaluations in PBAC submissions, representing the government benefit, not the provider's actual cost. [39]. It excludes inpatient hospital services unit costs, which are covered in the National Hospital Cost Data Collection (NHCCDC). In turn, the Medical Costs Finder (MCF) is a government transparency tool that uses MBS item codes to display real-market pricing for outpatient services and community-based medical services (e.g., GP visits, diagnostics), including hospital outpatient care (e.g., specialist consults). The MCF uses the MBS item classifications and lists schedule fees, the benefit paid by Medicare (MBS fees) (~85-100% of the actual schedule fee), out-of-pocket (OOP) payments by patients (any gap above the paid benefit), and a short description of the MBS item number [40]. The MCF is generally not used for formal HEE in PBAC submissions.

<sup>54</sup> The PBS Therapeutic Relativity Sheet aligns prices for therapeutically equivalent medicines to ensure cost neutrality. It identifies special pricing arrangements (e.g., confidential discounts) and applies to PBS-listed drugs with comparable clinical effects [41].

<sup>55</sup> Dispensed Price for Maximum Quantity (DPMQ) is the price reimbursed for a medicine's standard pack size under the PBS (DPMQ = Approved ex-manufacturer price (AEMP) + Wholesale Mark-Up + Pharmacy Mark-Up + Dispensing Fee). Dispensed Price for Maximum Amount (DPMA) applies to variable-dose therapies (e.g., infusions) and is based on the cheapest vial combination plus applicable fees (DPMA = (AEMP x Vials) + Mark-Ups + Preparation Fees).

<sup>58</sup> The HICP (Harmonised Index of Consumer Prices) is a standardised EU measure for comparing inflation across member states, with methodology and expenditure rules defined by European regulations.

<sup>60</sup> Provincial/territorial ministries publish annual fee schedules and drug formularies (e.g., Ontario Drug Benefit Formulary, Saskatchewan Drug Formulary, or British Columbia PharmaCare), though some require direct access. Alternative Payment Plans (ARPs) for delivering specific program services supplement fee-for-service models but often require institutional access for details [8].

<sup>61</sup> The catalogue guides all costing and resource domains, though alternatives may be used with justification [12].

Domain	Australia [1]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark <sup>37</sup> [9] [10] [11] [12]
		<ul style="list-style-type: none"> <li>Discontinued resources (e.g., training, equipment): Compare scenarios with/without these costs.</li> </ul>	<ul style="list-style-type: none"> <li>Consider dynamic relationships between resource volumes and unit costs (e.g., lowering of doses may result in savings).</li> </ul>	
Healthcare services <sup>62</sup>	<p>Healthcare services:</p> <ul style="list-style-type: none"> <li>MBS lists unit costs for outpatient and community-based medical services and hospital outpatient care (diagnostics, imaging, allied health, dental, nursing)<sup>53</sup>.</li> </ul>	<p>Healthcare services:</p> <ul style="list-style-type: none"> <li>Standard tariffs for ambulatory/hospital outpatient unit costs from the RIZIV-INAMI reimbursement scheme for regularly insured patients should be used.</li> <li>Additional charges (e.g., private room supplements) must be excluded, unless justified.</li> </ul>	<p>Healthcare services:</p> <ul style="list-style-type: none"> <li>Physician services: Provincial fee-for-service (FFS) schedules for physician services should be the primary data source for unit costs (e.g., Alberta Medical price list [43], British Columbia MSP Payment Schedule [42], Manitoba Physician Manual [44])</li> <li>For non-FFS (e.g., salaried physicians), fees from the FFS schedules may serve as a proxy and for ARPs published ARP cost data should be used for unit costs.</li> <li>For diagnostic and investigational services: provincial FFS schedules (e.g., Alberta Medical price list [43], British Columbia MSP Payment Schedule [42], Manitoba Physician Manual [44]) and specific schedule of benefits (e.g., Ontario Schedule of benefits for laboratory services [45]) should be used for cost approximation.</li> <li>Radiology: time-based valuation (equipment, technicians, physicians)</li> <li>Laboratory tests: Cost distinction between single-and panel-testing; fees for point-of-care (POC) devices may be not publicly available.</li> <li>Medical devices: Manufacturer/purchaser quotes (list prices vs. negotiated discounts)</li> <li>Non-physician professional services (community and facility): Specific provincial fee lists (Ontario chiropractic fee schedule [46], Dental fee guide [47] etc.) for government-covered services (may neglect copayments/OOP payments) should be used.</li> </ul>	<p>Healthcare services:</p> <ul style="list-style-type: none"> <li>For consumption in the primary sector, the basis for unit costs should be agreements on consultation/procedure tariffs by the Danish Regions and the relevant negotiating partner PLO-RLTN collective agreement for GPs [48], FAS-RLTN<sup>63</sup> collective agreement for 15 specialties [49].</li> <li>Basic GP tariffs (non-service-specific) are excluded.</li> <li>Specialist tariffs include consultations, procedures, lab tests (uniform across specialties).</li> </ul>

<sup>62</sup> The healthcare services domain primarily covers physician services (e.g., family doctors, specialists) and outpatient diagnostics/investigational services, such as imaging procedures, laboratory and pathology tests. Non-physician services are included also under the health care services domain unless addressing specialised domains (e.g., residential care, home nursing, transport) requiring a distinct valuation with more scrutiny compared to standard health care services.

<sup>63</sup> PLO = Praksislægernes Organisation (General Practitioners' Organization/Denmark's union for self-employed GPs). RLTN = Regionernes Lønnings- og Takstnævn (Regional Wage and Tariff Board/Sets fees and salaries for public healthcare providers). FAS = Foreningen af Speciallæger (Association of Specialist Physicians/Denmark's union for medical specialists). RLTN = Regionernes Lønnings- og Takstnævn (Regional Wage and Tariff Board/Government body setting fees for public healthcare).

Domain	Australia [1]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark <sup>37</sup> [9] [10] [11] [12]
			<ul style="list-style-type: none"> <li>■ If fee schedules are unavailable, then time-based costing is used using public-sector hourly wages or collective agreements (e.g., nursing services).</li> </ul>	
Pharmaceuticals <sup>64</sup>	<p>Pharmaceuticals:</p> <ul style="list-style-type: none"> <li>■ Category includes medicines, medicinal preparations, vaccines but does not include medicines/medicinal preparations prescribed in an inpatient setting and prices vary by dispensing setting.</li> <li>■ Prices/Rates are available on the PBS website: A-Z medicine listing or in the Schedule of Pharmaceutical Benefits (updated annually).</li> <li>■ Calculations should include wastage (e.g., broken packs, unused vials etc.).</li> <li>■ Community pharmacy: DPMQ = AEMP + tiered wholesale mark-up + AHI fee + dispensing fees<sup>65</sup>.</li> <li>■ Private Hospital: DPMQ = AEMP + flat mark-ups + dispensing fees.</li> <li>■ Public Hospital: DPMQ = AEMP + wholesale mark-up (no other fees).</li> <li>■ S100 Highly specialised drugs: DPMQ = AEMP + four-tier pharmacy mark-up + dispensing fees.</li> <li>■ s100 Chemotherapy (EFC): Cheapest vial combo (AEMP + per-vial mark-up) + preparation/diluent fees.</li> <li>■ s100 IVF/Growth hormone: DPMQ = AEMP + four-tier pharmacy mark-up.</li> <li>■ s100 Opiate: AEMP only.</li> <li>■ s100 Botulinum Toxin: AEMP + four-tier pharmacy mark-up.</li> <li>■ National Immunisation Program (Vaccines): AEMP only (no mark-ups or fees).</li> </ul>	<p>Pharmaceuticals:</p> <ul style="list-style-type: none"> <li>■ Prices for reimbursed drugs (reimbursement basis + patient share) from RIZIV-INAMI (Farmanet) should be used, i.e. the lowest-priced product (even if rarely used) for generics or reference-priced drugs.</li> <li>■ Prices from Belgian Centre for Pharmacotherapeutic Information (BCFI) should be used for non-reimbursed pharmaceuticals including OTC drugs.</li> <li>■ For follow-up treatments real-world data, e.g., IMA-AIM<sup>66</sup> data should be used and in simulated scenarios, generic costs.</li> <li>■ Confidential (unknown) discounts: For the intervention under assessment, the list price in the reference case should be used (analysis with hypothetical discounts for drugs under managed entry agreements (MEAs) should be explored in scenario/ sensitivity analyses<sup>67</sup>).</li> <li>■ Wastage costs (e.g., unused doses, non-compliance) must be considered in the reference case.</li> <li>■ If real-world compliance differs from trials, adjustment of both costs and effects in scenario analyses (not just costs) is necessary.</li> </ul>	<p>Pharmaceuticals:</p> <ul style="list-style-type: none"> <li>■ Pharmaceuticals<sup>68</sup> include prescription drugs, OTC drugs, drug delivery devices /monitoring tools, and drug administration costs.</li> <li>■ Prescription drugs: For prescription drugs searchable public provincial lists of covered medications with price information excluding confidential rebates should be used (Ontario Drug Benefit Formulary [51], Saskatchewan Drug Formulary [52], or British Columbia PharmaCare [53]).</li> <li>■ Dispensing fees, markups (varies by province: Markup Policies), copayments, potential payment schemes/rebates must be considered via sensitivity analysis including a national analyses accounting for weighted averages.</li> <li>■ OTC drugs: Retail prices or public provincial lists of covered medications (Ontario Drug Benefit Formulary [51], Saskatchewan Drug Formulary [52], or British Columbia PharmaCare [53]) should be used.</li> <li>■ Consider price variation between/within jurisdictions and generic alternatives.</li> <li>■ Drug Devices/Monitoring<sup>69</sup>: Retail prices, drug manufacturer programme costs<sup>70</sup>, or public provincial lists of covered medications (Ontario Drug Benefit Formulary [51], Saskatchewan Drug Formulary [52], or British Columbia PharmaCare [53]) should be used.</li> </ul>	<p>Pharmaceuticals:</p> <ul style="list-style-type: none"> <li>■ Pharmacy purchase price (AIP) including waste and administration costs should be used as a basis for unit costs.</li> <li>■ Data for pharmaceuticals can be found at Medicinpriser.dk by the DMC [55].</li> <li>■ Additional investment costs required for implementation are not included in the AIP rates (e.g., specialised database setup) and must be identified and included separately.</li> <li>■ For medicines that the patient buys themselves (OOP) at the pharmacy, the dispensing price (including pharmacy retail price and a dispensing fee) must be used (not for BIA).</li> </ul>

<sup>64</sup> If explicitly reported in guidelines, pharmaceutical dispensing and administration costs are included in the Pharmaceuticals domain; otherwise, they may be included in Healthcare or Hospital services unit costs.

<sup>65</sup> AHI stands for Administration, Handling and Infrastructure. Actual dispensing fees are setting-dependent but comprise of ready-prepared fee, extemporaneously prepared fee, dangerous medicine fee, or wastage fee. For public hospitals only the preparation fee is attributed as a cost in most of the cases. A list of dispensing fees is available on the PBS website [50].

<sup>66</sup> The IMA aggregates patient data from Belgium's seven mutual insurers into a unified database. It includes demographic, socio-economic, and billing details for all residents under compulsory health insurance. For each reimbursed service, IMA records the procedure code, date, location, and cost from provider claims [35].

<sup>67</sup> Confidential (unknown) discounts may skew evaluations – e.g., a € 150,000 list-price comparator could cost € 75,000 net, misleading cost comparisons. For the intervention, use list prices (pre-reimbursement discounts are unknown) and test hypothetical discounts in sensitivity analyses [4].

<sup>68</sup> Applies to outpatient drug administration costs only; inpatient drug costs are addressed under hospital services. Pharmaceutical costs in the hospital setting often require estimation (public prices as proxy).

<sup>69</sup> Drug (delivery) devices include insulin pens, nebuliser units, syringes, and blood glucose indicator tests.

<sup>70</sup> In some cases, the drug manufacturer will provide the device, tool, or system free of charge or at a reduced rate [8].

Domain	Australia [1]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark <sup>37</sup> [9] [10] [11] [12]
	<p>Comparator and co-prescribed medicines or medicinal preparations:</p> <ul style="list-style-type: none"> <li>Standard PBS-Listed Medicines (non-s100 EFC): DPMQ + premiums (from current schedule)</li> <li>s100 EFC: Use DPMA (adjusted for average patient dose; trial data-supported)</li> <li>Medicines provided in multiple settings: Weighted average price = [(Public volume x DPMQ) + (Private volume x DPMQ)] / Total volume</li> <li>Over-the-counter (OTC) medicines: Manufacturer's retail price (use PBS price if dual-listed).</li> <li>Delivery systems (e.g., insulin pens): Average consumer price</li> </ul>		<ul style="list-style-type: none"> <li>Drug administration costs: Provincial fee schedules (e.g., Saskatchewan Medical Association fee guide [54]), separate professional and facility fees should be used.</li> </ul>	
Medical devices	<p>Medical devices:</p> <ul style="list-style-type: none"> <li>Medical devices are not part of evaluations for the PBS.</li> </ul>	<p>Medical devices:</p> <ul style="list-style-type: none"> <li>Information for reimbursed implants and medical devices (reimbursement basis + patient shares, prices) should be used from RIZIV-INAMI or RIZIV-INAMI database of implants and invasive medical devices (SIMPL) [56].</li> </ul>	<p>Medical devices:</p> <ul style="list-style-type: none"> <li>Medical devices included in healthcare and hospital services costing domains<sup>71</sup>.</li> </ul>	<p>Medical devices:</p> <ul style="list-style-type: none"> <li>Medical equipment included in health care and hospital services costing domains.</li> </ul>
Hospital services	<p>Hospital services:</p> <ul style="list-style-type: none"> <li>The National Hospital Cost Data Collection (NHDCDC) and the associated National Public Sector Cost Weights (NPSCW)<sup>72</sup> contain unit costs on all hospital-based care services according to the AR-DRG classification (admitted services, non-admitted hospital care, emergency services, "hospital in the home").</li> <li>Admitted patient services must be costed with AR-DRG total cost per episode (e.g., surgery) from the NHDCDC.</li> <li>Non-admitted care services must be costed using NHDCDC Tier 2 average cost per service event (e.g., consultation)</li> <li>Emergency department (ED) services must be costed using NHDCDC Urgency related groups (URG<sup>73</sup>) average cost per presentation (e.g., ED visit) from the NHDCDC.</li> </ul>	<p>Hospital services:</p> <ul style="list-style-type: none"> <li>Per Diem (unit) costs<sup>74</sup> for salaried personnel, physicians, pharmaceuticals, medical support, overheads, investments should be from RIZIV-INAMI or calculated according to the Belgian Cost Manual for hospital interventions based on RIZIV-INAMI data [5].</li> <li>Default calculation by simple average (unweighted, all hospitals equal).</li> <li>Weighted average is preferred but requires non-public volume data (accounts for case-mix disparities).</li> <li>Unit cost/prices for stay types: Acute (A), Burns (BRA), Geriatrics (G), Palliative (PAL), Psychiatric (P), Specialised/Chronic care (Sp).</li> </ul>	<p>Hospital services (four approaches):</p> <ul style="list-style-type: none"> <li>1. Per Diem (unit) costs/prices should be calculated by average daily rates using either total annual hospital costs from budgets or financial reports divided by total patient-days from administrative data or by Canadian Institute for Health Information (CIHI) aggregate hospital costs data [57] divided by patient-days nationally/provincially (Total Costs = Cost per day x Length of stay).</li> <li>2. Case mix costing rates: Use of 528 Case Mix Groups (CMG) from Discharge Abstract Database (DAD) and Resource Intensity Weights (RIWs) account for clinical complexity and variation in resource intensity across cases compared to per diem costing.</li> </ul>	<p>Hospital services:</p> <ul style="list-style-type: none"> <li>Hospital service costs are based on Denmark's DRG rates [59] (for inpatient care) and DAGS tariffs (for outpatient care), rehabilitation, and psychotherapeutic tariffs provided by the Danish Health Data Agency<sup>77</sup> [60].</li> <li>Resource inclusions/exclusions must be justified (e.g., admin costs).</li> <li>If DRG/DAGS rates mask heterogeneity (e.g., varying medication use within same DRG) due to its average nature, then a micro-costing approach is used using data from the Municipal salary data [61] for staff time (adjusted for holidays, child care, and other breaks) and market prices for equipment.</li> </ul>

<sup>71</sup> Interventional device costing is included in the Healthcare Services domain; hospital based (inpatient) costing of devices and diagnostic/investigational services are covered under Hospital Services.

<sup>72</sup> The NPSCW are standardised cost benchmarks used in Australia to cost hospital services for activity-based funding and economic evaluations.

<sup>73</sup> The URG system classifies emergency department visits by clinical urgency (Australasian Triage Scale 1-5) and resource use, with costs ranging from ~\$ 150 (non-urgent) to ~\$ 1,200 (resuscitation). These NHDCDC-derived cost weights apply only to non-admitted care; admitted patients use AR-DRG pricing instead.

<sup>74</sup> The Belgian Health Care Knowledge Centre's (KCE) manual for cost-based pricing calculates hospital per diem prices (provider perspective), covering only basic costs. These methods inform economic evaluations (e.g., CEAs) for the reference case. For reference case analyses (healthcare-system perspective), additional costs (ICU, medications, etc.) must be added.

<sup>77</sup> In 2018, the DRG system merged DRG and DAGS rates into a unified grouping logic, applying identical classification for inpatient/outpatient and primary/assistance activities [60].

Domain	Australia [1]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark <sup>37</sup> [9] [10] [11] [12]
			<ul style="list-style-type: none"> <li>3. Use of average patient cost estimates for specific CMG: Patient Cost Estimator (PCE) [58] by CIHI<sup>75</sup> or Health Costing by Alberta Health's Interactive Health Data Application<sup>76</sup> (IHDA).</li> <li>4. Patient level costing rates (bottom-up micro-costing): Tracks individual resource use (e.g., labs, nursing) via workload units but only available for selected hospitals.</li> </ul>	
Residential care, home nursing and home care	<p>Residential care:</p> <ul style="list-style-type: none"> <li>Relevant residential care costs should be included and refer to care provided to residents of approved residential aged-care facilities</li> <li>Unit cost<sup>78</sup> = Daily ACFI subsidy + basic daily fee [62]</li> </ul> <p>Home care and home nursing:</p> <ul style="list-style-type: none"> <li>Relevant home nursing by qualified nurses, excluding residential or hospital-based nursing should be included.</li> <li>Unit cost home nursing = Commonwealth Home Support Programme (CHSP) national average [63].</li> <li>Relevant home care that delivers tailored in-home care for seniors with high care needs should be included.</li> <li>Unit cost home care<sup>79</sup> = Daily ACFI subsidy + basic fee (income-tested fees may apply) [62].</li> </ul>	<p>Residential care:</p> <ul style="list-style-type: none"> <li>Not reported</li> </ul> <p>Home care and home nursing:</p> <ul style="list-style-type: none"> <li>Not reported</li> </ul>	<p>Residential care:</p> <ul style="list-style-type: none"> <li>Residential care costs should be included and calculated per day considering care intensity (nursing homes, assisted living) adjusted for resident complexity using 44 RUG-III with each group having a CMI [64].</li> <li>Adjusted daily cost = Base per diem cost x CMI</li> <li>Resident payments should be excluded in the reference case but may be included in the societal perspective.</li> </ul> <p>Home nursing and home care</p> <ul style="list-style-type: none"> <li>Use provincial fee schedules (mostly not publicly available) for government-funded services.</li> <li>If fee schedules are unavailable, then time-based costing is used using public-sector hourly wages or collective agreements (e.g., nursing services) [64]: Cost per visit = Hourly wage x visit duration + travel costs.</li> <li>Include patient payments for societal perspective.</li> </ul>	<p>Residential care:</p> <ul style="list-style-type: none"> <li>Not reported</li> </ul> <p>Home nursing and home care:</p> <ul style="list-style-type: none"> <li>Municipal services costs should be included and valued using unit costs per effective hour from the Municipal salary data [61] following the same methodology as hospital services.</li> <li>Staff for municipal services includes Department doctor, Nursing home assistants, Social and healthcare assistants, Social and healthcare workers, Nursing assistants, (Senior) occupational therapists, Senior physiotherapists, (Senior) health nurses, (Senior) nurses, Physiotherapists.</li> </ul>
Transport/Travel/Ambulance	<p>Ambulance services:</p> <ul style="list-style-type: none"> <li>Ambulance services should be included if the medicine affects ambulance use (trips avoided/increased).</li> <li>Mean cost per trip = Total annual costs ÷ Total annual trips.</li> </ul>	<p>Transport costs:</p> <ul style="list-style-type: none"> <li>Transport costs must be excluded from reference case but may be reported separately if travel significantly impacts costs (quarterly revised federal employee kilometre allowances used, limited to a maximum of 15km per journey).</li> </ul>	<p>Ambulance services:</p> <ul style="list-style-type: none"> <li>Ambulance services should be included and annual reports by local ambulance authorities (e.g., Toronto Paramedic Services annual reports [65]) or (provincial patient) fee schedules should be used if available.</li> </ul>	<p>Transport costs:</p> <ul style="list-style-type: none"> <li>Transport costs should be included and valued through the state's tax-free mileage allowance (transport allowance).</li> <li>Regional, municipal, and patient/relative transport costs should be included but reported separately.</li> </ul>

<sup>75</sup> CIHI's PCE (<https://www.cihi.ca/en/patient-cost-estimator>) provides average acute care hospital costs by jurisdiction, service type, and age group for patients on a typical treatment course. Cost estimates include facility and (in 7 jurisdictions) physician costs. Jurisdictional variations may affect comparability due to variations in care models and labour rates (Patient Cost Estimator Methodology Notes and Glossary [58]).

<sup>76</sup> IHDA provides current year and inflation-adjusted estimates for average costs, and current year estimates for median costs.

<sup>78</sup> The Aged Care Funding Instrument (ACFI) determines daily subsidies for aged care by assessing dependency in three domains: daily living (ADL), behaviour, and complex care needs, with tiered funding (low/medium/high). Rates are updated quarterly. The basic daily fee is paid by the care recipient [62].

<sup>79</sup> Level 1 receives the lowest subsidy, and Level 4 receives the highest subsidy. The basic daily fee is paid by the care recipient.

Domain	Australia [1]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark <sup>37</sup> [9] [10] [11] [12]
			<ul style="list-style-type: none"> <li>Costs vary significantly by service type (emergency vs. transfer and ground vs. air) and perspective, with patient fees typically representing copayments rather than full costs.</li> <li>Full operating costs (vehicle, staff, dispatch, overheads) should be used for a societal perspective.</li> <li>Cost per ride = Total annual operating costs ÷ number of rides.</li> </ul> <p>Travel costs:</p> <ul style="list-style-type: none"> <li>Government of Canada issues annual estimated costs for private automobile travel, with the cost per kilometre listed by province (Vehicle expenses [66]).</li> </ul>	
Productivity costs <sup>80</sup> including patient and caregiver time	<p>Productivity costs:</p> <ul style="list-style-type: none"> <li>Productivity changes must be excluded in reference case and only included only in supplementary analysis</li> <li>If productivity costs are considered, HCA for short absence and FCA for long absence from paid work should be used.</li> </ul>	<p>Productivity costs:</p> <ul style="list-style-type: none"> <li>Productivity costs must be excluded from the reference case but may be reported separately for production losses due to unfitness to work/sick leave (in case of treatment/illness), early retirement/incapacity to work (in case of long-term illness or disability), premature death<sup>81</sup>.</li> <li>If productivity costs are considered, HCA for short absence and FCA for long absence from paid work should be used.</li> </ul>	<p>Productivity costs:</p> <ul style="list-style-type: none"> <li>Productivity costs should be included and a FCA (recommended) or HCA for lost paid work time (absenteeism/presenteeism) should be used.</li> <li>FCA: Wage loss/costs limited to “friction period” until replacement measured and values by WPAL.</li> <li>HCA: Costs = Time off x wage + benefits.</li> <li>Hourly wage data can be obtained from Statistics Canada [69].</li> <li>Leisure time is excluded (captured indirectly via QALYs) to avoid double-counting.</li> </ul>	<p>Productivity costs:</p> <ul style="list-style-type: none"> <li>Production losses and gains (productivity costs and labour market consequences) must be excluded in the reference case.</li> <li>If productivity costs are considered, the patients’ and relatives’ time can be valued at the average after-tax hourly wage for Danish employees based on data from the Statistics Denmark’s Statbank [70]. If labour market consequences (indirect costs) are included, they must be presented separately.</li> <li>Patient/relative time should be reported.</li> </ul>
Informal care	<p>Informal care:</p> <ul style="list-style-type: none"> <li>Not reported</li> </ul>	<p>Informal care:</p> <ul style="list-style-type: none"> <li>Disease-related informal care costs (measured only in time like unpaid work) must be excluded in the reference case and only included in a supplementary analysis (exclusion of future unrelated care).</li> </ul>	<p>Informal care:</p> <ul style="list-style-type: none"> <li>Informal care cost should be included (see Productivity costs including patient and caregiver time for informal care).</li> </ul>	<p>Informal care:</p> <ul style="list-style-type: none"> <li>Informal care cost should be excluded (see Productivity costs including patient and caregiver time for informal care).</li> </ul>
Other healthcare system specific services	<p>Other community-based services:</p> <ul style="list-style-type: none"> <li>Other community based services (e.g., Meals on wheels) should be excluded due to data limitations but may be noted qualitatively in broader assessments.</li> </ul>	<ul style="list-style-type: none"> <li>Not reported</li> </ul>	<p>Public health programmes:</p> <ul style="list-style-type: none"> <li>Public health programme costs should be included and the valuation should be based on local budget data or extrapolation from similar programs.</li> <li>Include overhead (e.g., 20% of direct costs).</li> </ul>	<p>Municipal services:</p> <ul style="list-style-type: none"> <li>Municipal services costs should be included and valued using unit costs per effective hour from the Municipal salary data [61] following the same methodology as hospital services.</li> </ul>

<sup>80</sup> The human capital approach (HCA) values lost productivity as total forgone wages (assuming permanent loss), while the friction cost approach (FCA) limits costs to the temporary “friction period” until workforce replacement. FCA may better reflect societal productivity loss in economies with unemployment [6], as it assumes vacant positions can be refilled within a set timeframe (friction period) to restore pre-absence productivity levels. There is no consensus on the best instrument or approach to measure productivity impacts. However, the Belgian and the Canadian guidelines recommend Work Productivity and Activity Impairment (WPAL) questionnaire [67] and the Belgian guidelines also recommend the iMTA Productivity Cost Questionnaire (iPCQ) [68], both available in several languages .

<sup>81</sup> Short-term paid work uses HCA (days absent x € 376.8/day). Long-term/death uses a FCA approach (135-day friction period x €376.8/day).

Domain	Australia [1]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark <sup>37</sup> [9] [10] [11] [12]
			<ul style="list-style-type: none"> <li>Report per-person costs and total program costs.</li> </ul>	<ul style="list-style-type: none"> <li>Staff for municipal services includes Department doctor, Nursing home assistants, Social and healthcare assistants, Social and healthcare workers, Nursing assistants, (Senior) occupational therapists, Senior physiotherapists, (Senior) health nurses, (Senior) nurses, Physiotherapists.</li> </ul>
Lump-sum payments/Overhead costs <sup>82</sup>	Lump-sum payments: <ul style="list-style-type: none"> <li>Not reported</li> </ul> Overheads: <ul style="list-style-type: none"> <li>Not reported</li> </ul>	Lump-sum payments: <ul style="list-style-type: none"> <li>Lump-sum payments (e.g., for lab tests, imaging) should be excluded to avoid cost underestimation as these payments do not reflect actual resource use.</li> </ul> Overheads: <ul style="list-style-type: none"> <li>Not reported</li> </ul>	Lump-sum payments: <ul style="list-style-type: none"> <li>Not reported</li> </ul> Overheads: <ul style="list-style-type: none"> <li>Overheads are included in cost calculations for hospital care, ambulance services, and public health.</li> </ul>	Lump-sum payments: <ul style="list-style-type: none"> <li>Not reported</li> </ul> Overheads: <ul style="list-style-type: none"> <li>Not reported</li> </ul>
Other costs and aspects	<ul style="list-style-type: none"> <li>Not reported</li> </ul>	<ul style="list-style-type: none"> <li>Non-health societal impacts beyond the healthcare system perspective (educational, justice system) must be excluded in the reference case and may be included in a supplementary analysis.</li> <li>Transfer payments<sup>83</sup> and leisure time effects must be excluded.</li> </ul>	<ul style="list-style-type: none"> <li>Transfer payments must be excluded when estimating economic costs.</li> <li>Capital/Investment costs should be included and cover costs for assets (equipment, buildings) by valuing annualised discounting for foregone returns.</li> </ul>	<ul style="list-style-type: none"> <li>Transfer payments must be excluded, because these are not socio-economic costs but transfers.</li> </ul>
Manual consists of formulas and/or calculation examples for valuation and calculation of unit costs (costing)	Qualitative information on calculation (e.g., average costs per patient, per bed etc.) and formulas	Qualitative information on calculation (e.g., average costs per patient, per bed etc.), formulas, and calculation examples	Qualitative information on calculation (e.g., average costs per patient, per bed etc.), formulas, and calculation examples	Qualitative information on calculation (e.g., average costs per patient, per bed etc.), formulas, and calculation examples
Unit costs, fee schedules, per diem prices available	Yes	Yes	Yes	Yes
Type of source	Healthcare services: <ul style="list-style-type: none"> <li>Medical Benefits Schedule fees [39] (fees).</li> </ul> Pharmaceuticals: <ul style="list-style-type: none"> <li>A-Z medicine list [71] (prices).</li> <li>Pharmaceutical Benefits - Fees, Patient Contributions and Safety Net Thresholds [50] (fees).</li> </ul> Medical devices: <ul style="list-style-type: none"> <li>Medical devices are not part of evaluations for the PBS.</li> </ul> Hospital services:	Healthcare services: <ul style="list-style-type: none"> <li>RIZIV-INAMI schedules for tariffs, per diem prices, pharmaceutical and devices (publicly available) [32] (tariffs and unit costs).</li> </ul> Pharmaceuticals: <ul style="list-style-type: none"> <li>RIZIV-INAMI schedules for tariffs, per diem prices, pharmaceutical and devices (publicly available) [32] (tariffs and unit costs).</li> <li>Farmanet/Pharmanet pharmaceutical reimbursement (prices) data (restricted access) [33] (prices).</li> </ul>	Healthcare services: <ul style="list-style-type: none"> <li>Provincial FFS schedules for physician services (Alberta Medical price list [43], British Columbia MSP Payment Schedule [42], Manitoba Physician Manual [44])</li> <li>Provincial FFS schedules for diagnostic and investigational services (e.g., Alberta Medical price list [43], British Columbia MSP Payment Schedule [42], Manitoba Physician Manual [44], Ontario Schedule of benefits for laboratory services [45])</li> </ul>	Healthcare services <ul style="list-style-type: none"> <li>Danish Medicines Council Catalogue of Unit Costs [12]</li> <li>Danish Health Data Agency DAGS tariffs (for outpatient care), rehabilitation, and psychotherapeutic tariffs [60]</li> </ul> Pharmaceuticals: <ul style="list-style-type: none"> <li>Danish Medicines Council Catalogue of Unit Costs [12]</li> <li>Medicinpriser.dk for pharmacy purchase price (AIP) by the DMC [55]</li> </ul>

<sup>82</sup> Lump-sum payments are fixed reimbursements for defined services and may indirectly include overhead allocations, but they are not classified as overhead costs per se. E.g., for bundled services: If a lump-sum (e.g., per hospital stay) implicitly covers shared infrastructure, overheads may be allocated within it – although this is not their primary purpose. For pragmatic reasons, both were summarised in one category.

<sup>83</sup> Transfer payments (e.g., unemployment/sickness/disability benefits and pensions) involve no resource exchange and should be excluded from analyses to avoid double-counting. Sales taxes are paid to governments but don't reflect service costs – opportunity costs should use pre-tax resource prices.

Domain	Australia [1]	Belgium [4] [5]	Canada [6] [7] [8]	Denmark <sup>37</sup> [9] [10] [11] [12]
	<ul style="list-style-type: none"> <li>■ National Hospital Cost Data Collection (aggregate data to calculate average costs) [30].</li> </ul> <p>Other:</p> <ul style="list-style-type: none"> <li>■ Aged Care Funding Instrument (ACFI) subsidy data [62] for residential care, home care and Commonwealth Home Support Programme (CHSP) data [63] for home nursing (unit costs).</li> </ul>	<ul style="list-style-type: none"> <li>■ BCFI-CBIP drug prices for non-reimbursed and over-the-counter (OTC) drugs (publicly available) [37] (prices).</li> <li>■ IMA database for follow-up treatments real-world data [35].</li> </ul> <p>Medical devices:</p> <ul style="list-style-type: none"> <li>■ RIZIV-INAMI schedules for tariffs, per diem prices, pharmaceutical and devices (publicly available) [32] (tariffs and unit costs)..</li> <li>■ RIZIV-INAMI SIMPL with information on prices and reimbursement conditions [56].</li> </ul> <p>Hospital services:</p> <ul style="list-style-type: none"> <li>■ RIZIV-INAMI schedules for tariffs, per diem prices, pharmaceutical and devices (publicly available) [32].</li> <li>■ Manual for cost-based pricing of hospital interventions (unit costs) [5].</li> <li>■ TCT hospital clinical and billing data (restricted access) [34]</li> <li>■ IMA (individual billing data) (restricted access) [35]</li> <li>■ MZG-RHM hospital (discharge) data (restricted access) [36].</li> </ul> <p>Other:</p> <ul style="list-style-type: none"> <li>■ Not reported/included</li> </ul>	<ul style="list-style-type: none"> <li>■ Special provincial fees for non-physician professional services (e.g., Ontario chiropractic fee schedule [46], Dental fee guide [47])</li> </ul> <p>Pharmaceuticals:</p> <ul style="list-style-type: none"> <li>■ Public provincial lists with prices for prescription drugs, drug/monitoring devices, and drug administration costs (e.g., Ontario Drug Benefit Formulary [51], Saskatchewan Drug Formulary [52], or British Columbia PharmaCare [53])</li> </ul> <p>Medical devices</p> <ul style="list-style-type: none"> <li>■ see Healthcare services and hospital services</li> </ul> <p>Hospital services</p> <ul style="list-style-type: none"> <li>■ CIHI aggregate hospital costs data (aggregate data) [57]</li> <li>■ CIHI Discharge Abstract Database (aggregate data) [72]</li> <li>■ CIHI Patient Cost Estimator [58]</li> </ul> <p>Other:</p> <ul style="list-style-type: none"> <li>■ Residential care based on multiple sources [64].</li> <li>■ Home nursing unit costs based on Statistics Canada [69] as nursing fees are not publicly available.</li> <li>■ Ambulance services based on data from local ambulance authorities Toronto Paramedic Services annual reports [65].</li> <li>■ Travel costs per kilometre (Government of Canada) Vehicle expenses [66]</li> <li>■ Hourly wage data (for Productivity costs including patient and caregiver time) can be obtained from Statistics Canada [69].</li> <li>■ No specific data for Public health programmes</li> </ul>	<p>Medical devices:</p> <ul style="list-style-type: none"> <li>■ Danish Medicines Council Catalogue of Unit Costs [12]</li> </ul> <p>Hospital services:</p> <ul style="list-style-type: none"> <li>■ Danish Medicines Council Catalogue of Unit Costs [12]</li> <li>■ Denmark's DRG rates [59]</li> </ul> <p>Other:</p> <ul style="list-style-type: none"> <li>■ Productivity costs: Hourly wage data for Danish employees from the Statistics Denmark's Statbank [70].</li> <li>■ Municipal salary data [61] and Danish Medicines Council Catalogue of Unit Costs [12] for municipal services.</li> <li>■ Danish Medicines Council Catalogue of Unit Costs [12] for transport costs.</li> </ul>

Domain	England & Wales [16]	France [17]	Germany <sup>84</sup> [18] [19]	New Zealand [20] [21]
Costing approach and Identification of resources				
Costing approach <sup>38</sup>	<p>The opportunity cost approximation including considering implications for healthcare programmes for other patient groups that may be displaced by the adoption of the new technology by a pragmatic hybrid approach is done via...</p> <ul style="list-style-type: none"> <li>■ Top-down macro-costing in the National Cost Collection<sup>85</sup> for almost all services in the NHS (preferred approach).</li> <li>■ Bottom-up micro-costing via PLICS<sup>86</sup> to supplement the NCC.</li> </ul>	<p>The approaches are not explicitly reported but opportunity cost approximation to ensure technical cost-effectiveness and allocative cost-effectiveness via...</p> <ul style="list-style-type: none"> <li>■ Top-down macro-costing for standardised healthcare services via national average costs, and for hospital services via Homogeneous Patient Groups<sup>87</sup> (HPG) unit costs from ATHI's National Cost Study<sup>88</sup> (NCS) [74] (preferred approach).</li> <li>■ Top-down micro-costing for individual components of care without primary data collection via ATIH's Unit Cost List.</li> <li>■ Bottom-up micro-costing for new technologies not yet covered by a reimbursement scheme, services for which reimbursed amounts do not reflect real resource use and non-standardised resources (e.g., caregiver time, training programs).</li> <li>■ Bottom-up macro-costing to create national averages for future top-down macro-costing (e.g., updating HPG costs in the NCS).</li> </ul>	<p>The opportunity cost approximation is done by a pragmatic combination of approaches depending on data availability and the level of precision required via...</p> <ul style="list-style-type: none"> <li>■ Top-down macro-costing for DRG-based hospital services</li> <li>■ Top-down micro-costing for complex (outpatient) healthcare services such as chronic disease management.</li> <li>■ Bottom-up micro-costing for pharmaceuticals, medical devices, healthcare services.</li> </ul>	<p>The opportunity cost approximation (not explicit reported) is done via...</p> <ul style="list-style-type: none"> <li>■ Top-down macro costing for sectoral outpatient services using average national tariffs (like DRG tariffs for hospitalisations, Purchase Unit (PU) prices for outpatient events). (preferred approach)</li> <li>■ Bottom-up micro-costing only for intervention-specific costs.</li> </ul>
Identification <sup>43</sup> of resources	<ul style="list-style-type: none"> <li>■ Reference case (base case) should include only costs that relate to NHS and PSS resources and should be valued using prices relevant to the NHS and PSS.</li> <li>■ Incremental cost focus (CC only for technologies with similar benefits and costs to NICE-recommended options) with consideration of comparative costs/savings of technologies, infrastructure changes, maintenance, and staff training.</li> </ul>	<ul style="list-style-type: none"> <li>■ Reference case (base case) should include total direct cost of an intervention based on the intervention's production costs from a societal perspective<sup>89</sup>.</li> <li>■ Focus is on cost-effectiveness frontier and incremental costs</li> <li>■ BIA should be conducted, but no formal guidelines were available<sup>90</sup>.</li> </ul>	<ul style="list-style-type: none"> <li>■ Reference case (base case) should include direct (medical and non-medical) reimbursable and non-reimbursable costs from the SHI-insured community perspective.</li> <li>■ Incremental cost focus (CUA and CEA) for a health care pathway (or several health care pathways) for the assessed drug and the appropriate comparator therapy.</li> </ul>	<ul style="list-style-type: none"> <li>■ Reference case (base case) should include only costs that relate to the perspective of the healthcare system and include pharmaceutical, hospital inpatient and outpatient, and direct patient health care costs.</li> </ul>

<sup>84</sup> HTA in Germany comprises of evaluation of (clinical) benefits and harms assessment, health economic evaluations, analysis of ethical, social, legal, and organisational aspects.

<sup>85</sup> The term NHS Reference Costs is generally no longer applied in the healthcare context in the UK but still informally used. The concept has not been replaced but rather integrated in the more comprehensive National Cost Collection (NCC) process. Instead, the term National Cost Collection Index (NCCI) is used [73].

<sup>86</sup> The Patient-Level Information and Costing System (PLICS) refines NHS pricing, particularly the National Cost Collection, by linking costs to individual patient pathways, supplementing tariff averages.

<sup>87</sup> HPGs group clinically similar cases with comparable resource used for hospital costing.

<sup>88</sup> The Technical Agency for Hospital Information (ATHI) is a French public administrative establishment under the supervision of the ministries that publishes the National Cost Study (Étude Nationale des Coûts, ENC or NCS) and the Unit Cost Lists (RTC) [74]. The NCC is France's official hospital cost database and provides production costs for hospital stays. NCS involves a voluntary sample of institutions. All hospital resources excluded from the base tariff in the NCS – including separately funded drugs/devices, ICU supplements, patient co-payments, and private clinic surcharges – must be individually valued and added to the total cost.

<sup>89</sup> The societal perspective is limited to healthcare, domestic sphere/informal care, and the medico-social sphere (e.g., personal care services). A supplemental analysis may include direct costs from other sectors.

<sup>90</sup> The French approach to estimate the target population for a BIA is not explicitly stated, but the HEEG indicates that a combination of both approaches should be conducted.

Domain	England & Wales [16]	France [17]	Germany <sup>84</sup> [18] [19]	New Zealand [20] [21]
	<ul style="list-style-type: none"> <li>■ BIA (Resource impact assessments/RIA) should follow an epidemiological approach that is informed by expected market share.</li> </ul>		<ul style="list-style-type: none"> <li>■ BIA should follow an epidemiological approach with considering the expected uptake rate (market share).</li> </ul>	<ul style="list-style-type: none"> <li>■ Incremental cost focus between the new pharmaceutical compared with current treatment (omit resources if costs are trivial or cancel out)</li> <li>■ BIA should follow a market share approach considering future uptake and displacement of existing treatments.</li> </ul>
Measurement <sup>91</sup> of resources				
Data sources <sup>92</sup>	<ul style="list-style-type: none"> <li>■ The National Institute for Health and Care Excellence (NICE) considers all types of evidence in its evaluations but strongly prefers direct randomised trials for relative effectiveness comparisons.</li> <li>■ Economic evaluations may use new analyses or existing evaluations (if adequate and appropriate), but a review of published relevant evaluations should always be conducted.</li> <li>■ Non-randomised evidence and data may be used to provide estimates of resource use for populating economic models: Hospital data such as Hospital Episode Statistics, Primary care data through the Personal Social Services Research Unit (PSSRU), Prescribing data (e.g., systemic anti-cancer therapy (SACT) activity), National Institute for Health Protection (NIHP), Healthcare Quality Improvement Partnership (HQIP), Hospital pharmacy audit index (provided by IQVIA), Pharma (industry or company submission), Local Government Association (LGA).</li> <li>■ Expert opinion supplements the best available data (e.g., input parameters).</li> </ul>	<ul style="list-style-type: none"> <li>■ The French National Authority for Health (HAS) deem RCTs and meta-analyses as the best source of evidence of comparative effectiveness and to measure resources linked to the acquisition or production of the interventions.</li> <li>■ Observational data including French real-world data from Medical IT system (PMSI) for Medicine, Surgery, Obstetrics and Odontology (MSO), Hospitalisation at Home (HAH), Follow-up Care and Rehabilitation (FCR) services, the annual statistics of healthcare institutions (SAE) provide data to measure resources, esp. for disease follow-up and end-of-life care.</li> <li>■ Expert opinion is only used in case of lack of data or to support existing data (e.g., input parameters)<sup>49</sup>.</li> </ul>	<ul style="list-style-type: none"> <li>■ The Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen (IQWiG) has a standardised process of information retrieval but considers systematic reviews and RCTs with having the highest evidence level for comparative effectiveness.</li> <li>■ For the health economic reference case, data from the benefit assessment (§35a SGB V) and its information retrieval process is used, but a decision-analytic model is the standard for the HEE.</li> <li>■ Data usage from an exploratory information retrieval from the following sources is obligatory to identify resources for cost estimation, BIA, and additional model input parameters: Dynamed, UpToDate, guideline databases, Robert Koch Institute, Federal Statistical Office (Destatis), Federal Employment Agency (Bundesagentur für Arbeit – BA), Allgemeine Ortskrankenkasse<sup>93</sup> Research Institute (WIdO), regional registries, laws, regulations, directives.</li> <li>■ Data usage from secondary data analysis is optional for cost estimation, BIA, and additional model input parameters.</li> <li>■ Expert opinion is optional for cost estimation, BIA, and additional model input parameters.</li> </ul>	<ul style="list-style-type: none"> <li>■ The Pharmaceutical Management Agency (PHARMAC) suggests that all levels of evidence should be identified but well-conducted RCTs and meta-analyses are the preferred data sources when estimating relative treatment effects.</li> <li>■ Resource use estimates should be based on New Zealand information from clinical guidelines, clinical trials, and/or the Ministry of Health.</li> <li>■ Data includes hospital admissions and stays, hospital outpatient visits, emergency department visits, specialist and GP consultations, laboratory/diagnostic tests, community-based services (nurse visits, hospice, residential care).</li> <li>■ Expert (clinical) opinion should, e.g., to review an economic model, can be included but not as the primary source.</li> </ul>
Cost units	<p>Cost units:</p> <ul style="list-style-type: none"> <li>■ General: Natural units</li> <li>■ Healthcare services: Cost per GP consultation, cost per community nurse visit, cost per hour of social care, cost per week in a residential home.</li> </ul>	<p>Cost units:</p> <ul style="list-style-type: none"> <li>■ General: Natural units</li> <li>■ Healthcare services: Cost per consultation, cost per procedure, per journey.</li> </ul>	<p>Cost units:</p> <ul style="list-style-type: none"> <li>■ General: Natural units</li> <li>■ Healthcare services: Cost per service/consultation</li> </ul>	<p>Cost units:</p> <ul style="list-style-type: none"> <li>■ General: Natural units</li> <li>■ Healthcare services: Cost per visit, cost per day care.</li> <li>■ Pharmaceuticals: Cost per patient based on dose and treatment duration.</li> </ul>

<sup>91</sup> Measurement means quantifying the amount/frequency of resources used (e.g., number of hospital days, drug doses).

<sup>92</sup> The Data sources domain serves to identify the origin of resources and provide information on their valuation. Note that sources for resource use and pricing data are frequently intertwined and not fully disentangled. The specific methodologies and sources for valuation are elaborated in the General principles of valuation section and are further detailed within each service domain (e.g., healthcare, hospital services).

<sup>93</sup> The Allgemeine Ortskasse (AOK) is a local SHI fund.

Domain	England & Wales [16]	France [17]	Germany <sup>84</sup> [18] [19]	New Zealand [20] [21]
	<ul style="list-style-type: none"> <li>■ Pharmaceuticals: Cost per milligram/microgram, cost per unit (e.g., tablet, vial), cost per defined daily dose (DDD), cost per treatment course.</li> <li>■ Medical devices: Cost per device considering annual maintenance cost, cost per test, cost per procedure.</li> <li>■ Hospital services: Cost per Healthcare Resource Group<sup>94</sup> (HRG) (if HRG data is inappropriate cost per bed-day, cost per outpatient attendance, cost per staff hour should be calculated).</li> <li>■ Other cost units: Cost per hour (social care)</li> </ul>	<ul style="list-style-type: none"> <li>■ Pharmaceuticals: Cost per unit (e.g., per box, per mg), cost per treatment cycle, cost per patient per year.</li> <li>■ Medical devices: Cost per device unit.</li> <li>■ Hospital services: Cost per stay/procedure based on HPGs, per day.</li> <li>■ Other cost units: Cost per day, cost per hour (Residential care, home nursing and home care).</li> </ul>	<ul style="list-style-type: none"> <li>■ Pharmaceuticals: Cost per defined daily dose (DDD), cost per package extrapolated to the treatment duration per patient.</li> <li>■ Medical devices: Cost per device unit or per use (amortised over expected usage) but medical device costs are included in the DRG-based hospital per-case costs.</li> <li>■ Hospital services: Cost per DRG case or per stay.</li> <li>■ Other cost units: Cost per journey (transport), cost per hour (travel), cost per day of absence (productivity)</li> </ul>	<ul style="list-style-type: none"> <li>■ Medical devices: Cost per device unit or cost per use (amortised over expected usage).</li> <li>■ Hospital services: Cost per Healthcare Resource Groups (HRGs)/DRG case<sup>94</sup>.</li> <li>■ Other cost units: not reported/already included in other cost units.</li> </ul>
Data Quality & Analysis	NA		<ul style="list-style-type: none"> <li>■ Assessment of the data structure and evaluating data quality, includes evaluating its completeness, plausibility, the methods used for data collection, and the timeliness of the data.</li> </ul>	■ NA
Valuation of resources				
General principles	<p>General principles:</p> <ul style="list-style-type: none"> <li>■ Main sources for unit costs (in the hospital setting) should be the National Cost Collection (NCC) [75] systems, the 2025/26 NHS Payment Scheme<sup>95</sup> [76], and the Personal Social Services Research Unit (PSSRU) unit costs<sup>96</sup> [77].</li> <li>■ Further costs should reflect actual NHS payments, including negotiated discounts.</li> <li>■ If costs or prices vary (e.g., regional differences), analysis of both highest and lowest costs or prices using the midpoint for sensitivity analyses should be conducted.</li> <li>■ Patient costs reimbursed by NHS/PSS should be averaged and non-reimbursed costs presented separately.</li> </ul>	<p>General principles:</p> <ul style="list-style-type: none"> <li>■ The unit costs for HPGs in the NCS should be used as they reflect unit production costs to match actual expenses for (inpatient and outpatient) hospital services and average costs for healthcare services should be calculated using on National Health Insurance statistics<sup>97</sup> data (SNIIRAM) [78] from the National Health Data System (SNDS)<sup>98</sup>.</li> <li>■ If unit costs are unavailable or unsuitable, tariffs or fees may be used instead, with any patient surcharges/OOP included (discrepancies between fees or tariffs and market prices, must be documented and analysed in sensitivity tests).</li> </ul>	<p>General principles:</p> <ul style="list-style-type: none"> <li>■ Costs are valued using DRG-based hospital per-case flat rates or negotiated tariffs (for pharmaceuticals and outpatient healthcare services).</li> <li>■ Standardised methods and unit costs should be used to value cost components [19, 80-83]<sup>99</sup>.</li> <li>■ Non-reimbursable costs, which are often regulated (e.g., standard co-payments/OOP in the hospital and for drugs), are valued according to these standards and reported separately from the SHI perspective.</li> <li>■ Expression of costs using CPI-adjustment (Costs should be as up-to-date as possible).</li> </ul>	<p>General principles:</p> <ul style="list-style-type: none"> <li>■ The primary source for unit costs is PHARMAC's Cost Resource Manual, which covers national tariffs and prices [21].</li> <li>■ When precise data is unavailable, a wide range of tariffs and prices should be tested in sensitivity analyses.</li> <li>■ OOP: Partially-reimbursed costs from GP visits, pharmaceutical co-payments (though the full drug cost is captured elsewhere), and home care must be considered.</li> </ul>

<sup>94</sup> Cost units for hospital services are mainly calculated using HRGs. This approach uses standardised procedure categories similar to DRGs and bundles costs per admission or per procedure.

<sup>95</sup> The 2025/26 NHS Payment Scheme replaced the National Tariff system and updated the National Cost Collection (NCC), which remains the primary data source for cost calculations. The NHS Payment Scheme still uses tariff prices (based on NCC data) but with added flexibility, e.g., local adjustments using a market forces factor (MFF), blended payments: tariff mix and outcome-based pricing including efficiency adjustments. None rely solely on simple averages. NCC tariffs are raw averages considering patient-level costs from the PLICS. NHS Payment Scheme tariffs are NCC tariffs + blended payment rules. National Tariffs originally used NCC averages + Market forces factor (MFF) or efficiency adjustments. These adjustments are now part of the blended payment rules in the NHS Payment Schemes, e.g., the MFF adjusts for geographic cost differences in delivering healthcare.

<sup>96</sup> The PSSRU provides unit costs for health and social care services [77].

<sup>97</sup> SNIR provides aggregated data on amounts reimbursed, the reimbursement bases, the reimbursement rates, and surcharges.

<sup>98</sup> The National Health Data System (SNDS) makes it possible to link health insurance data (SNIIRAM database), hospital data (PMSI database), the medical causes of death, disability-related data, a sample of data from complementary health insurance organisations [79].

<sup>99</sup> The German society for health economics published two method papers to estimate standardised costs and pharmaceutical costs for the German healthcare system [19, 82].

Domain	England & Wales [16]	France [17]	Germany <sup>84</sup> [18] [19]	New Zealand [20] [21]
	<ul style="list-style-type: none"> <li>■ Expression of historical costs using inflation indices (e.g., NHS cost inflation index, PSS pay and prices index).</li> <li>■ Foreign cost adjustment: Conversion of international costs to GBP should be done using current exchange rates.</li> <li>■ VAT should be excluded in economic evaluations but included it in budgetary impact calculations.</li> </ul>	<ul style="list-style-type: none"> <li>■ Valuation of non-tariffed items (e.g., unlisted procedures or non-reimbursable devices) should be based on observable market prices or another justified method.</li> <li>■ Expression of costs using CPI-adjustment.</li> <li>■ Foreign cost adjustment: Conversion of international costs should be done using PPP, or any other justified method</li> </ul>	<ul style="list-style-type: none"> <li>■ Foreign cost adjustment: Not reported</li> </ul>	<ul style="list-style-type: none"> <li>■ Expression of inflation-adjusted pharmaceutical costs (2% per year) and long-term cost of capital by adjusting the discount rate (~nominal interest rate – inflation).</li> <li>■ Foreign cost adjustment: International costs and prices should not be used in analyses (if used data should be validated for the New Zealand setting).</li> </ul>
Future cost (changes)	<p>Future cost (changes):</p> <ul style="list-style-type: none"> <li>■ Reference case should include survival-related costs and, in resource impact assessments, savings from reduced admissions, avoided events, staff time costs/savings (only if affecting employment or captured in national tariffs).</li> </ul>	<p>Future cost (changes):</p> <ul style="list-style-type: none"> <li>■ Reference case includes discounted future costs, but not costs not directly linked to the interventions</li> <li>■ Expected cost changes (e.g., price drops) should be examined in sensitivity analyses.</li> </ul>	<p>Future cost (changes):</p> <ul style="list-style-type: none"> <li>■ Reference case includes costs of medical care directly related to the gained life years from the intervention (e.g., follow-up drugs and check-ups for the condition that was treated), if the time horizon is long enough and relevant differences are expected.</li> </ul>	<p>Future cost (changes):</p> <ul style="list-style-type: none"> <li>■ Reference case should include savings to the pharmaceutical schedule, public hospitals, and patients.</li> <li>■ Indirect future health care costs (e.g., from living longer) should not be included.</li> </ul>
Healthcare services <sup>100</sup>	<p>Healthcare services:</p> <ul style="list-style-type: none"> <li>■ Healthcare services (including outpatient, community, primary care should be valued using the 2025/26 NHS Payment Scheme (primary source), the NCC, or PSSRU unit costs.</li> <li>■ Healthcare services are less standardised than hospital tariffs and often rely on local or regional cost data.</li> </ul>	<p>Healthcare services:</p> <ul style="list-style-type: none"> <li>■ Outpatient services should be valued according to average costs based on SNIRAM [78] from the SNDS and Open Data platforms (Open Damir, Open Bio) [84].</li> <li>■ Laboratory, medical imaging procedures and technical medical procedures should be valued based on tariffs<sup>101</sup> from the National Health Insurance site, the national laboratory table (TNB), and SNDS/CCAM respectively.</li> </ul>	<p>Healthcare services:</p> <ul style="list-style-type: none"> <li>■ General services can be valued according to the tariffs from the German uniform evaluation catalogue (Einheitlicher Bewertungsmaßstab – EBM) [85], fee reports from the National Association of Statutory Health Insurance Physicians (KBV), or other standardised unit cost published by the German society for health economics [19, 82].</li> <li>■ Reimbursable costs are included and include expenditure on health care services financed by the SHI or other social insurance providers.</li> <li>■ Non-reimbursable medical costs for services directly borne by the insured persons, such as co-payments/OOP for drugs, medical remedies and aids, and outpatient visits are included.</li> </ul>	<p>Healthcare services:</p> <ul style="list-style-type: none"> <li>■ Primary health care costs mainly include GP and practice nurse visits, calculated as the average cost to the patient plus the reimbursed amount by the government per visit.</li> <li>■ The reimbursed amount by the government per visit is calculated by dividing the annual capitation fee (a fixed pre-payment per patient) by the estimated number of visits per year, then adding the patient co-payment.</li> <li>■ Diagnostic imaging<sup>102</sup>: The cost for services like magnetic resonance imaging (MRI), computed tomography (CT), and X-rays should be based on an average of prices from major radiology providers, excluding taxes.</li> <li>■ Pathology tests: The cost per test should be based on an average of prices from major laboratory providers, excluding taxes.</li> </ul>

<sup>100</sup> The healthcare services domain primarily covers physician services (e.g., family doctors, specialists) and outpatient diagnostics/investigational services, such as imaging procedures, laboratory and pathology tests. Non-physician services are included also under the health care services domain unless addressing specialised domains (e.g., residential care, home nursing, transport) requiring a distinct valuation with more scrutiny compared to standard health care services.

<sup>101</sup> Medical imaging procedures (e.g., CT, MRI) should be valued using official classification of procedure codes (CCAM) tariffs plus a national average for technical fees (reference activity). For high-cost procedures involving radiopharmaceuticals (e.g., PET scans), the drug cost is included in or added to the tariff. Contrast agents are valued at retail price, with discounts tested in sensitivity analyses.

<sup>102</sup> Imaging services in the (inpatient) hospital setting are already included in the DRG price.

Domain	England & Wales [16]	France [17]	Germany <sup>84</sup> [18] [19]	New Zealand [20] [21]
				<ul style="list-style-type: none"> <li>■ Hospital outpatient costs<sup>103</sup> (e.g., clinic visits, ED, day procedures) are valued using Outpatient Purchase Unit (PU) prices, which bundle all associated costs like staff time, administration, and overheads into a single price for the event.</li> <li>■ Community service<sup>104</sup> costs (e.g., residential care, ambulances) are valued using specific per-event or per-day rates, often obtained from provider schedules or national averages, and may also utilise PU prices.</li> </ul>
Pharmaceuticals	<p>Pharmaceuticals:</p> <ul style="list-style-type: none"> <li>■ For primary care pharmaceuticals, the NHS Drugs Tariff should be used [86] (for pharmaceuticals in secondary care see Hospital services)</li> <li>■ If no NHS-wide price reduction exists, list price or company-submitted prices (if transparent) should be used.</li> <li>■ Patient Access Schemes (PAS) and Commercial Access Agreements should be consulted for confidential discounts in the confidential committee analysis.</li> </ul>	<p>Pharmaceuticals:</p> <ul style="list-style-type: none"> <li>■ Reimbursed pharmaceuticals should be valued according to tariffs published in the Official Gazette (Journal official) [87] or tariff and price catalogues<sup>105</sup> [17].</li> <li>■ Non-reimbursed pharmaceuticals should be valued at the market price<sup>106</sup> or at a volume-weighted average selling price if the drug is sold at a freely determined price above the reimbursement tariff.</li> <li>■ Consideration of dispensing fees and average acquisition costs using the market share approach.</li> </ul>	<p>Pharmaceuticals:</p> <ul style="list-style-type: none"> <li>■ Pharmaceuticals can be valued according to prices in the database of the Information Service Provider for the Pharmaceutical Market (Informationsstelle für Arzneispezialitäten – IFA) [88] using standardised methods [19, 80-83] or price information within the chargeable LAUER TAXE® database [89].</li> </ul>	<p>Pharmaceuticals:</p> <ul style="list-style-type: none"> <li>■ Net price negotiated with the supplier in the Pharmaceutical Schedule is used to value pharmaceuticals.</li> <li>■ Doses should be based on the key clinical trials if it reflects New Zealand practice, otherwise on real-world evidence, considering body weight of the patient.</li> <li>■ Future generic entry and price reduction (e.g., 70% reduction) must be considered if patent expires within 10 years of funding.</li> <li>■ Dispensing fees, administration costs<sup>107</sup>, pharmacy mark-up (for community dispensing), and co-administered pharmaceuticals for managing side-effects need to be included.</li> <li>■ Valuation at full cost including wastage, regardless of patient co-payment.</li> </ul>

<sup>103</sup> Outpatient visits and services in New Zealand comprise of outpatient clinic visits, specialist consultations and minor operations, emergency department visits, dental care (in most cases the full cost is to the patient from age 18 years), blood transfusions performed as an outpatient or elective day case, travel and accommodation reimbursed through the Ministry of Health National, Travel Assistance Scheme, outpatient education and case management sessions.

<sup>104</sup> Community services include palliative care, residential care (rest home, dementia care, and hospital care for the health of older, people), home nursing, personal care and home help, prenatal and postnatal care, disability support services funded by the Ministry of Health, ambulance services.

<sup>105</sup> France provides different sources for measurement and valuation (tariffs and prices) of pharmaceuticals. Each provides specific information on usage, reimbursement, pricing, and volume. National Health Insurance expense data: Open MEDIC (aggregated use), OPEN PHMEV (prescribed products), Retroced\_AM (reimbursement bases), BdM\_IT (prices); retail (pharmacy) sales/prescription data: ANSM (sales to hospitals/retail), SDM (pharmacy prices), GERS (units sold/sales); and hospital sales/consumption data: Xpr-So-Open-health (real-time dispensing), HOSPI PHARMA-IMS/HOSPIWARD-IMS (intra-hospital dispensing), AFSSAPS Tax (hospital sales).

<sup>106</sup> If the tariff of reimbursed pharmaceuticals and medical device does not represent all of the expenses borne by the funders, then the actual price paid or a real weighted average price is used.

<sup>107</sup> According to PHARMAC, pharmaceutical administration costs can arise in three settings: hospital inpatient, hospital outpatient, outpatient (home, GP surgery, hospice, or residential care). The calculation of these costs depends on the personnel and structures utilised in each specific setting.

Domain	England & Wales [16]	France [17]	Germany <sup>84</sup> [18] [19]	New Zealand [20] [21]
Medical devices	<p>Medical devices:</p> <ul style="list-style-type: none"> <li>■ NHS Supply Chain prices from the NHS Supply Chain catalogue should be used to value medical devices [90].</li> <li>■ If no NHS-wide price reduction exists, list price or company-submitted prices (if transparent) should be used.</li> </ul>	<p>Medical devices:</p> <ul style="list-style-type: none"> <li>■ Reference prices (tariffs) from catalogues (tarif forfaitaire de responsabilité – TFR)<sup>108</sup> such as the Products and Services Qualifying for Reimbursement (LPPR) catalogue [91] laying down the tariffs should be used.</li> <li>■ Market prices should be used for non-reimbursed medical devices (documentation of deviations from tariffs necessary).</li> </ul>	<p>Medical devices:</p> <ul style="list-style-type: none"> <li>■ Medical devices are not part of IQWiG evaluations, but medical device costs are included in the DRG-based hospital per-case costs.</li> </ul>	<p>Medical devices:</p> <ul style="list-style-type: none"> <li>■ PHARMAC provides a comprehensive medical devices list with contracted listing prices [92].</li> <li>■ New Zealand acknowledges that devices have unique cost structures compared to pharmaceuticals: Costs extend beyond the device itself to its full lifecycle and not just the purchase price and should include one-off costs (price negotiated between the supplier and procurement agencies, primarily PHARMAC, disposal of old devices, implementation, switching costs), fixed costs (additional staff, overheads, training), and variable costs (operating costs, maintenance, repair, consumables).</li> </ul>
Hospital services	<p>Hospital services:</p> <ul style="list-style-type: none"> <li>■ Primary cost sources for HRG should be the NCC system and the 2025/26 NHS Payment Scheme.</li> <li>■ For pharmaceuticals in the primary care (hospitals), the Drugs and Pharmaceutical Electronic Market Information Tool (eMIT) [93] or prices agreed by the Medicines Procurement and Supply Chain<sup>109</sup> (MPSC) should be used.</li> <li>■ For new/high-cost procedures excluded from national tariffs, prices should be sourced directly from NHS providers.</li> </ul>	<p>Hospital services</p> <ul style="list-style-type: none"> <li>■ Primary method for valuation of hospital services (inpatient and outpatient) should be unit costs provided in the NCS (actual production costs excluding structural expenses), which considers HPGs, and the unit cost reference lists (RTC) [74].</li> <li>■ If NCS data are unreliable (low sample size, high uncertainty) HRG tariffs published in the Official Gazette (Journal official) [87] should be used.</li> <li>■ For new/unlisted procedures (e.g., robotic surgery), micro-costing using proposed data sources is used.</li> </ul>	<p>Hospital services</p> <ul style="list-style-type: none"> <li>■ Costs are valued using mainly the German DRG-based hospital flat-rate payment system (per-DRG case costs).</li> <li>■ Institute for the Hospital Remuneration System (InEK) provides a calculation handbook [94] to calculate cost per DRG case in hospitals and a catalogue and a database (aG-DRG-Report Browser) [95] with cost per DRG case including additional charges according to the DRG system [96].</li> <li>■ The DRG research group provides the DRG Webgrouper that applies the grouping rules of the German DRG system to calculate potentially reimbursed costs per DRG case including additional charges [97].</li> <li>■ Psychological or psychiatric services can be valued according to the average cost remuneration system for psychiatry and psychosomatics (PEPP) provided by InEK [98].</li> </ul>	<p>Hospital services:</p> <ul style="list-style-type: none"> <li>■ DRG tariffs sourced from the Ministry of Health inpatient data set should be used as the standard valuation.</li> <li>■ WIES (Weighted Inlier Equivalent Separations) case mix system is applied to adjust DRG tariffs for complexity/severity, patient volume (when weighting multiple DRGs), and mechanical ventilation.</li> <li>■ Pharmaceutical administration costs are already included in the WIES case mix adjusted DRG tariffs.</li> <li>■ DRG tariffs are average costs that include capital and overheads: If hospitalisation is the main cost driver, marginal costs are used.</li> </ul>

<sup>108</sup> The TFR is a reference price set by the French healthcare pricing committee (CEPS) for medical devices, procedures, and other healthcare products, used to determine reimbursement levels. France provides sources for measurement and valuation (tariffs and fees) of medical device resources. Each provides specific information on usage, reimbursement, pricing, and volume. National Health Insurance expense data: List of products and services/LLP (reimbursed amounts and face prices), non-hospital retail sales/prescription data: ANSM (sales to hospitals/retail), SDM (pharmacy prices), hospital sales/consumption data: Xpr-So-Open-health (real-time dispensing).

<sup>109</sup> The NHS Supply Chain catalogue is a digital platform listing all products and services procured by NHS Supply Chain, offering a single source of information including pricing, stock status, and alternatives for suspended items for NHS staff. The eMIT provides information about prices and usage for generic drugs and pharmaceutical products. NHS England's Medicines Procurement and Supply Chain (MPSC, formerly CMU) oversees secondary care medicines procurement via framework agreements.

Domain	England & Wales [16]	France [17]	Germany <sup>84</sup> [18] [19]	New Zealand [20] [21]
			<ul style="list-style-type: none"> <li>■ Federal health reporting (Gesundheitsberichterstattung des Bundes) GBE also provides hospital cost and expenditure data [99].</li> </ul>	
Residential care, home nursing and professional home care	Residential care: <ul style="list-style-type: none"> <li>■ See Other health care system specific services (Public health and social care)</li> </ul> Home care and home nursing: <ul style="list-style-type: none"> <li>■ See Other health care system specific services (Public health and social care)</li> </ul>	Residential care, home nursing and home care: <ul style="list-style-type: none"> <li>■ Care costs should be included and valued according to the average daily cost of care in the NCS on care homes for dependent elderly people (ENC EHPAD) [100].</li> </ul>	Residential care, home nursing and home care: <ul style="list-style-type: none"> <li>■ Not included (not part of the statutory health insurance system)</li> </ul>	Residential care, home care and home nursing: <ul style="list-style-type: none"> <li>■ See Healthcare services</li> </ul>
Transport/Travel/Ambulance	Transport/Travel/Ambulance: <ul style="list-style-type: none"> <li>■ Not reported</li> </ul>	Transport/Travel/Ambulance: <ul style="list-style-type: none"> <li>■ Average reimbursed amounts (non-reimbursed costs estimated similarly) calculated on the basis of national health insurance data/Open Damir (data on monthly reimbursements per type of service/provider/prescriber).</li> <li>■ Application of transparent methods (micro-costing) for non-reimbursed transport services.</li> </ul>	Transport/Travel/Ambulance: <ul style="list-style-type: none"> <li>■ Transport/Travel costs for medical interventions are included in the reference case, but no explicit information is available.</li> </ul>	Transport/Travel/Ambulance: <ul style="list-style-type: none"> <li>■ See Healthcare services</li> </ul>
Productivity costs <sup>110</sup> including patient and caregiver time	Productivity costs: <ul style="list-style-type: none"> <li>■ Productivity costs must be excluded in the reference case and included only in supplementary analysis.</li> </ul>	Productivity cost: <ul style="list-style-type: none"> <li>■ Productivity costs must be excluded in the reference case but may be conducted in a supplemental analysis (Authors have a free choice of the valuation method for indirect costs (e.g., productivity cost) but selections need justification).</li> </ul>	Productivity cost: <ul style="list-style-type: none"> <li>■ Productivity losses (societal perspective) should be included in the reference case and valued using the friction cost approach (80% of wage costs for a specific period); the human capital approach is an alternative for sensitivity analyses.</li> <li>■ Productivity losses due to premature death are excluded if mortality is already included on the benefit side to avoid double-counting.</li> <li>■ Time costs (e.g., for patients/relatives) are valued at the average net wage using data from the Destatis [101].</li> </ul>	Productivity costs: <ul style="list-style-type: none"> <li>■ Lost wages, cost of premature mortality, reduced productivity, intangible costs (e.g., pain and suffering) must be excluded in reference case.</li> </ul>
Informal care	Informal care: <ul style="list-style-type: none"> <li>■ Cost of informal care should only be included in the reference case if it substitutes NHS/PSS services, using clear valuation methods and sensitivity analyses.</li> </ul>	Informal care: <ul style="list-style-type: none"> <li>■ Informal care cost should be excluded in the reference case but if included in a supplemental analysis, transparent methods to calculate (micro-costing) caregiver time must be used (See Productivity costs)</li> </ul>	Informal care: <ul style="list-style-type: none"> <li>■ Disease-related time invested by affected patients and their relatives should be included in the reference case, but no explicit information is available.</li> </ul>	Informal care: <ul style="list-style-type: none"> <li>■ Not reported</li> </ul>
Other health care system specific services	Public health and social care: <ul style="list-style-type: none"> <li>■ Public health and social care services should be included but no national tariffs exists</li> </ul>	Emergency services	<ul style="list-style-type: none"> <li>■ Not reported</li> </ul>	Palliative/terminal care:

<sup>110</sup> The human capital approach (HCA) values lost productivity as total forgone wages (assuming permanent loss), while the friction cost approach (FCA) limits costs to the temporary “friction period” until workforce replacement. The latter better reflects societal productivity loss in economies with unemployment [6], because it assumes vacant positions can be refilled within a set timeframe (friction period) to restore pre-absence productivity levels. There is no consensus on the best instrument or approach to measure productivity impacts but the Belgian and the Canadian guidelines recommend Work Productivity and Activity Impairment (WPAI) questionnaire [67] or the iMTA Productivity Cost Questionnaire (iPCQ) [68] (only Belgium) available in several languages .

Domain	England & Wales [16]	France [17]	Germany <sup>84</sup> [18] [19]	New Zealand [20] [21]
	<ul style="list-style-type: none"> <li>The calculation should be similar to healthcare services and the valuation relies on PSSRU unit costs and local data.</li> </ul>	<ul style="list-style-type: none"> <li>Medicine, Surgery, Obstetrics and Odontology (MSO) emergency services should be included and valued using NCS HPG unit costs and the unit cost reference lists (RTC) [74]</li> <li>Unit cost for MSO emergency services is based on a specific tariff plus a flat-rate fee (emergency admission and treatment fee) per admission.</li> </ul>		<ul style="list-style-type: none"> <li>Palliative care costs should be included in the reference case and calculated based on the care setting: DRG tariffs for hospital-based care and per-day/per-visit rates (e.g., for hospice, residential, or home care) for community-based care.</li> <li>Cost of terminal care should be restricted to the terminal costs associated with the primary condition.</li> <li>When specific costing is complex, standard proxy estimates are used, and a wide range of these values must be tested in the sensitivity analysis due to significant cost variation.</li> </ul>
Lump-sum payments/Overhead costs <sup>111</sup>	<p>Lump-sum payments:</p> <ul style="list-style-type: none"> <li>Not reported</li> </ul> <p>Overheads:</p> <ul style="list-style-type: none"> <li>Not reported</li> </ul>	<p>Lump-sum payments:</p> <ul style="list-style-type: none"> <li>Not reported</li> </ul> <p>Overheads:</p> <ul style="list-style-type: none"> <li>Not reported</li> </ul>	<p>Lump-sum payments:</p> <ul style="list-style-type: none"> <li>Not reported</li> </ul> <p>Overheads:</p> <ul style="list-style-type: none"> <li>Not reported</li> </ul>	<p>Lump-sum payments:</p> <ul style="list-style-type: none"> <li>Not reported</li> </ul> <p>Overheads:</p> <ul style="list-style-type: none"> <li>Not reported</li> </ul>
Other costs and aspects	<ul style="list-style-type: none"> <li>Inclusion of survival-related costs but exclude unrelated expenses.</li> </ul>	<ul style="list-style-type: none"> <li>Exclusion of avoided events to prevent double-counting (included only in cost-minimisation analyses<sup>112</sup>).</li> </ul>	<ul style="list-style-type: none"> <li>Transfer payments should be excluded, and leisure time should only be considered in sensitivity analysis.</li> <li>One-off capital/investment costs for financing the provision or implementation of a healthcare service should be included in the reference case but typically addressed through sensitivity analyses rather than the reference case.</li> <li>Intangible costs such as costs incurred because of pain and suffering must be excluded in the reference case.</li> </ul>	<ul style="list-style-type: none"> <li>Transfer payments/Taxes and costs not falling under healthcare (e.g., social welfare) should be excluded.</li> </ul>
Manual consists of formulas and/or calculation examples for valuation and calculation of unit costs (costing)	Qualitative information on calculation (e.g., average costs per patient, per bed etc.), formulas, and calculation examples	Qualitative information on calculation (e.g., average costs per patient)	Qualitative information on calculation (e.g., average cost per patient)	Qualitative information on calculation (e.g., average costs per patient)
Unit costs, tariff system, per diem prices, fees available	Yes	Yes	Yes	Yes
Type of source	<p>Healthcare services:</p> <ul style="list-style-type: none"> <li>National Cost Collection (HRG unit costs) [75].</li> <li>2025/26 NHS Payment Scheme (HRG unit costs) [76].</li> </ul>	Healthcare services:	Healthcare services:	<p>Cost Resource Manual [21]</p> <p>Hospital medical devices list [92]</p>

<sup>111</sup> Lump-sum payments are fixed reimbursements for defined services and may indirectly include overhead allocations, but they are not classified as overhead costs per se. E.g., for bundled services: If a lump-sum (e.g., per hospital stay) implicitly covers shared infrastructure, overheads may be allocated within it – but this is not their primary purpose. For pragmatic reasons, both were summarised in one category.

<sup>112</sup> Including costs of the avoided event risks double-counting, as the benefit is already captured in the health outcome. Excluding them, however, omits consequential resource implications, presenting a methodological tension [102].

Domain	England & Wales [16]	France [17]	Germany <sup>84</sup> [18] [19]	New Zealand [20] [21]
	<ul style="list-style-type: none"> <li>■ PSSRU unit costs [77].</li> <li>Pharmaceuticals: <ul style="list-style-type: none"> <li>■ NHS Drugs Tariff (tariffs) [86].</li> </ul> </li> <li>Medical devices: <ul style="list-style-type: none"> <li>■ NHS Supply Chain catalogue (prices) [90].</li> </ul> </li> <li>Hospital services: <ul style="list-style-type: none"> <li>■ National Cost Collection [75] (HRG unit costs).</li> <li>■ 2025/26 NHS Payment Scheme [76] (HRG unit costs).</li> <li>■ Drugs and Pharmaceutical Electronic Market Information Tool (eMIT) for hospital pharmaceuticals [93] (prices).</li> </ul> </li> <li>Other: <ul style="list-style-type: none"> <li>■ PSSRU unit costs [77] (unit costs).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>■ Outpatient services: National Health Insurance statistics data (SNIIRAM) [78] from the National Health Data System (SNDS)<sup>113</sup> (average unit costs)</li> <li>■ Outpatient services: Open Data platforms (Open Damir, Open Bio) [84] (average unit costs)</li> <li>Pharmaceuticals: <ul style="list-style-type: none"> <li>■ Official Gazette (Journal official) [87] or tariff and price catalogues<sup>114</sup> [17] (tariffs and prices)</li> </ul> </li> <li>Medical devices: <ul style="list-style-type: none"> <li>■ Tariff catalogues<sup>105,115</sup> such as the Products and Services Qualifying for Reimbursement (LPPR) catalogue [91] laying down the tariffs should be used. (tariffs)</li> </ul> </li> <li>Hospital services: <ul style="list-style-type: none"> <li>■ NCS HPG unit costs and the unit cost reference lists (RTC) [74] (unit cost)</li> </ul> </li> <li>Other: <ul style="list-style-type: none"> <li>■ NCS HPG unit costs and the unit cost reference lists (RTC) [74] for emergency services (unit cost)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>■ German uniform evaluation catalogue (Einheitlicher Bewertungsmaßstab – EBM) [85] (tariffs)</li> <li>■ Standardised unit cost published by the German society for health economics [19, 82] (unit costs).</li> <li>Pharmaceuticals: <ul style="list-style-type: none"> <li>■ Database of the Information Service Provider for the Pharmaceutical Market (Informationsstelle für Arzneispezialitäten – IFA) [88] (prices).</li> <li>■ LAUER TAXE® database [89] (prices).</li> </ul> </li> <li>Medical devices: <ul style="list-style-type: none"> <li>■ Valuation of medical devices is included in the hospital cost per-DRG case costs.</li> </ul> </li> <li>Hospital services: <ul style="list-style-type: none"> <li>■ Catalogue and a database (aG-DRG-Report Browser) [95] with cost per DRG case including additional charges according to the DRG system [96] (cost per DRG case).</li> <li>■ DRG Webgroup that applies the grouping rules of the German DRG system to calculate potentially reimbursed cost per DRG case [97] (cost per DRG case).</li> <li>■ Federal health reporting for hospital cost and expenditure data [99] (aggregate data).</li> </ul> </li> <li>Other: <ul style="list-style-type: none"> <li>■ Average net wage from the Destatis [101] (average costs).</li> </ul> </li> </ul>	

<sup>113</sup> The National Health Data System (SNDS) makes it possible to link health insurance data (SNIIRAM database), hospital data (PMSI database), the medical causes of death, disability-related data, a sample of data from complementary health insurance organisations [79].

<sup>114</sup> France provides different sources for measurement and valuation (tariffs) of pharmaceutical resources. Each provides specific information on usage, reimbursement, pricing, and volume. National Health Insurance expense data: Open MEDIC (aggregated use), OPEN PHMEV (prescribed products), Retroced\_AM (reimbursement bases), BdM\_IT (prices); retail (pharmacy) sales/prescription data: ANSM (sales to hospitals/retail), SDM (pharmacy prices), GERS (units sold/sales); and hospital sales/consumption data: Xpr-So-Open-health (real-time dispensing), HOSPI PHARMA-IMS/HOSPIWARD-IMS (intra-hospital dispensing), AFSSAPS Tax (hospital sales).

<sup>115</sup> France provides different sources for measurement and valuation (tariffs) of medical device resources. Each provides specific information on usage, reimbursement, pricing, and volume. National Health Insurance expense data: List of products and services/LLP (reimbursed amounts and face prices), non-hospital retail sales/prescription data: ANSM (sales to hospitals/retail), SDM (pharmacy prices), hospital sales/consumption data: Xpr-So-Open-health (real-time dispensing).

Domain	Norway <sup>116</sup> [23]	Scotland [24]	The Netherlands [25] [26]	USA [27] [28]
Costing approach and Identification of resources				
Costing approach <sup>38</sup>	<p>The approaches are not explicitly reported but opportunity cost approximation using...</p> <ul style="list-style-type: none"> <li>■ Top-down macro costing via NoMA Unit Cost for healthcare services and hospital services adjusted by DRG-weighting (preferred approach).</li> <li>■ Bottom-up micro costing for new technologies, devices, capital equipment, and specific procedures including administration.</li> </ul>	<p>The approaches are not explicitly reported but opportunity cost approximation is done by a hybrid approach using...</p> <ul style="list-style-type: none"> <li>■ Top-down macro-costing<sup>117</sup> to calculate average unit costs for almost all services with bottom-up resource identification for the patient pathway in de novo health economic evaluations.</li> </ul>	<p>The opportunity cost approximation is done via a mixed-method approach, but with a clear and strong preference for bottom-up micro-costing as the gold standard using...</p> <ul style="list-style-type: none"> <li>■ Bottom-up micro-costing<sup>118,119</sup> as default for staff costs, costs relating to clients or residents, and alternatively for (large or expensive) items/materials (preferred approach).</li> <li>■ Top-down macro-costing as default for costs of (general) materials, food costs, other accommodation-related costs, other general costs, medical equipment, overhead costs and alternatively for staff costs and costs relating to clients or residents.</li> </ul>	<p>The approaches not explicitly reported but opportunity cost approximation is done by a mixed approach using...</p> <ul style="list-style-type: none"> <li>■ Top-down macro-costing for pharmaceuticals, hospital and outpatient services via DRG rates and Medicare Physician Fee Schedule (preferred approach).</li> <li>■ Bottom-up micro-costing (if possible) to capture not only health care utilisation, but also the key elements of the disease process.</li> </ul>
Identification <sup>43</sup> of resources	<ul style="list-style-type: none"> <li>■ Reference case (base case) should include costs from a societal perspective including the treatment or prevention costs, transport costs related to travelling to and from treatment (both with distinction whether paid by the healthcare system or by the patient/caregiver), and patients and their caregivers use of time during patient treatment.</li> <li>■ Incremental cost focus between the new pharmaceutical or medical device compared with current treatment (omit resources if costs are trivial or cancel out)</li> <li>■ BIA is conducted, but no formal guidelines are available.</li> </ul>	<ul style="list-style-type: none"> <li>■ Reference case (non-mandatory base case) should include only costs that relate to the healthcare system and personal social services perspective.</li> <li>■ Incremental cost focus (CUA) for alternative therapies routinely used in the NHS in Scotland.</li> <li>■ BIA is mandatory using a market-share analysis to calculate the population and a healthcare system and personal social services perspective only considering direct consequences over a period of at least 3 years (including VAT).</li> </ul>	<ul style="list-style-type: none"> <li>■ Reference case (base case) should include all costs within healthcare (also during life years gained), patient and family costs, as well as costs in other sectors. from a societal perspective.</li> <li>■ Incremental cost focus (CUA) for the intervention and comparative intervention.</li> <li>■ The role of BIA is not yet fully established in the Netherlands.</li> </ul>	<ul style="list-style-type: none"> <li>■ Reference case (base case) should include all relevant resources and costs based on the healthcare system perspective.</li> <li>■ Incremental cost focus (CUA) for the intervention and comparative intervention.</li> <li>■ BIA is conducted using an epidemiological (preferred) or market-share analysis with equal proportion of prevalent patients (20%) receiving the new treatment each year over five years.</li> </ul>

<sup>116</sup> The Norwegian Medicines Agency (NoMA) is the primary body for HTAs of pharmaceuticals – so called Single technology assessments (STAs) for medicinal products. Since January 2024, it also conducts HTAs for medical devices, but only when commissioned by the national New Methods (Nye metode) system. While the HTA process for devices shares core methods with medicinal products, slight differences exist in the submission guidelines, particularly regarding the costing of medical devices including diagnostic products and capital costs.

<sup>117</sup> The Scottish Medicines Consortium (SMC) bases its costing on two top-down macro-costing approaches: the NHS NCC and the Personal Social Services Research Unit (PSSRU) method that provides unit costs for health and social care services [77].

<sup>118</sup> The Dutch Costing Manual provides nationally agreed upon reference prices (unit costs) and Standard Calculation Values to ensure consistency and efficiency, and to avoid time-consuming primary costing for common elements in economic evaluations. Reference prices are cost prices and based on a bottom-up micro-costing approach. The reference prices for many types of healthcare services are listed in the costing manual and should be preferably used. In some instances, reference prices are not available, or they are too inaccurate for the evaluation in question. In that case independent costing studies is required. If reference prices and costing studies are not available, the specified costing approaches in combination with other evaluation units, such as financial healthcare registries, NZa rates, market prices, or DTC rates, can be used. The Standard Calculation Values, which are standardised natural units and do not reflect the cost price of a healthcare cost unit, can be used to calculate costs and cost prices.

<sup>119</sup> The costing approaches in the Netherlands are mainly used for the hospital context, but ZIN states that the methodology can be largely used for costing studies at healthcare providers other than in hospital. Some domains or components are not equally relevant every healthcare context outside the hospital (e.g., accommodation-related costs are less relevant in primary care but relevant in nursing homes). Deviations from the standard costing approach for hospital services are described in each (health) service domain.

Domain	Norway <sup>116</sup> [23]	Scotland [24]	The Netherlands [25] [26]	USA [27] [28]
Measurement <sup>120</sup> of resources				
Data sources <sup>121</sup>	<ul style="list-style-type: none"> <li>■ The Norwegian Medical Products Agency (NoMA) requires the submission to be based on systematic literature searches with evidence from RCTs as the gold standards for establishment of relative efficacy and the safety profile.</li> <li>■ Parametrisation of the health economic model must be based on the actual data from (Norwegian) clinical studies or international clinical studies with adaptations to the Norwegian setting.</li> <li>■ Expert opinion can complement existing data (e.g., input parameters).</li> </ul>	<ul style="list-style-type: none"> <li>■ The Scottish Medicines Consortium (SMC) prioritises evidence from active-comparator RCTs and meta-analyses but will consider placebo-controlled or uncontrolled studies if they demonstrate clinical benefits in absence of RCTs.</li> <li>■ The health economic reference case utilises diverse (clinical) data sources for clinical and economic parameters (e.g., cohort studies for parameters relating to the natural history of the condition, RCTs for relative treatment effects, cross-sectional surveys for resource use and costs), with resource use commonly drawn from national repositories (e.g., PSSRU, National Services Scotland, and datasets covering hospital activity, primary care, and prescribing).</li> <li>■ Expert opinion is an acceptable data source when study data is lacking but requires a transparent expert selection process and must be tested in sensitivity analyses.</li> <li>■ Expert opinion or foreign resource use data can be used but should be avoided if possible or at least validated for the Scottish setting.</li> </ul>	<ul style="list-style-type: none"> <li>■ The Zorginstituut Nederland (ZIN) prioritises relative effectiveness data from systematic reviews, meta-analysis, and RCTs for the reference case.</li> <li>■ Resource data are taken from clinical studies (comparative and observational studies), registries, clinical guidelines, hospital treatment protocols, Diagnosis Treatment Combination (DTC) information system, and patient self-reporting.</li> <li>■ Specific medical devices, drugs and dosages are mainly identified from treatment protocols and resources used for elderly care, disability care, home care from care plans.</li> <li>■ Informal care time is measured by the Institute for Medical Technology Assessment (iMTA) Valuation of Informal Care Questionnaire (iVICQ) [103] or the informal CARE effect (iCARE) tool [104].</li> <li>■ Productivity losses are measured via the iMTA Productivity Cost Questionnaire (iPCQ) [68].</li> <li>■ Expert opinion can be consulted for an economic evaluation but only if no other evidence is available.</li> </ul>	<ul style="list-style-type: none"> <li>■ The Institute for Clinical and Economic Review (ICER) prioritises relative effectiveness data from systematic reviews with meta-analysis for the reference case.</li> <li>■ Resource data and economic impacts of the interventions are identified through the scoping process and taken from the identified evidence. Data includes mainly the evidence used in the systematic review including clinical trials but also standard treatment guidelines.</li> <li>■ Other sources of economic data should be preferably taken from publicly available sources (e.g., Healthcare Cost and Utilization Project (HCUP), publications using commercial claims data, Medicare, RED BOOK<sup>122</sup>).</li> <li>■ Observational data (real-world evidence) can be used as a source of model inputs on transitional health states, concordance and persistence, costs, and health utilities if critical comparative data is lacking and sufficient confidence in the data is ensured.</li> <li>■ Expert opinion is used to validate the modelled pathway of care.</li> </ul>
Cost units	<p>Cost units:</p> <ul style="list-style-type: none"> <li>■ General: Natural units</li> <li>■ Healthcare services: Cost per contact/consultation/unit.</li> <li>■ Pharmaceuticals: Cost per package</li> <li>■ Medical devices: Cost per medical device</li> <li>■ Hospital services: Cost per hospital bed day or cost per DRG case</li> <li>■ Other cost units: Time-based, e.g., cost per hour (Caregiver, Travel/Transport, staff training sessions)</li> </ul>	<p>Cost units:</p> <ul style="list-style-type: none"> <li>■ General: Natural units</li> <li>■ Healthcare services: Cost per visit/consultation (GP, nurse, community care, and other outpatient services).</li> <li>■ Pharmaceuticals: Cost per unit (e.g., per tablet, per vial), per defined daily dose (DDD), per treatment course.</li> <li>■ Medical devices: Costs are absorbed within broader NHS service tariffs (see Medical devices).</li> </ul>	<p>Cost units:</p> <ul style="list-style-type: none"> <li>■ General: Natural units</li> <li>■ Healthcare services: Cost per consultation, per session, per hour.</li> <li>■ Pharmaceuticals: Cost per defined daily dose (DDD), per package, per issue.</li> <li>■ Medical devices: Cost per item.</li> <li>■ Hospital services: Cost per procedure, per minute, per day, per visit, per administration.</li> </ul>	<p>Cost units:</p> <ul style="list-style-type: none"> <li>■ General: Natural units</li> <li>■ Healthcare services: Cost per physician visits, per hospitalizations, per (diagnostic) procedure.</li> <li>■ Pharmaceuticals: Cost per mg of drug, per dose considering frequency and duration.</li> <li>■ Medical devices: No specific guidance reported.</li> <li>■ Hospital services: Cost per DRG case admission/episode.</li> </ul>

<sup>120</sup> Measurement means quantifying the amount/frequency of resources used (e.g., number of hospital days, drug doses).

<sup>121</sup> The Data sources domain serves to identify the origin of resources and provide information on their valuation. Note that sources for resource use and pricing data are frequently intertwined and not fully disentangled. The specific methodologies and sources for valuation are elaborated in the General principles of valuation section and are further detailed within each service domain (e.g., healthcare, hospital services).

<sup>122</sup> The RED BOOK is a comprehensive resource providing current drug pricing, product descriptions, and manufacturer information for prescription and over-the-counter pharmaceuticals to simplify drug identification and comparison.

Domain	Norway <sup>116</sup> [23]	Scotland [24]	The Netherlands [25] [26]	USA [27] [28]
		<ul style="list-style-type: none"> <li>■ Hospital services: Cost per hospital bed day (Scottish per diems), per surgical procedure, per diagnostic test.</li> <li>■ Other cost units: not reported/already included in other cost units.</li> </ul>	<ul style="list-style-type: none"> <li>■ Other cost units: Cost per day, per hour, per visit (Elderly care, disability care, home care).</li> </ul>	<ul style="list-style-type: none"> <li>■ Other cost units: Cost per hour (productivity costs)</li> </ul>
Data Quality & Analysis		<ul style="list-style-type: none"> <li>■ Study limitations (e.g., in design, conduct, analysis) that influence the strength of the clinical evidence for the product's benefits and adverse effects versus the chosen comparator must be described.</li> <li>■ All clinical and cost-effectiveness input data must be presented clearly in tables, including full details of their sources.</li> </ul>	<ul style="list-style-type: none"> <li>■ Adherence to hierarchical source preference and use of validated (resource) measurement Instruments.</li> <li>■ Systematic checks for completeness and accuracy when collecting (primary) data.</li> </ul>	
Valuation of resources				
General principles	<p>General principles:</p> <ul style="list-style-type: none"> <li>■ Market prices and official Norwegian sources such as the NoMA Unit Cost database including the associated documentation report are the primary sources for valuation.</li> <li>■ OOP: Patient co-payments for outpatient consultations are to be disregarded as they are already factored into the DRG weighting system.</li> <li>■ Cost of healthcare professionals time is based on gross monthly wages, converted to an hourly cost adjusted for annual working hours and add-ons for employer's national insurance contributions and other social costs.</li> <li>■ Expression of inflation-adjusted cost by using using specified indices (Consumer Price Index - CPI)</li> </ul>	<p>General principles:</p> <ul style="list-style-type: none"> <li>■ The primary source for official tariffs, fees, and prices (unit costs) are official listings from Scottish Government, UK Department of Health (e.g., "NHS Reference Costs"/NCC, National Services Division, and Welsh Assembly Government.</li> <li>■ Public list prices are used for standardisation reasons. (not actual, negotiated or confidential prices except for some pharmaceuticals the Patient Access Scheme price<sup>123</sup> is used).</li> <li>■ Staff cost must include all employer costs (salary, capital, training). The standard approach includes annuitised capital and education costs, reflecting a long-term opportunity cost perspective.</li> <li>■ Capital costs should be annuitised and included unless a specific short-term perspective is justified.</li> <li>■ Expression of inflation-adjusted costs updated to the current year using a UK health service price index.</li> </ul>	<p>General principles:</p> <ul style="list-style-type: none"> <li>■ ZIN has a clear hierarchy of sources for identifying economic and resource data and for deriving reference prices, which must be applied in the course of costing: 1) Costing studies by the Ministry of Health, Welfare and Sport (VWS) or published cost price studies (preferably bottom-up microcosting), 2) Financial registries and National databases, e.g., Zorgcijfersdatabank, Medicines and medical devices Information Project-databank (GIP)<sup>124</sup>, Statistical Netherlands (CVB), etc., 3) Dutch Healthcare Authority (NZa) tariffs and maximum medicine reimbursement rates<sup>125</sup> provided by ZIN, 4) Market prices, 5) DTC tariffs (least preferred, as they are negotiated prices, not cost prices).</li> <li>■ ZIN's reference prices (unit costs) in the costing manual are the main source valuation and are derived from a strict hierarchy of sources (Costing studies<sup>126</sup> &gt; Financial &gt; NZa &gt; Market price &gt; DTC).</li> </ul>	<p>General principles:</p> <ul style="list-style-type: none"> <li>■ ICER prefers the use of publicly available cost data for unit costs including Medicare fee schedules, HCUP DRG reimbursement rates, commercial claims data publications, the RED BOOK for drug Wholesale Acquisition Cost (WAC), ASP Drug Pricing File for Average Sales Price (ASP) of physician-administered drugs, SSR Health, IPD Analytics Rebate Monitor<sup>127</sup> for net price discounts</li> <li>■ Expression of inflation-adjusted costs updated to the current year using Personal Consumption Expenditures – Health care services (PCE-H) price from the Bureau of Economic Analysis (BEA).</li> <li>■ Foreign cost adjustment: Foreign cost data should be converted to current-year US dollars, using foreign exchange rates.</li> </ul>

<sup>123</sup> The approved Patient Access Scheme (PAS) discount for the submitted medicine agreed by the Patient Access Scheme Assessment Group (PASAG) and the company must be used alongside the list price. For comparator medicines with a PAS, the list price should be used for the public calculation, though NHS Boards will confidentially factor in the actual discounted cost for internal budget planning.

<sup>124</sup> The Zorgcijfersdatabank serves as the primary repository for statistical data on the Dutch healthcare sector, encompassing metrics like healthcare expenditure and patient volumes. The GIP-databank (Medicines and Medical Devices Information Project) catalogs information pertaining to medicines and medical devices eligible for reimbursement through the Dutch healthcare system.

<sup>125</sup> The NZa establishes maximum rates for various types of care, including GP and dental services. A key issue is that these rates do not directly reflect a procedure's actual cost, as they also serve macro-budgeting and income policy purposes. The primary source for determining cost of medicines is [www.medicijnkosten.nl](http://www.medicijnkosten.nl) by the ZIN.

<sup>126</sup> The references prices from (empirical) costing studies are the preferred form of valuation for every (healthcare) service.

<sup>127</sup> SSR Health provides a net price database of industry data used by academics, brand manufacturers, policymakers etc. and IPD Analytics provides manufacturer-reported sales data and rebate information.

Domain	Norway <sup>116</sup> [23]	Scotland [24]	The Netherlands [25] [26]	USA [27] [28]
		<ul style="list-style-type: none"> <li>Foreign cost adjustment: Foreign data can be used but should be avoided if possible or at least validated for the Scottish setting.</li> <li>Exclusion of VAT in economic evaluations but include it in budgetary impact calculations.</li> </ul>	<ul style="list-style-type: none"> <li>The reference prices (unit costs), methodology and valuation approach are primarily designed for hospital services but are broadly applicable to other (health) care domains<sup>119</sup>.</li> <li>Expression of inflation-adjusted costs updated to the current year using the Dutch CPI (listed reference prices in the costing manual are expressed in 2022 Euros).</li> <li>Prices (for pharmaceuticals) excluding VAT should be used.</li> </ul>	
Future cost (changes)	Future cost (changes): <ul style="list-style-type: none"> <li>Consequences of patients' future use of public services and unrelated health service costs and savings are excluded.</li> </ul>	Future cost (changes): <ul style="list-style-type: none"> <li>Predictions future practice must be justified using multiple sources (data from related HEE, historical uptake of similar medicines, and consultations with clinical experts).</li> </ul>	Future cost (changes): <ul style="list-style-type: none"> <li>For studies with a lifelong time horizon, all future costs must be included, including those incurred during years of life gained<sup>128</sup>.</li> </ul>	Future cost (changes): <ul style="list-style-type: none"> <li>Future related and unrelated health care costs of survival and death related to the condition are explicitly included.</li> </ul>
Healthcare services <sup>129</sup>	Healthcare services: <ul style="list-style-type: none"> <li>The NoMA unit cost database should be used to value healthcare services as it contains most of the relevant costs for GP and specialist services, nursing homes services, and diagnostic services including imaging and laboratory tests.</li> <li>The unit cost for (outpatient) healthcare services are based on tariffs from the Poliklinikkforskriften (Outpatient Regulations) and the Norwegian Health Economics Administration (HELFO) provides an overview of these tariffs for various outpatient healthcare services [107].</li> </ul>	Healthcare services: <ul style="list-style-type: none"> <li>Cost and resource data for the healthcare services should be used from the NHS Cost Book<sup>130</sup>.</li> <li>Unit costs can also be taken from the Unit Costs of Health and Social Care publication by the PSSRU. The choice to use these costs must be justified.</li> </ul>	Healthcare services <ul style="list-style-type: none"> <li>ZINs reference prices are the main source for healthcare services<sup>119</sup> such as GP consultations, diagnostic and radiology services in the outpatient setting.</li> <li>If no reference prices for primary and paramedical healthcare are available, the services are predominantly costed by a top-down macro-costing approach using national aggregate expenditure and production data.</li> </ul>	Healthcare services <ul style="list-style-type: none"> <li>Unit costs for outpatient and professional services are derived using Medicare Physician Fee Schedule (PFS) rates or commercial claims data and reported as total per patient.</li> </ul>

<sup>128</sup> Kellerborg et al. [2020] and van Baal et al. [2011] provide guidance on how to include future costs.

<sup>129</sup> The healthcare services domain primarily covers physician services (e.g., family doctors, specialists) and outpatient diagnostics/investigational services, such as imaging procedures, laboratory and pathology tests. Non-physician services are included also under the health care services domain unless addressing specialised domains (e.g., residential care, home nursing, transport) requiring a distinct valuation with more scrutiny compared to standard health care services.

<sup>130</sup> Public Health Scotland's Cost Book is the comprehensive source for Scottish health service costs, used for benchmarking and capturing ~95% of costs across all settings (hospital inpatient and outpatient care, primary and family health, and community sectors) delivered by the 14 territorial NHS Boards (regional healthcare organisations) and national centres. The Cost Book's R100T datasheet [108] is an essential source of national unit cost data, providing per diem costs (national average cost per attendance for day patients), Costs for inpatient activity (e.g., cost per case, cost of inpatient surgery, intensive care), Costs for long-stay inpatient activity (cost per week), costs for day cases (cost per day case) and day patients (cost per attendance), outpatient and A&E attendances (cost per attendance), diagnostic services (e.g., cost per CT scan, cost per MRI scan), community services (e.g., district nursing, midwifery, and dentistry, all reported as cost per head of population), support services (e.g., catering cost per inpatient week, cleaning cost per square metre). This publication supersedes all previous data from the now-retired Information Services Division (ISD), whose website has been retired and whose functions have been incorporated into Public Health Scotland [109].

Domain	Norway <sup>116</sup> [23]	Scotland [24]	The Netherlands [25] [26]	USA [27] [28]
	<ul style="list-style-type: none"> <li>The Norwegian Medical Association (NMA) for primary care and outpatient services also provides an overview of relevant tariffs, patient contributions, and subsidies for healthcare services but the NoMA unit cost database should be the basis for valuation.</li> <li>If NoMA tariffs are used, then a special valuation for GP/Specialist consultations applies: Official remuneration tariff x 2 to account for public subsidies and overhead.</li> </ul>			
Pharmaceuticals	<p>Pharmaceuticals:</p> <ul style="list-style-type: none"> <li>The maximum Pharmacy Retail Price (PRP) excluding VAT from the NoMA website must be used for valuation.</li> <li>Valuation should be done per package to account for wastage, but any vial sharing or drug wastage must be reported.</li> <li>Sensitivity analysis using discounted prices, anticipating future generics/biosimilars or tender agreements.</li> <li>Admission and infusion fees need to be included and are listed in the NoMA unit cost database based on data from the Oslo University Hospital (mainly for monoclonal antibodies)</li> <li>The unit costs consider nurse time, labour costs from pharmacy, disposable equipment, and additives adjusted by an overhead cost of 25% to cover other types of expenses such as management cleaning, premises.</li> </ul>	<p>Pharmaceuticals:</p> <ul style="list-style-type: none"> <li>Unit costs must be based on list prices in the British National Formulary (BNF) or Monthly Index of Medical Specialities<sup>131</sup> (MIMS).</li> <li>For a medicine with a Patient Access Scheme (PAS), both the list price and the PAS price must be used in the analysis.</li> <li>If a volume-weighted average cost for the comparator is used, a sensitivity analysis using the cheapest alternative (e.g., a generic) must be included. Drug tariff data on generics may be used from the Scottish Drug Tariff catalogue [110].</li> </ul>	<p>Pharmaceuticals:</p> <ul style="list-style-type: none"> <li>A standardised formula is applied for prescription only medicines (Healthcare (Market Regulation Act medicines – WMG medicines): WMG costs = Purchase price provided by ZIN + Costs pharmaceutical care or Issuing costs</li> <li>Inpatient medicines may require a top-down adjustment if significant discounts are suspected.</li> <li>OTC medicines are valued using the medicine's sales price.</li> <li>For determining costs of blood products, ZIN provides a specific source (<a href="http://www.farmacotherapeutischkompas.nl">www.farmacotherapeutischkompas.nl</a>)</li> <li>Alternative sources for prices are the G-standaard, a reference database for pharmaceutical products, and the GIP-databank (Medicines and medical devices Information Project database).</li> </ul>	<p>Pharmaceuticals:</p> <ul style="list-style-type: none"> <li>Calculation of pharmaceutical acquisition costs is highly detailed and depends on three factors: 1) branded, generic, or biosimilar status; 2) requirement for provider administration; 3) whether the price is known.</li> <li>Generic/Biosimilar provider administered drugs (price known): Median WAC (from RED BOOK).</li> <li>Generic/Biosimilar provider-administered drugs (price known): The ASP + markup (from ASP Drug Pricing File) is used. For biosimilars, the markup is 6% of the original biologic's price.</li> <li>Branded treatments non-provider administered drugs (price unknown): Median WAC (from RED BOOK) is used. A net price is estimated for the base case by applying average discounts from SSR Health or IPD Analytics.</li> <li>Branded treatments provider administered drugs (price known): ASP + markup (from the ASP Drug Pricing File) is used for total cost (markup is modelled separately).</li> <li>Drugs with unknown price (placeholder): A placeholder price is established by consulting manufacturers, analyst reports, or using prices of analogous drugs.</li> </ul>
Medical devices	<p>Medical devices:</p> <ul style="list-style-type: none"> <li>The expected retail price excluding VAT from the NoMA website must be used for valuation.</li> </ul>	<p>Medical devices:</p>	<p>Medical devices:</p>	<p>Medical devices:</p> <ul style="list-style-type: none"> <li>Not reported<sup>132</sup>.</li> </ul>

<sup>131</sup> MIMS is a UK-wide pharmaceutical reference for healthcare professionals providing essential information on medicines for prescribing and clinical decisions.

<sup>132</sup> ICER's HEEG does not provide specific guidance unique to devices, but the Value Assessment Framework presents specific considerations for the assessment of non-drug interventions (devices, digital health technologies, diagnostic test, and delivery system innovations) [28].

Domain	Norway <sup>116</sup> [23]	Scotland [24]	The Netherlands [25] [26]	USA [27] [28]
	<ul style="list-style-type: none"> <li>The cost of any pharmaceuticals or ancillary healthcare services used with the medical device must be valued according to the standard unit costs for those resources. (see Pharmaceuticals and Healthcare services).</li> </ul>	<ul style="list-style-type: none"> <li>The SMC's remit is limited to medicines with MHRA marketing authorisation; devices without this approval are excluded from assessment.</li> <li>Costs for routine medical devices are typically absorbed within broader NHS service tariffs (see Healthcare services or Hospital services). If a device is specifically required for a new treatment, its official price should be included in the economic model.</li> </ul>	<ul style="list-style-type: none"> <li>The price of medical devices is taken directly from supplier lists or national databases (e.g., GIP-databank: <a href="http://www.gipdatabase.nl">www.gipdatabase.nl</a>).</li> </ul>	
Hospital services	<p>Hospital services</p> <ul style="list-style-type: none"> <li>Different approaches for the valuation hospital services exist in Norway.</li> <li>NoMA's unit costs for general and intensive care bed-days are derived from official national data (Norwegian Directorate of Health's database – SAMDATA)</li> <li>A publication by Lindemark et al. [2017] also provides unit costs for an average hospital bed-day and intensive care bed-day based on data from four hospitals.</li> <li>Another method to get the total cost of the stay adjusted for the diagnosis is to use the DRG system by multiplying the relevant DRG code's cost weight ("Kostnadsvekt") by the national unit price for that year.</li> <li>If the DRG code is unknown, cost per day or per consultation can be sourced from the SAMDATA for the specialist health service (somatic, mental health services and multi-disciplinary specialised addiction treatment).</li> </ul>	<p>Hospital services</p> <ul style="list-style-type: none"> <li>Scottish per diem costs must be used for hospital services. Cost and resource data for the hospital sector is available in the NHS Cost Book<sup>130</sup>.</li> <li>NHS NCC from England is also an acceptable source for unit costs.</li> </ul>	<p>Hospital services</p> <ul style="list-style-type: none"> <li>ZINs reference prices for day care, day treatment, outpatient visit, emergency room usage, transportation by ambulance, medicines (see Pharmaceuticals), inpatient diagnostic and radiology services are the main source for hospital services.</li> <li>A mix of micro-costing (for specific, high-cost procedures) and macro-costing (for broader units like bed days) is used.</li> <li>The preferred method is bottom-up micro-costing according to the preferred valuation hierarchy, especially for specific and high-cost procedures (identifying and valuing every input for a specific unit).</li> <li>Top-down macro-costing is used (total department costs divided by total volume) for broader units like bed days, where detailed breakdowns are impractical.</li> </ul>	<p>Hospital services</p> <ul style="list-style-type: none"> <li>Unit costs are derived using DRG reimbursement rates (from HCUP or Medicare) and reported as total per patient</li> </ul>
Residential care, home nursing and professional home care	<p>Residential care, home care and home nursing:</p> <ul style="list-style-type: none"> <li>See Healthcare services</li> </ul>	<p>Residential care, home care and home nursing:</p> <ul style="list-style-type: none"> <li>See Healthcare services</li> </ul>	<p>Residential care, home care and home nursing:</p> <ul style="list-style-type: none"> <li>Like outpatient services, cost per unit is either taken from the costing manual or derived from sector-wide totals, mainly via top-down macro-costing, e.g., reference prices for elder care are based on the total costs of the entire stay and the average days per stay in 2021.</li> </ul>	<p>Residential care, home care and home nursing:</p> <ul style="list-style-type: none"> <li>See Healthcare services</li> </ul>
Transport/Travel/Ambulance	<p>Transportation costs</p> <ul style="list-style-type: none"> <li>Transportation costs for travel to and from treatment (e.g., for hospital outpatient care) should be included in the health economic analysis.</li> <li>HELFO provides tariffs (excl. patient's co-payments) for transport costs for travels with and without medical requisitions.</li> </ul>	<p>Transport/Travel/Ambulance</p> <ul style="list-style-type: none"> <li>Costs falling outside the NHS and social work perspective (e.g., patient travel, informal care) should only be included if they are differentially affected by the treatments.</li> </ul>	<p>Transport/Travel</p>	<p>Transport/Travel/Ambulance</p> <ul style="list-style-type: none"> <li>Included but not specifically reported.</li> </ul>

Domain	Norway <sup>116</sup> [23]	Scotland [24]	The Netherlands [25] [26]	USA [27] [28]
	<ul style="list-style-type: none"> <li>In case of treatment, the cost will be double.</li> </ul>	<ul style="list-style-type: none"> <li>As such (social) service costs are hard to find for Scotland, English data (e.g. from PSSRU) are acceptable, but the use should be clearly explained.</li> </ul>	<ul style="list-style-type: none"> <li>Travel costs by patients: Each mode of transport (car, public transport, taxi, ambulance, transport covered by the Social Support Act/Wmo<sup>133</sup>) has a standardised reference price per km.</li> <li>The total cost of a home care visit by a health professional includes a fixed travel component.</li> </ul>	
Productivity costs <sup>134</sup> including patient and caregiver time	Productivity cost: <ul style="list-style-type: none"> <li>Productivity changes resulting from the intervention should not be included.</li> </ul>	Productivity cost: <ul style="list-style-type: none"> <li>Not reported</li> </ul>	Productivity cost: <ul style="list-style-type: none"> <li>The reference price for productivity losses is calculated using a friction cost approach considering either absenteeism or presenteesim. The value per hour is based on the average gross labour costs per hour per worker.</li> </ul>	Productivity cost: <ul style="list-style-type: none"> <li>Unit cost estimates by Jiao and Basu [2023] based on a human capital approach applied on time spent on formal labour, informal labour, household production, and time seeking care.</li> </ul>
Informal care	Informal care: <ul style="list-style-type: none"> <li>Not reported</li> </ul>	Informal care: <ul style="list-style-type: none"> <li>Costs falling outside the NHS and social work perspective (e.g., patient travel, informal care) should only be included if they are differentially affected by the treatments.</li> <li>As such (social) service costs are hard to find for Scotland, English data (e.g. from PSSRU) are acceptable, but the use should be clearly explained.</li> </ul>	Informal care: <ul style="list-style-type: none"> <li>Reference prices are calculated using the replacement cost method. The time is valued at the hourly rate of a professional domestic care worker.</li> </ul>	Informal care <ul style="list-style-type: none"> <li>See Productivity Costs</li> </ul>

<sup>133</sup> Car travel uses a comprehensive per-kilometer rate covering all variable operating costs (fuel, depreciation, maintenance, insurance, and tax). Public transport is calculated using a simpler average cost-per-kilometer, which is a weighted average across different modes (bus, tram, metro, train) based on the proportion of total kilometers traveled by each. Taxi/Wmo transport is based on regulated government tariffs of a fixed initial charge plus a variable distance cost. Ambulance transport employs a two-tiered system where an average cost per journey is derived from total sector expenditure, with emergency transport priced higher to reflect its greater resource intensity.

<sup>134</sup> The human capital approach (HCA) values lost productivity as total forgone wages (assuming permanent loss), while the friction cost approach (FCA) limits costs to the temporary “friction period” until workforce replacement. The latter better reflects societal productivity loss in economies with unemployment [6], because it assumes vacant positions can be refilled within a set timeframe (friction period) to restore pre-absence productivity levels. There is no consensus on the best instrument or approach to measure productivity impacts but the Belgian and the Canadian guidelines recommend Work Productivity and Activity Impairment (WPAI) questionnaire [67] or the iMTA Productivity Cost Questionnaire (iPCQ) [68] (only Belgium) available in several languages .

Domain	Norway <sup>116</sup> [23]	Scotland [24]	The Netherlands [25] [26]	USA [27] [28]
Other health care system specific services	<ul style="list-style-type: none"> <li>■ Palliative Care: Palliative care costs are calculated based on a palliative care unit price set by NoMA, DRG code and a palliative duration of 14 days (only guidance, because palliative care costs depend on the disease area including the duration of the end-of-life phase)</li> </ul>	<ul style="list-style-type: none"> <li>■ Not reported</li> </ul>	<ul style="list-style-type: none"> <li>■ Mental health care services including social work<sup>135</sup>: Costs per hour/minute/contact (GPs, social work, psychologists, nurses, mental healthcare provider in basic and specialised mental health institutions including general hospitals and university hospitals), day of care (psychiatric institution, general and university hospitals), or per part of a day for daytime activities (specialised mental healthcare institutions) are primarily based on reference prices from comprehensive bottom-up micro-costing studies.</li> <li>■ Paramedical services: Reference prices for paramedical care are available and are based on the total expenditure and production data in 2021 in the outpatient setting.</li> <li>■ Rehabilitation: referenced prices are calculated by a top-down macro-costing approach. Total costs of rehabilitation centres are divided by the number of consultations (for costs per consultation) and days of care (for costs per day), with separate values for adults and children.</li> <li>■ Disability care: Reference prices are based on national expenditure data and volume of care days calculated via a top-down macro-costing approach.</li> </ul>	<ul style="list-style-type: none"> <li>■ Not reported</li> </ul>
Lump-sum payments/Overhead costs <sup>136</sup>	<p>Lump-sum payments:</p> <ul style="list-style-type: none"> <li>■ Not reported</li> </ul> <p>Overheads:</p> <ul style="list-style-type: none"> <li>■ Currently no general recommendation concerning allocation of overhead costs exist (see Pharmaceuticals).</li> </ul>	<p>Lump-sum payments:</p> <ul style="list-style-type: none"> <li>■ Not reported</li> </ul> <p>Overheads:</p> <ul style="list-style-type: none"> <li>■ Not reported</li> </ul>	<p>Lump-sum payments:</p> <ul style="list-style-type: none"> <li>■ Not reported</li> </ul> <p>Overheads:</p> <ul style="list-style-type: none"> <li>■ Overheads such as general administrative costs or non-patient-related staff salaries for cleaning, laundry catering, management, IT, and pharmacy services are calculated using the cost centre method (preferred) or mark-up method<sup>137</sup>.</li> </ul>	<p>Lump-sum payments:</p> <ul style="list-style-type: none"> <li>■ Not reported</li> </ul> <p>Overheads:</p> <ul style="list-style-type: none"> <li>■ Not reported</li> </ul>

<sup>135</sup> The 2014 reform in the Dutch mental healthcare system (Geestelijke gezondheidszorg – stelselherziening) decentralised mental healthcare to provide more integrated, community-based care closer to the patient. As part of this system change, the reform was also reflected in the costing manual, where mental health services are specifically costed and defined separately from other healthcare services.

<sup>136</sup> Lump-sum payments are fixed reimbursements for defined services and may indirectly include overhead allocations, but they are not classified as overhead costs per se. E.g., for bundled services: If a lump-sum (e.g., per hospital stay) implicitly covers shared infrastructure, overheads may be allocated within it – but this is not their primary purpose. For pragmatic reasons, both were summarised in one category.

<sup>137</sup> Cost centre method: Costs from support department cost centres are allocated to medical department cost centres (e.g., surgery, neurology) using a logical and measurable allocation formula. The mark-up is calculated by dividing the total organization's non-directly attributable costs by its total directly attributable costs. This method assumes a linear relationship between attributable and overhead costs, which may not be accurate and should be used with caution.

Domain	Norway <sup>116</sup> [23]	Scotland [24]	The Netherlands [25] [26]	USA [27] [28]
Other costs and aspects	<ul style="list-style-type: none"> <li>Transfer payments/Taxes and other transfer payments are excluded</li> </ul>	<ul style="list-style-type: none"> <li>Not reported</li> </ul>	<ul style="list-style-type: none"> <li>Education sector: the reference prices per unit for days or hours of education including specialised services like tutoring are calculated by a top-down macro-costing approach (total annual government expenditure for a specific educational tier from budget reports divided by the statutorily mandated number of hours or days of education per student per year).</li> <li>Criminal justice sector: the reference prices per specific type of delinquent act<sup>138</sup> (e.g., vandalism, assault, theft, drug dealing) are calculated by a top-down micro-costing approach (total annual government expenditure for the entire security and justice system allocated down to individual criminal acts).</li> </ul>	<ul style="list-style-type: none"> <li>Not reported</li> </ul>
Manual consists of formulas and/or calculation examples for valuation and calculation of unit costs (costing)	Qualitative information on calculation (e.g., average costs per patient, per bed etc.).	Qualitative information on calculation (e.g., average cost per patient) and calculation examples.	Qualitative information on calculation (e.g., average cost per patient), formulas, and calculation examples.	
Unit costs available	Yes	Yes	Yes	
Type of source	NoMA Unit cost database [113] Tariff catalogues	NHS Cost Book (R100T sheet) [108, 109] PSSRU [77] NHS Reference Cost/NCC [75]	Costing Manual (Reference prices) [26]	

Abbreviations: ACFI...Aged Care Funding Instrument, ADL...Activities of Daily Living, AR-DRG...Australian Refined Diagnosis Related Groups, ARPs...Alternative Payment Plans, ASP...Average Sales Price, ATIH...Agence Technique de l'Information sur l'Hospitalisation / Technical Agency for Hospital Information, AUS...Australia, BA...Bundesagentur für Arbeit, BCFI...Belgian Centre for Pharmacotherapeutic Information, BEL...Belgium, BIA...Budget Impact Analysis, BIAG...Budget Impact Analysis Guideline(s), BNF...British National Formulary, CA...Cost Analysis / Cost-Analysis, CA...Cost Analysis, CADTH...Canadian Agency for Drugs and Technologies in Health, CAN...Canada, CBA...Cost-Benefit Analysis, CC...Cost-Comparison, CCA...Cost-Consequence Analysis, CEA...Cost-Effectiveness Analysis, CEACs...Cost-Effectiveness Acceptability Curves, CHEERS...Consolidated Health Economic Evaluation Reporting Standards, CHSP...Commonwealth Home Support Programme, CM...Costing Manual(s), CMA...Cost-Minimisation Analysis, CMG...Case-Mix Group, CMI...Case Mix Index, CPI...Consumer Price Index, CT...Computertomographie / Computed Tomography, CUA...Cost-Utility Analysis, CVB...Centraal Bureau voor de Statistiek, DAGS...Ambulante Grupperingssysteme (Dänemark) / Danish Ambulatory Grouping System, DCEA...Distributional Cost-Effectiveness Analysis, DDD...Defined Daily Dose, DE...German, DESDE...Description and Evaluation of Services and Directories, DHE...Department of Health Economics, DKN...Denmark, DMC...Danish Ministry of Finance's Centre for Economic Evaluation / Danish Medicines Council, DRG...Diagnosis Related Group, DSA...Deterministic Sensitivity Analysis, DTC...Diagnosis Treatment Combination, E&W...England & Wales, EBM...Evidence-Based Medicine, EbM...Evidence-basierte Medizin, EKO...Erstattungskodex, EMA...European Medicines Agency, eMIT...Drugs and Pharmaceutical Electronic Market Information Tool, EN...English, EPAR...European Public Assessment Report, EU...European Union, EUnetHTA...European Network for Health Technology Assessment, EVPI...Expected Value of Perfect Information, EVPPI...Expected Value of Partial Perfect Information, FCA...Friction Cost Approach, FCR...Follow-up Care and Rehabilitation, FPS...Federal Public Service,

<sup>138</sup> The manual provides a detailed list of 15 acts with each having a specific reference cost. The costs do not include the often-substantial costs to victims (e.g., property loss, physical and emotional suffering, lost productivity), which would be far higher for a full societal cost assessment. Including victim costs would require a different methodology.

FRA...France, GDP...Gross Domestic Product, GEAR...Guide to Economic Analysis and Research, GER...Germany, GIP...Genees- en hulpmiddelen Informatie Project, GP...General Practitioner, HAH...Hospitalisation at Home, HAS...French National Authority for Health, HCA...Human Capital Approach, HCUP...Healthcare Cost and Utilization Project, HE...Health Economics, HEA...Health Economic Analysis / Health Economic Analyses, HEE...Health Economic Evaluation(s), HEEG...Health Economic Evaluation Guideline(s), HELFO...Norwegian Health Economics Administration, HICP...Harmonised Index of Consumer Prices, HPG...Homogeneous Patient Group(s), HQIP...Healthcare Quality Improvement Partnership, HRG...Healthcare Resource Group, HRQoL...Health-Related Quality of Life, HTA...Health Technology Assessment, HTAG...Health Technology Assessment Guideline(s), iCARE...Instrument zur Messung von Kosten und Ressourcenverbrauch in der Pflege, ICER...Incremental Cost-Effectiveness Ratio / Institute for Clinical and Economic Review, ICU...Intensive Care Unit, IFA...Informationsstelle für Arzneispezialitäten, IMA–AIM...Intermutualistisch Agentschap – Agence Intermutualiste / InterMutualist Agency, InEK...Institut für das Entgeltsystem im Krankenhaus, iPCQ...iMTA Productivity Cost Questionnaire, IQWiG...Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen, ISPOR...The Professional Society for Health Economics and Outcomes Research, iVICQ...iMTA Valuation of Informal Care Questionnaire, KCE...Belgian Health Care Knowledge Centre, LGA...Local Government Association, LKF...Leistungsorientierte Krankenanstaltenfinanzierung, LPPR...Liste des Produits et Prestations Remboursables, MBS...Medicare Benefits Schedule / Medical Benefit Scheme, MC...Marginal Cost, MEA...Managed Entry Agreement, MHRA...Medicines and Healthcare products Regulatory Agency, MPSC...Medicines Procurement and Supply Chain, MRI...Magnetresonanztomographie / Magnetic Resonance Imaging, MSO...Médecine, Chirurgie, Obstétrique et Odontologie, MZG-RHM...Minimale Ziekenhuisgegevens – Résumé Hospitalier Minimum / Minimum Hospital Data, N/A...Not applicable, NA...Not available, NCC...National Cost Collection, NCS...Nationale Kostenstudie / National Cost Study, NHCDC...National Hospital Cost Data Collection, NHS...National Health Service, NICE...National Institute for Health and Care Excellence, NIP... National immunisation program, NL...Dutch, NLD...The Netherlands, NMA...Norwegian Medical Association, NoMA...Norwegian Medicines Agency / Norwegian Medical Products Agency, NOR...Norway, NPSCW...National Public Sector Cost Weights, NZa...Nederlandse Zorgautoriteit, NZL...New Zealand, OOP...Out-of-Pocket / Out-of-Pocket Payments, OTC...Over-the-Counter, PAS...Patient Access Scheme, PBAC...Pharmaceutical Benefits Advisory Committee, PBS...Pharmaceutical Benefits Scheme / Pharmaceutical Benefit scheme, PBS...Pharmaceutical benefits scheme, PCE...Patient Cost Estimator, PCE-H...Personal Consumption Expenditures for Healthcare, PECUNIA...Programme in Costing, resource use measurement and outcome valuation for Use in multi-sectoral National and International health economic evaluations, PEPP...Pauschalierendes Entgeltsystem für Psychiatrie und Psychosomatik, PFS...Physician Fee Schedule, PHARMAC...Pharmaceutical Management Agency, PICO...Population, Interest, Context, PLICS...Patient-Level Information and Costing System, PMSI MSO...The Medical IT system for Medicine, Surgery, Obstetrics and Odontology, PMSI...Programme de Médicalisation des Systèmes d'Information, PoMS...Prescription Only Medicines, PPP...Purchasing Power Parity, PoMs...Prescription Only Medicines, PSA...Probabilistic Sensitivity Analysis, PSS...Personal Social Services, PSSRU...Personal Social Services Research Unit, PU...Purchase Unit, QALY...Quality-Adjusted Life Year, RCT...Randomised Controlled Trial, RIW...Resource Intensity Weight, RIZIV – INAMI...Rijksinstituut voor Ziekte- en Invaliditeitsverzekering – Institut National d'Assurance Maladie-Invalidité, RPBS...Repatriation pharmaceutical benefits scheme, RPDC...Routine Practice Data Collection / Routine Practice Data Collection from Registries, RQ...Research Question, RTC...Reference List of Unit Costs / French Unit Cost Lists, RUC...Resource Unit Cost / Reference Unit Cost, RUG-III...Resource Utilisation Groups Version III, RWD...Real-World Data, SACT...Systemic Anti-Cancer Therapy, SAE...Statistique Annuelle des Établissements de santé / Annual Statistics of Healthcare Institutions, SCT...Scotland, SHI...Social Health Insurance, SI...Slovene, sIMPL...databank van implantaten, SK...Slovak, SMC...Scottish Medicines Consortium, SNDS...Système National des Données de Santé / National Health Data System, SNIIRAM...Système National d'Information Inter-Régimes de l'Assurance Maladie / National Health Insurance Statistics Data, SR...Systematic Review, SV...Swedish, TC...Total Costs / Total Cost, TCT...Technical Cell for the processing of hospital data / Technical Unit for the Processing of Data relating to Hospitals, TFR...Tarif Forfaitaire de Responsabilité, TNB...Table Nationale de Biologie, UK...United Kingdom, UKHSA...UK Health Security Agency, URG...Urgency Related Group, USA...United States of America, VAT...Value Added Tax / Value-Added Tax, VOI...Value of Information, VWS...Ministerie van Volksgezondheid, Welzijn en Sport, WHO...World Health Organisation, WIdO...Wissenschaftliches Institut der AOK, WMG...Wet marktordening gezondheidszorg, WPAL...Work Productivity and Activity Impairment Questionnaire, ZIN...Zorginstituut Nederland

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