Addendum to the poster, "Taxonomy of the Full Value of mRNA Influenza and COVID-19 Combination Vaccines for Adults" (HTA405), presented at ISPOR EU 2024.

JP Sevilla, Joseph S. Knee, Genevieve Meier, Jingyan Yang, Manuela Di Fusco, Tianyan Hu, and David E. Bloom

For more information, email JP Sevilla: jsevilla@datafordecisions.net

Figure 1 presents the steps of the targeted literature review (TLR):

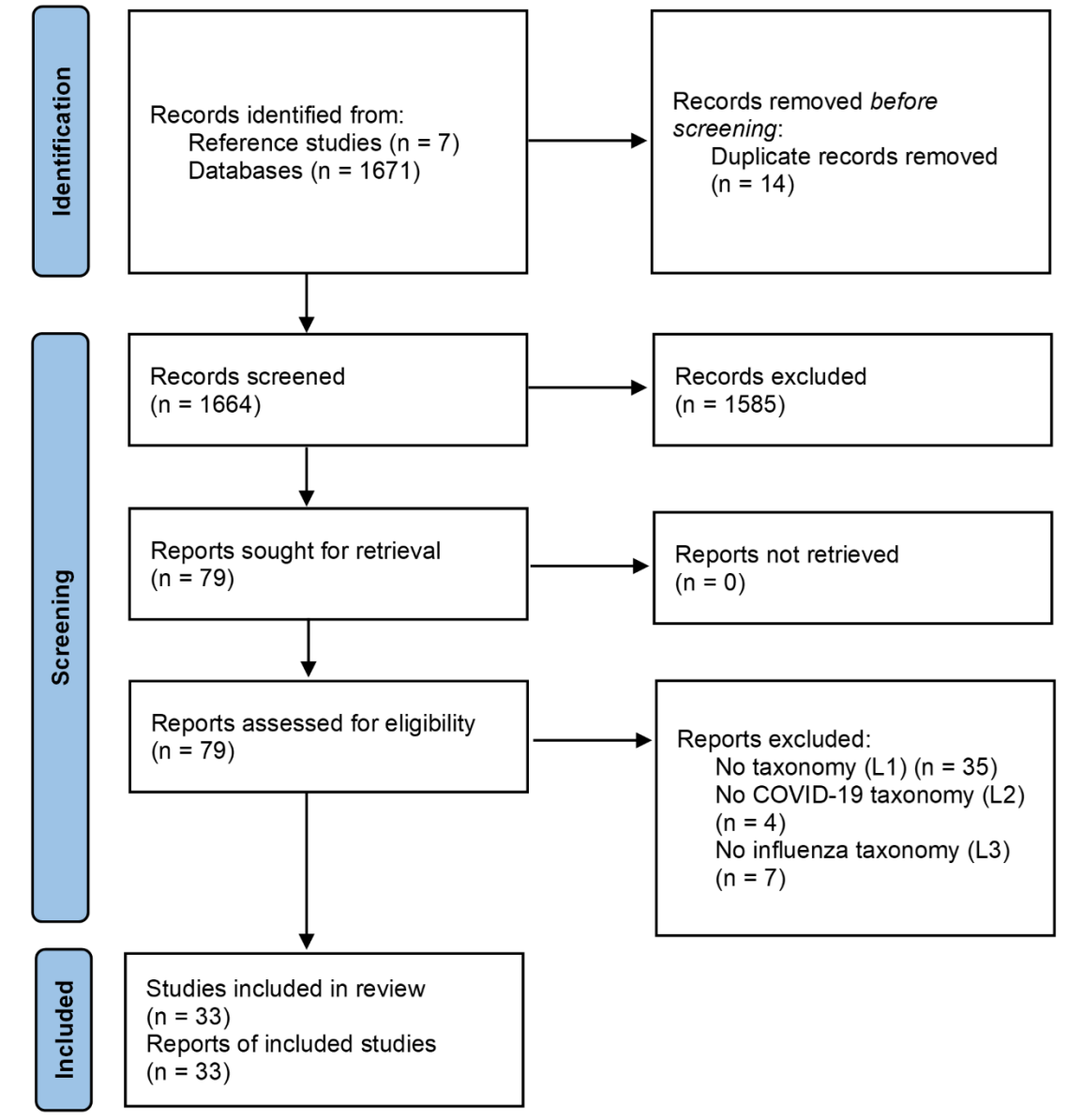

Figure 1. Number of studies included and excluded from each step of the TLR.

Table 1 describes the studies included in the results of the TLR:

Table 1. Characteristics of studies in our targeted literature review.

Author (year)	**Literature**	**Study design[a]**	**Geographic scope[b]**	**Study outcomes**
Annemans et al. (2020) [1]	L1	Advisory board	Belgium	Value elements; inclusion in value assessments
Beck et al. (2022) [2]	L1	Literature review and expert panel	Countries with well-established HTA processes (Australia, France, Germany, the Netherlands, Spain, UK, and US)	Value elements; classification of value elements
Bell et al. (2022) [3]	L1	Literature review and modified Delphi	High-income markets (Belgium, Canada, France, Germany, Italy, Japan, Sweden, UK and US)	Value elements; recognition in current HTAs; prioritization of value elements for value assessments
Breslau et al. (2023) [4]	L1	Literature review	Middle- and high-income countries	Value elements; relevance of value elements to HTA guidelines
Currie et al. (2023) [5]	L1	Literature review	Canada	Value elements; perspective of value elements
Fox et al. (2022) [6]	L1	Economic modeling	Australia	Value elements; economic value of elements in COVID-19 recovery
Lakdawalla et al. (2018) [7]	L1	Expert panel and advisory board	US	Value elements; novelty of elements; relevance in value assessment; perspective of elements

McQueen et al. (2023) [8]	L1	Literature review and patient workshop	US	Value elements; importance to patients; applicability in value assessment
Neumann et al. (2016) [9]	L1	Expert panel	US	Value elements; perspective of value elements
Postma et al. (2022) [10]	L1	Advisory Board	Countries with well-established HTA processes (Australia, France, Germany, the Netherlands, Spain, UK, and US)	Recognition of value elements in HTA guidelines; prioritization of value elements for HTA inclusion
Sevilla (2022) [11]	L1	Literature review	NA	Value elements; classes of beneficiaries; perspectives
Takami et al. (2023) [12]	L1	Literature review	Japan	Value elements; methods used for quantification; pricing of value
Voehler et al. (2022) [13]	L1	Modified Delphi	US	Value elements; importance to patients
Di Fusco et al. (2023) [14]	L1 and L2	Literature review and modified Delphi	UK and US	Value elements; inclusion of value elements in other frameworks; priority for inclusion, quality of evidence, and feasibility of inclusion for each value element
Calabrò et al. (2022) [15]	L3	Literature review	Global	Value elements; inclusion in vaccine value studies
Cai et al. (2023) [16]	L4	Economic modeling	Singapore and Thailand	Economic value of border control policies in COVID-19 pandemic

Currie et al. (2020) [17]	L4	Economic modeling	UK	Economic value of elements in COVID-19 pandemic
Leahy et al. (2020) [18]	L4	Perspective piece	US, UK, and Europe	Impact of the pandemic on HTA value elements
Maya et al. (2022) [19]	L4	Economic modeling	California (US)	Economic value of indirect effects of COVID-19
Schnitzler et al. (2021) [20]	L4	Perspective piece	NA	Applicability of broader value elements in COVID-19 pandemic
Dodd et al. (2003) [21]	L5	Literature review	US	Benefits of other combination vaccines
Domnich et al. (2022) [22]	L5	Literature review	NA	Evidence on COVID-19/influenza co-administration and combination vaccine candidates
Lennon et al. (2022) [23]	L5	Survey of the general population	US	Vaccine acceptance of COVID-19, influenza, and hypothetical combination vaccines
Maman et al. (2015) [24]	L5	Literature review	NA	Benefits and challenges of other combination vaccines
Marcy et al. (2003) [25]	L5	Literature review	US	Benefits and issues of other combination vaccines
Samant et al. (2022) [26]	L5	Survey of physicians	US	Physicians' preferences and order of preferences about other combination vaccines
Skibinski et al. (2011) [27]	L5	Literature review	NA	Benefits, challenges, and prospects of other combination vaccines

Cagigi and Douradinha (2023) [28]	L6	Literature review	NA	Differences between mRNA and DNA vaccines; benefits and challenges of both
Guo et al. (2023) [29]	L6	Literature review	NA	General aspects of mRNA vaccines; benefits and challenges of mRNA vaccines
Haghpanah et al. (2024) [30]	L6	Epidemiological modeling	US	Hospitalizations and deaths
Hausdorff et al. (2024) [31]	L6	Perspective piece	NA	Comparison of benefits and challenges of other combination vaccines and co-administration; risks of other combination vaccine development; solutions for other combination vaccine development
Mir and Mir (2024) [32]	L6	Literature review	NA	General aspects of mRNA vaccines; benefits and challenges of mRNA vaccines
Zhang et al. (2023) [33]	L6	Literature review	NA	General aspects of mRNA vaccines; benefits and challenges of mRNA vaccines

Notes:
[a]The study design is determined based on the study's description of its methods.
[b]The geographic scope is determined based on the study's description of its setting, context, or target population(s). Where such a description is not included, we mark it as not applicable (NA).
Abbreviations: HTA = health technology assessment; US = United States of America; UK = United Kingdom.

Acknowledgements

We thank Meghan Gavaghan for assisting with the poster and for supporting the research more broadly.

References

1. Annemans L, Beutels P, Bloom DE, De Backer W, Ethgen O, Luyten J, et al. Economic Evaluation of Vaccines: Belgian Reflections on the Need for a Broader Perspective. Value in Health. 2021;24:105–11.

2. Beck E, Biundo E, Devlin N, Doherty TM, Garcia-Ruiz AJ, Postma M, et al. Capturing the value of vaccination within health technology assessment and health economics: Literature review and novel conceptual framework. Vaccine. 2022;40:4008–16.

3. Bell E, Neri M, Steuten LM. Towards a Broader Assessment of Value in Vaccines: The BRAVE Way Forward. Applied Health Economics and Health Policy. 2021;20:105–17.

4. Breslau RM, Cohen JT, Diaz J, Malcolm B, Neumann PJ. A review of HTA guidelines on societal and novel value elements. International Journal of Technology Assessment in Health Care. 2023/05/25 ed. 2023;39:e31.

5. Currie GR, Gerber B, Lorenzetti D, MacDonald K, Benseler SM, Bernier FP, et al. Developing a Framework of Cost Elements of Socioeconomic Burden of Rare Disease: A Scoping Review. PharmacoEconomics. 2023;41:803–18.

6. Fox N, Adams P, Grainger D, Herz J, Austin C. The Value of Vaccines: A Tale of Two Parts. Vaccines. 2022;10.

7. Lakdawalla DN, Doshi JA, Garrison LP Jr, Phelps CE, Basu A, Danzon PM. Defining Elements of Value in Health Care—A Health Economics Approach: An ISPOR Special Task Force Report [3]. Value in Health. 2018;21:131–9.

8. McQueen RB, Mendola ND, Jakab I, Bennett J, Nair KV, Németh B, et al. Framework for Patient Experience Value Elements in Rare Disease: A Case Study Demonstrating the Applicability of Combined Qualitative and Quantitative Methods. PharmacoEconomics - Open. 2023;7:217–28.

9. Neumann PJ, Ganiats TG, Russell LB, Sanders GD, Siegel JE, editors. Cost-Effectiveness in Health and Medicine [Internet]. 2nd ed. Oxford University Press; 2016 [cited 2024 Apr 22]. Available from: https://doi.org/10.1093/acprof:oso/9780190492939.001.0001

10. Postma M, Biundo E, Chicoye A, Devlin N, Mark Doherty T, Garcia-Ruiz AJ, et al. Capturing the value of vaccination within health technology assessment and health economics: Country analysis and priority value concepts. Vaccine. 2022;40:3999–4007.

11. Sevilla J. The value of vaccines. Current Opinion in Immunology. 2022;78:102243.

12. Takami A, Kato M, Deguchi H, Igarashi A. Value elements and methods of value-based pricing for drugs in Japan: a systematic review. Expert Review of Pharmacoeconomics & Outcomes Research. 2023;23:749–59.

13. Voehler D, Neumann PJ, Ollendorf DA. Patient and Caregiver Views on Measures of the Value of Health Interventions. Patient Prefer Adherence. 2022;16:3383–92.

14. Di Fusco M, Mendes D, Steuten L, Bloom DE, Drummond M, Hauck K, et al. The Societal Value of Vaccines: Expert-Based Conceptual Framework and Methods Using COVID-19 Vaccines as a Case Study. Vaccines. 2023;11.

15. Calabrò GE, D'Ambrosio F, Fallani E, Ricciardi W. Influenza Vaccination Assessment according to a Value-Based Health Care Approach. Vaccines. 2022;10.

16. Cai CG, Lim NW, Huynh VA, Ananthakrishnan A, Dabak SV, Dickens BS, et al. Economic Analysis of Border Control Policies during COVID-19 Pandemic: A Modelling Study to Inform Cross-Border Travel Policy between Singapore and Thailand. International Journal of Environmental Research and Public Health. 2023;20.

17. Currie J, Adamson J, Bowden B, Woolls J, Jones R, Healy B, et al. Impact of a novel community testing pathway for people with suspected COVID-19 in Wales: a cost-minimisation analysis. BMJ Open. 2020;10:e038017.

18. Leahy J, Hickey C, McConnell D, Cassidy O, Trela-Larsen L, Barry M, et al. Coronavirus Disease 2019: Considerations for Health Technology Assessment From the National Centre for Pharmacoeconomics Review Group. Value in Health. 2020;23:1423–6.

19. Maya S, Kahn JG, Lin TK, Jacobs LM, Schmidt LA, Burrough WB, et al. Indirect COVID-19 health effects and potential mitigating interventions: Cost-effectiveness framework. PLOS ONE. 2022;17:e0271523.

20. Schnitzler L, Janssen LMM, Evers SMAA, Jackson LJ, Paulus ATG, Roberts TE, et al. The broader societal impacts of COVID-19 and the growing importance of capturing these in health economic analyses. International Journal of Technology Assessment in Health Care. 2021/03/09 ed. 2021;37:e43.

21. Dodd D. Benefits of combination vaccines: effective vaccination on a simplified schedule. Am J Manag Care. 2003;9:S6-12.

22. Domnich A, Orsi A, Trombetta C-S, Guarona G, Panatto D, Icardi G. COVID-19 and Seasonal Influenza Vaccination: Cross-Protection, Co-Administration, Combination Vaccines, and Hesitancy. Pharmaceuticals. 2022;15.

23. Lennon RP, Block R, Schneider EC, Zephrin L, Shah A. Underserved population acceptance of combination influenza-COVID-19 booster vaccines. Vaccine. 2022;40:562–7.

24. Maman K, Zöllner Y, Greco D, Duru G, Sendyona S, Remy V. The value of childhood combination vaccines: From beliefs to evidence. Human Vaccines & Immunotherapeutics. 2015;11:2132–41.

25. Marcy SM. Pediatric combination vaccines: their impact on patients, providers, managed care organizations, and manufacturers. Am J Manag Care. 2003;9:314–20.

26. Samant S, Petigara T, Aggarwal J, Mercer M, Nelson CB, Zormpas E, et al. Physician preferences for attributes of pediatric combination vaccines in the United States. Current Medical Research and Opinion. 2022;38:2003–9.

27. Skibinski DA, Baudner BC, Singh M, O'Hagan DT. Combination Vaccines. Journal of Global Infectious Diseases. 2011;3:63–72.

28. Cagigi A, Douradinha B. Have mRNA vaccines sentenced DNA vaccines to death? Expert Review of Vaccines. 2023;22:1154–67.

29. Guo X, Liu D, Huang Y, Deng Y, Wang Y, Mao J, et al. Revolutionizing viral disease vaccination: the promising clinical advancements of non-replicating mRNA vaccines. Virology Journal. 2023;20:64.

30. Haghpanah F, Hamilton A, Klein E. Modeling the potential health impacts of delayed strain selection on influenza hospitalization and mortality with mRNA vaccines. Vaccine: X. 2023;14:100287.

31. Hausdorff WP, Madhi SA, Kang G, Kaboré L, Tufet Bayona M, Giersing BK. Facilitating the development of urgently required combination vaccines. The Lancet Global Health. 2024;12:E1059–67.

32. Mir S, Mir M. The mRNA vaccine, a swift warhead against a moving infectious disease target. Expert Review of Vaccines. 2024;23:336–48.

33. Zhang G, Tang T, Chen Y, Huang X, Liang T. mRNA vaccines in disease prevention and treatment. Signal Transduction and Targeted Therapy. 2023;8:365.