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A scoping review protocol of outcome measurement used for economic evaluation in dentistry

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ADMINISTRATIVE INFORMATION

Support - University of Aberdeen.

Review Stage at time of this submission - Formal screening of search results against eligibility criteria.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 27 June 2023 and was last updated on 27 June 2023.

INTRODUCTION

Review question / Objective Research question: - What outcome measures have been used in economic evaluations of oral health interventions in adults?

Objective:

- To identify and summarize outcome measures used in economic evaluations of adult oral health interventions delivered in an individual or community setting.

Secondary objectives

- To examine trends over time of outcome measures used in economic evaluations across the dental specialities defined by the Royal College of Surgeons of England (The Royal College of Surgeons of England, 2022), Implant Dentistry and Temporomandibular joint (TMJ) disorders.

Background Economic Evaluations can inform decisions about how to ensure efficient resource allocation within fixed healthcare budgets (Brazier et al., 2017; Guinness and Wiseman, 2011). The three main types of economic evaluation are Cost-

Benefit Analysis (CBA), where outcomes are expressed in monetary terms; Cost-Effectiveness Analysis (CEA), where outcomes are expressed in natural clinical units, and Cost-Utility Analysis (CUA), where outcomes are expressed in composite measures such as quality-adjusted life years (QALYs) (Drummond et al., 2015).

QALYs capture the health-related quality of life (HRQoL) experienced in a health state multiplied by the duration of time (in years) spent in it. To calculate QALYs, it is recommended to measure HRQoL using a preference-based measure (PBM). A PBM refers to an HRQoL instrument in which health states or items are assigned values, known as utilities, preference weights or valuation tariffs based on individuals' stated preferences for those health states. These values range from one, representing perfect health, to zero (death) or even lower, representing the worst possible health state imaginable. When a PBM can be applied to any health condition, such as EQ-5D, it is referred to as generic. When it is applicable to only one specific health condition, such as the Glaucoma utility index, it is referred to as condition-specific (York

Health Economics Consortium and The Cochrane Collaboration, 2022).

Within the healthcare sector, CUA is the most commonly used approach to guide decisions regarding the allocation of scarce healthcare budgets. This approach is recommended by several health technology assessment (HTA) agencies, including the National Institute for Health and Care Excellence (NICE) (National Institute for Health and Care Excellence, 2022).

QALYs are favoured by HTA agencies and decision-makers because they provide a standardised common metric for comparing different care options across various disease areas (Drummond et al., 2015). However, there is a growing recognition that generic QALYs may not be sensitive enough to effectively capture changes in health states for some conditions, such as oral diseases (Clarkson et al., 2020; Hulme C. et al., 2014; Souto M.L.S. et al., 2021; Zhurakivska et al., 2023), as they do not consider all the relevant dimensions affected by poor oral health (Hettiarachchi et al., 2020; Nguyen T.M. et al., 2020).

Rationale The lack of sensitivity of generic QALYs has led to the consideration of alternative outcome measures for oral health economic evaluations. These include the use of disease-specific natural clinical units, such as caries incidence or the Decayed-Missing-Filled Teeth (DMFT) index, in CEAs; developing condition-specific QALYs for CUAs; or obtaining monetary valuations for oral health interventions by applying willingness to pay (WTP) tariffs in CBAs (Clarkson et al., 2020; Hettiarachchi et al., 2020). However, there is currently limited comprehensive information on the range of outcome measures available for conducting oral health economic assessments. Without summarized information, researchers struggle to reach a consensus on which measures are the most suitable for comparing cost effectiveness across the dental field. The resulting heterogeneity across studies affects the robustness of conclusions to guide resource allocation and impose additional challenges for HTA agencies and decision-makers. Therefore, in order to improve future economic evaluations, it is crucial to review and understand what outcome measures have been used in dentistry to date, and to discuss their suitability for economic evaluations.

METHODS

Strategy of data synthesis Online searches carried out in Medline (via Pubmed), Embase (via

OvidSP) and NHS-EED (via OvidSP) databases including the following terms:

- MEDLINE (Trough PubMed)
 ((dentistry[MeSH Terms]) OR (“oral health”[tiab]) OR (“dental”[tiab]) OR (“tooth”[tiab]) OR (“teeth”[tiab])) AND (“Costs and Cost Analysis”[Mesh]) AND (“economic evaluation*”[tiab]) OR (“economic analy*”[tiab]) OR (“Health economic*”[tiab]) OR (“cost effective*”[tiab]) OR (“cost benefit*”[tiab]) OR (“cost utilit*”[tiab]) OR (“cost minimization”[tiab])) NOT (“Pediatric Dentistry”[Mesh]) OR (“child*”[TIAB]) OR (“pediatric*”[TIAB]) OR (“paediatric*”[TIAB]))

- EMBASE (Trough OvidSP)

- 1 exp dental procedure
- 2 exp dentistry
- 3 "oral health".ti,ab.
- 4 dental.ti,ab.
- 5 tooth.ti,ab.
- 6 teeth.ti,ab.
- 7 exp economic evaluation/
- 8 "cost* analys".ti,ab.
- 9 "economic* analys".ti,ab.
- 10 "health economic".ti,ab.
- 11 "cost* effective".ti,ab.
- 12 "cost* benefit".ti,ab.
- 13 "cost* utilit".ti,ab.
- 14 "cost* minimizati".ti,ab.
- 15 child*.ti,ab.
- 16 pediatric*.ti,ab.
- 17 paediatric*.ti,ab.
- 18 1 or 2 or 3 or 4 or 5 or 6
- 19 8 or 9 or 10 or 11 or 12 or 13 or 14
- 20 7 and 18 and 19
- 21 15 or 16 or 17
- 22 20 not 21

- NHS EED* (Trough OvidSP)

- 1 exp dentistry/
- 2 exp Dental Care/
- 3 exp Specialties, Dental/
- 4 oral health.mp. or exp Oral Health/
- 5 dental.mp.
- 6 exp Tooth/ or tooth.mp.
- 7 teeth.mp.
- 8 1 or 2 or 3 or 4 or 5 or 6 or 7
- 9 exp "costs and cost analysis"/ or exp economics, dental/
- 10 economic evaluation*.mp.
- 11 economic analy*.mp.
- 12 health economic*.mp.
- 13 cost* effective*.mp.
- 14 cost* benefit*.mp.
- 15 cost* utilit*.mp.
- 16 cost* minimizati*.mp.
- 17 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16
- 18 child*.mp.
- 19 pediatric.mp.
- 20 paediatric.mp.

21 18 or 19 or 20

22 8 and 17

23 22 not 21

Search strategies have been piloted for sensitivity to capture 5 pre-selected studies that are known to be relevant to the research question.

*Note that the NHS EED searches were limited to articles up to 2016 because the database has not been updated beyond that year.

Eligibility criteria The inclusion criteria are:

- Full economic evaluations as defined by Drummond et al. (2015): “The comparative analysis of alternative courses of action in terms of both costs (resource use) and consequences (outcomes, effects)”. These include studies defined as:

o Cost Benefit Analyses (CBA)

o Cost Effectiveness Analyses (CEA)

o Cost-Utility Analyses (CUA)

- Peer-Reviewed articles in academic journals

- Published in the period from database inception to 31 March 2023

- Any language

- Interventions: Active treatments, preventive treatments, promotional strategies or diagnostic actions addressing affections of the stomatognathic system*, where the unit of intervention was the health consumer (i.e., provided to individual patients or general population) and the effect measured at the same level.

*The stomatognathic system includes temporomandibular joints, bones forming the oral cavity, soft tissue (gingiva, mucosa, tongue, cheeks, lips, and glands), muscles involved in chewing and swallowing, and teeth.

- Comparator: All comparators will be considered.

- Population: Adult population with a mean (or median) age of 16 years old or over at the beginning of the intervention.

Excluded studies, therefore, will be:

- Studies without a comparative analysis of alternative courses of action, such as:

o Cost minimization studies or partial economic evaluations (e.g. Budget impact analyses, cost-only analyses, cost-of-illness studies, efficacy or effectiveness-only analyses, cost-consequence analyses)

o Systematic reviews of existing economic evaluations.

o Valuation studies.

o Study protocols or guidelines for economic evaluations.

- Studies where the economic assessment was not based on an intervention. E.g. Forensic studies, assessment of dental biomaterials properties at a laboratory level.

- Studies where interventions addressed health affections or structures outside the stomatognathic system. E.g., Pneumonia, endocarditis, knee and hip prosthesis late infection, blood sugar levels, tobacco health consequences, etc.

- Studies where the unit of intervention and/or measurement of effects was at a health professional, provider entity or health system level (i.e. not at a health consumer level). E.g., Professional training or education, implementation of provider guidelines, providers' provider office management strategies, providers' strategies to increase revenue or save costs of office functioning, health system reforms, health insurance modifications, etc.

Source of evidence screening and selection All abstracts retrieved by the search strategy will be scanned for duplicates using the reference software manager Zotero (Collaboration for Digital Scholarship, 2023) and the research collaboration platform Rayyan.ai (Ouzzani et al., 2016).

From the search results, a random sample of 20 titles and abstracts will be selected for refinement of the inclusion and exclusion criteria.

Based on the refined criteria, DB and CY will independently review a randomly selected sample of 10% of the titles to calibrate their inclusion decisions. The agreement threshold will be 90%. Disagreements are going to be discussed and if no agreement can be reached, adjudication will be provided by EG or MV. If the agreement threshold is not met, the process will be repeated with a new random sample of 10% of the articles.

After reaching calibration, all remaining abstracts will be reviewed for inclusion by CY. In case abstracts do not contain enough information for reaching a decision, the study will be included for full-text assessment.

Using a randomly selected 10% of the included full-text articles, DB and CY will calibrate again to ensure agreement on the final inclusion decision. The agreement threshold will be 90%. Disagreements are going to be discussed and if no agreement can be reached, adjudication will be provided by EG or MV. If the agreement threshold is not met, the process will be repeated with a new random sample of 10% of the articles.

After reaching calibration, all remaining full-text articles will be reviewed by CY. During the process, information on exclusion reasons will be recorded.

Data management From the included articles, a random sample of 10% will be used for the refinement of a predesigned data extraction Excel sheet (Microsoft Corporation, 2018).

Using the refined data extraction sheet, CY and DB will extract information from a sample of 10%

randomly selected articles to perform a double-blind cross-validation of the extracted data. Disagreements will be discussed and adjudicated by EG or MV if necessary. If the proportion of disagreements exceeds 10%, a new set of articles will be randomly selected to repeat the data cross-validation process. Once calibration is achieved, CY will proceed to extract data from all the remaining full-text articles.

Information to be extracted from each study will include:

1. Study characteristics:
 - a. Author
 - b. Year
 - c. Country
 - d. Study population
 - e. Oral health condition
 - f. Dental speciality
2. Intervention and comparator characteristics
 - a. What
 - b. By Who
 - c. Where
 - d. How Often
 - e. For How Long
 - f. Level
3. Economic evaluation methods
 - a. Type of economic evaluation
 - b. Type of evidence
 - c. Modelling approach
 - d. Perspective on Costs and Benefits
 - e. Time Horizon
4. Outcome methods
 - a. Economic evaluation measurement
 - b. Outcome measurement method
 - c. Who reports the outcomes (patients, proxies, clinicians)
 - d. Valuation Method (if applicable)
 - e. Who values the outcomes (if applicable)
5. Economic evaluation results.

Reporting results / Analysis of the evidence

Study characteristics and economic evaluation methodology applied will be summarised using appropriate tabulations and graphical representations, with a focus on outcome measurement methodology. The frequency and proportions of outcome measures used within each type of economic evaluation will be summarised across studies, within different dental specialties.

Trends in terms of the outcomes measures and evaluation types used over time and by dental speciality will be narratively presented.

Presentation of the results A PRISMA chart will be used to describe the inclusion/exclusion of studies and the final number of full-text articles included for data extraction. Extracted data will be

tabulated and presented graphically where appropriate.

Language restriction No language restrictions will be applied.

Country(ies) involved Scotland, United Kingdom.

Other relevant information This study is designed using the Joanna Briggs Institute scoping review methodology (Peters et al., 2020).

Keywords Oral health economics, economic evaluation, cost effectiveness analysis, cost utility analysis, cost benefit analysis, outcomes, dentistry.

Contributions of each author

Author 1 - Carolina Yanez - Study conception and design, development of search strategy, development of selection criteria, drafted manuscript, development of selection criteria.

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References

- Brazier, J., Ratcliffe, J., Salomon, J.A., Tsuchiya, A., 2017. Measuring and Valuing Health Benefits for Economic Evaluation, Second Edition. ed. Oxford University Press, United Kingdom.
- Clarkson, J.E., Pitts, N.B., Goulao, B., Boyers, D., Ramsay, C.R., Floate, R., Braid, H.J., Fee, P.A., Ord, F.S., Worthington, H.V., van der Pol, M., Young, L., Freeman, R., Gouick, J., Humphris, G.M., Mitchell, F.E., McDonald, A.M., Norrie, J.D., Sim, K., Douglas, G., Ricketts, D., 2020. Risk-based, 6-monthly and 24-monthly dental check-ups for adults: the INTERVAL three-arm RCT. *Health Technol. Assess. Winch. Engl.* 24, 1–138. <https://doi.org/10.3310/hta24600>
- Collaboration for Digital Scholarship, 2023. ZOTERO.
- Drummond, M.F., Sculpher, M.J., Claxton, K., Stoddart, G.L., Torrance, G.W., 2015. Methods for the Economic Evaluation of Health Care Programmes, Fourth Edition. ed. Oxford University

- Press, Oxford, United Kingdom.
- Guinness, L., Wiseman, V., 2011. Introduction to Health Economics, 2nd Edition. ed. McGraw-Hill, England.
- Hettiarachchi, R., Kularatna, S., Byrnes, J., Mulhern, B., Chen, G., Scuffham, P.A., 2020. Valuation study for a preference-based quality of life measure for dental caries (Dental Caries Utility Index - DCUI) among Australian adolescents - study protocol. *BMJ Open* 10, e038626. <https://doi.org/10.1136/bmjopen-2020-038626>
- Hulme C., Yu G., Browne C., O'Dwyer J., Craddock H., Brown S., Gray J., Pavitt S., Fernandez C., Godfrey M., Dukanovic G., Brunton P., Hyde T.P., 2014. Cost-effectiveness of silicone and alginate impressions for complete dentures. *J. Dent.* 42, 902–907. <https://doi.org/10.1016/j.jdent.2014.03.001>
- Microsoft Corporation, 2018. Microsoft Excel.
- National Institute for Health and Care Excellence, 2022. Incorporating economic evaluation | Developing NICE guidelines: the manual | Guidance | NICE [WWW Document]. URL <https://www.nice.org.uk/process/pmg20/chapter/incorporating-economic-evaluation> (accessed 11.3.22).
- Nguyen T.M., Tonmukayakul U., Warren E., Cartwright S., Liew D., 2020. A Markov cost-effective analysis of biannual fluoride varnish for preventing dental caries in permanent teeth over a 70-year time horizon. *Health Promot. J. Aust. Off. J. Aust. Assoc. Health Promot. Prof.* 31, 177–183. <https://doi.org/10.1002/hpja.283>
- Ouzzani, M., Hammady, H., Fedorowicz, Z., Elmagarmid, A., 2016. Rayyan-a web and mobile app for systematic reviews. *Syst. Rev.* 5, 210. <https://doi.org/10.1186/s13643-016-0384-4>
- Peters, M.D.J., Godfrey, C.M., McInerney, P., Munn, Z., Tricco, A.C., Khalil, H., 2020. Chapter 11: Scoping reviews (2020 version), in: Aromataris E, Munn Z (Editors). *JBIM Manual for Evidence Synthesis*. Joanna Briggs Institute.
- Souto M.L.S., Carrer F.C.A., Braga M.M., Pannuti C.M., 2021. Smoking Cessation therapy is a cost-effective intervention to avoid tooth loss in Brazilian subjects with periodontitis: an economic evaluation. *BMC Oral Health* 21, 616. <https://doi.org/10.1186/s12903-021-01932-2>
- The Royal College of Surgeons of England, 2022. Specialists [WWW Document]. *R. Coll. Surg.* URL <https://www.rcseng.ac.uk/dental-faculties/fds/nacpde/eea-qualified-dentists/specialists/> (accessed 7.13.22).
- York Health Economics Consortium, The Cochrane Collaboration, 2022. Glossary of Terms for Health Economics and Systematic Review [WWW Document]. *Gloss. Cochrane Methods Econ.* URL <https://methods.cochrane.org/economics/methods-training/glossary> (accessed 5.9.22).
- Zhurakivska, K., Luciano, R., Caponio, V.C.A., Lo Russo, L., Muzio, L.L., Mascitti, M., Troiano, G., 2023. Cost/effectiveness analysis of treatment options for the rehabilitation of the total edentulous mandible. *J. Oral Rehabil.* <https://doi.org/10.1111/joor.13423>.