An overview of studies funded by the UK Health Technology Assessment (HTA) program from 2019

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Introduction and literature overview

The aim of this paper is to assess the variability of resource use data collection and costing methods in recent HTA-funded primary research papers. The UK Health Technology Assessment (HTA) Programme funds research regarding the clinical and cost-effectiveness of healthcare treatments and tests whether an intervention should be adopted[1]. The findings from HTA research directly influences the UK National Health Service's (NHS) clinical practise, hence are undoubtedly important for national health decision-making, as well as internationally. The internal and external validity of HTA research is therefore of upmost importance. This paper is specifically concerned with the robustness of the methods that HTA research papers use for collecting resource use data and costing.

Economic data collection methods include: patient self-report forms, electronic data sources and routinely collected data such as medical records[2]. Franklin and Thorn note the advantages and disadvantages of each method. Namely, though patient self-reports are cheap and controllable, they may suffer from high attrition, missing data and issues with validity. Additionally, electronic data sources can be more accurate and practical for larger sample sizes, however may involve constraints and possibly time-consuming data approval processes and may not include all of the required variables. Routinely collected data can be convenient but can also depends on accurate recordings and the required information technology infrastructure being in place. There are advantages and disadvantages to each of these commonly used data collection methods in HTA studies, but there is no universally recognised approach.

Ridyard and Hughes conducted a systematic review of all 100 UK HTA-funded primary research papers published from January 2000 to June 2009 in order to assess the variability of data collection methods and costing in such research papers[3]. They concluded that economic data is variable and a standardized approach should be adopted in order to improve transparency and external validity between studies. It is important to assess whether there have improvements in the variability of resource use data collection and costing since 2009, hence the motivation for review of more recent studies.

Methodology

[1] NIHR.ac.uk (2020) *Health Technology Assessment - NIHR*. [online] Available at: <https://www.nihr.ac.uk/explore-nihr/funding-programmes/health-technology-assessment.htm> [Accessed 10 August 2020].

[2] Franklin, M. and Thorn, J. (2019) Self-reported and routinely collected electronic healthcare resource-use data for trial-based economic evaluations: the current state of play in England and considerations for the future. *BMC Medical Research Methodology*.

[3] Ridyard, C. and Hughes, D. (2010) Methods for the Collection of Resource Use Data within Clinical Trials: A Systematic Review of Studies Funded by the UK Health Technology Assessment Program. *Value in Health*.

In this review of HTA primary research papers, the eligibility criteria to include a paper was for it to be a HTA Journal, to be a primary research study and to be a randomised control trial (RCT). This paper is only concerned with RCTs since this is the prime interest of the Edinburgh Health Economics group. The number of such papers has considerably increased. Ridyard and Hughes found 100 HTA primary research journals for a 10-year period from January 2000. In comparison, in a 10-year period from January 2010, 368 HTA primary research journals were published. Reviewing this number of journals is out of scope of this papers. Instead, this paper reviews 25, randomly chosen, HTA primary research journals published in 2019.

Similarly to Ridyard and Hughes, for each article reviewed, data for the following factors will be elicited:

1. The health technology being assessed: device, procedure, drug, screening or setting of care.
2. The trial duration.
3. The perspective adopted in the economic evaluation (EE).
4. Whether there is evidence of piloting resource use data collection instrument.
5. Whether there is evidence of validating the resource use data collection instrument.
6. The resource use data collection method.
7. Whether there is evidence of how resource items for costing were identified.
8. The source of unit costs.
9. Whether costs were beyond the time horizon of the trial.

In addition to the factors Ridyard and Hughes include, this paper will elicit data for the additional following factors:

1. Whether EE was used and if so, which technique and measurement was used.
2. The name of database if an electronic data collection method is used.

Results and Discussion

The results are displayed in *Table 1*.

Types of HTA being assessed were categorised into: procedures (8 of 25, 32%); drugs (7 of 25, 25%); devices (4 of 25, 16%); setting of care (1 of 25, 4%); screenings (1 of 25, 4%); and combinations (4 of 25, 16%). Ridyard and Hughes found: 38% of the 95 papers they studied are procedures; 15% are devices; 14% are drugs; 8% are screenings; 1% are settings care; and 23% are combinations. The types of health technologies assessed are relatively similarly between 2000 to 2010 and 2019. Additionally, the trial durations range from 8 days to 8 years, as expected from Ridyard and Hughes.

20 of the 25 papers included an economic evaluation. The 5 that did not, intended to but were not able to due to various reasons as noted in *Table 1.* The majority of the papers use a cost-utility analysis (15 of 25), with most using the measurements cost per QALY and the incremental cost-effectiveness ratio (ICER). 4 of the 24 use cost-effectiveness analyses and 1 uses a cost-consequence analysis. Ridyard and Hughes do not comment on which economic evaluation technique papers used, therefore a comparison cannot be made.

Table 1: Summary of data resource use collection and costing methods

Paper	***Health technology being assessed***	***Trial duration (period patients were studied for)***	***Was EE used?***	***Perspective taken for costs***	***Evidence of how resource items for costing were identified (yes or no)***	***Source of unit costs***	***Were costs modelled beyond the time horizon of the trial***	***Resource use data collection method used***	***Evidence of piloting resource use data collection instrument (yes/no)***	***Evidence of validation of health-care resource use data collection methods (yes/no)***	***Additional information***
TEC[4]	Drugs / Devices.	12 months.	Yes: cost-effectiveness analysis (CEA).	NHS, PSS and societal.	Yes.	Prescription Cost Analysis – England 2016. Curtis L, Burns A. Unit Costs of Health and Social Care 2016. NHS Business Services Authority. PD1 reports. 2017. Some costs from research team e.g. cost of leaflets. Some costs by self-report e.g. pharmacotherapies.	Yes – captures lifetime cost-effectiveness using Markov model.	Oracle 11g database used. When unavailable, data was collected on paper case report forms (CRFs) and entered into database.	No.	Yes - conducted a review of published economic literature.	
AMBER[5]	Setting of care.	12 weeks.	Yes: CEA.	NHS, PSS and societal.	Yes.	From a diary kept by the nurses and nurse facilitators. No evidence of costing from a "societal perspective"	Not applicable as end of life care.	Patient or relative completed questionnaire and trial researchers completed interviews with patient, relatives and HCPs and questionnaires completed by	Yes: questionnaires were piloted and subsequently improved and they tested the procedures.	Yes - conducted a review of published economic literature.	Triangulation data method. Collected data from quantitative and qualitative sources and looked if they were

[4] Hajek, P. et al. (2019) E-cigarettes compared with nicotine replacement therapy within the UK Stop Smoking Services: the TEC RCT. *Health Technology Assessment.*

[5] Koffman, K. et al. (2019) The AMBER care bundle for hospital inpatients with uncertain recovery nearing the end of life: the ImproveCare feasibility cluster RCT. *Health Technology Assessment.*

								HCPs. CSRI for health care use 3 months prior to hospital admission. Ed-5D for health-related quality of life.			complimentary, agree (convergence) or contradict each other.
CHANGE[6]	Procedure.	8 months.	Yes: CUA - incremental costs and cost per QALY.	Societal [intervention-specific costs, parent productivity costs, e.g. time off work to attend the intervention sessions, associated child-care costs and changes to the family's weekly food bill].	Yes.	Collected from the children's weight management service providers and costs to families were captured through questionnaires.	No.	Interviews with researchers, patient completed questionnaires and questionnaires completed by researchers.	No.	No. Assess literature but no reference to comparison of data collection methods. Use some validated questionnaires e.g. Child Health Utility 9D (CHU-9D) questionnaire.	
ReMemBrIn[7]	Procedure	10 weeks	Yes. CUA – incremental cost per QALY gained.	NHS and PSS.	Yes.	British National Formulary (BNF).	Yes.	Prospective forms completed by assistant phycologist. Patient completed questionnaires. Information from medical notes. Relative / friend completed forms.	Yes – researchers executed pilot study.	Yes conducted a review of published economic literature.	

[6]Griffin, T. et al. (2019) Cultural adaptation of an existing children's weight management programme: the CHANGE intervention and feasibility RCT. *Health Technology Assessment*.

[7] das Nair, R. et al. (2019) A group memory rehabilitation programme for people with traumatic brain injuries: the ReMemBrIn RCT. *Health Technology Assessment.*

CanTalk[8]	Procedure	24 weeks	Yes: CUA – ICER per QALY gained.	NHS and PSS.	No.	No source stated.	No.	Forms completed by trial researchers based on interviews with patients and health care workers.	Yes - adopted formats that had previously been piloted in similar studies.	No.	
ARTISTIC[9]	Screening	2 years	No.	N/A	N/A	N/A	N/A	From databases: NHS Central Register (NHSCR) and NHS Cervical Screening Programme call–recall database.	Yes - adopted formats that had previously been piloted in similar studies.	No.	
VIST[10]	Devices.	8 years	No [Intended: CUA: cost per QALY and cost per ICER].	N/A [Intended: NHS and PSS].	N/A	N/A	N/A [Intended]	N/A	No.	N/A	They intended to include economic evaluation however there was a withdrawal of funding.
FIAT[11]	Devices and procedures.	1 year	Yes: CUA - ICER and QALY gained comparison.	NHS and PSS.	Yes.	Databases: Personal Social Services Research Unit (PSSRU), Unit Costs of Health and Social Care 2017, NHS Reference Costs and the BNF 2018.	Yes.	Patient completed forms.	No.	No.	

[8] Serfaty, M. et al. (2019) Manualised cognitive–behavioural therapy in treating depression in advanced cancer: the CanTalk RCT. *Health Technology Assessment.*
[9] Gilham, C. et al. (2019) HPV testing compared with routine cytology in cervical screening: long-term follow-up of ARTISTIC RCT. *Health Technology Assessment.*
[10] Markus, H. et al. (2019) Vertebral artery stenting to prevent recurrent stroke in symptomatic vertebral artery stenosis: the VIST RCT. *Health Technology Assessment.*
[11] Jayne, D (2019) Anal fistula plug versus surgeon's preference for surgery for trans-sphincteric anal fistula: the FIAT RCT. *Health Technology Assessment.*

OVIVA[12]	Drugs	1 year	Yes: CUA – cost per QALY gained; and CEA – cost per definitive failure averted.	NHS and PSS.	Yes.	Databases: BNF, NHS reference costs and IV administration resources. Some costs were taken from the literature.	No.	Patient completed forms.	Yes– researchers executed pilot study.	Yes - conducted a review of published economic literature.	
NEAT[13]	Drugs and Proced ures	3 years	No.	N/A	N/A	N/A	N/A	N/A	No.	Yes - conducted a review of published economic literature.	EE was intended to be used. The original sample size was 300 but at the end of trial was only 6 due to many complication s.
PESSURE [14]	Devices	3 months	Yes: CUA - cost per QALY.	NHS and PSS.	No.	Database: PSSRU Unit Costs of Health and Social Care 2016.	Yes.	Patient-completed forms and data collected by clinical research nurse/registered health-care professionals.	No.	No.	
PDSAFE[15]	Proced ure	1 year	Yes: CUA - ICER and QALY.	NHS and PSS.	Yes.	Database: PSSRU Unit Costs of Health and Social Care and NHS Reference Costs 2015 to 2016.	No.	Interviews between trial researchers and patients, as well as between treating	Yes – researchers executed pilot study.	Yes - conducted a review of published	

[12] Scarborough, M. et al. (2019) Oral versus intravenous antibiotics for bone and joint infections: the OVIVA non-inferiority RCT. *Health Technology Assessment.*

[13] Strang, J. et al. (2019) Extended-release naltrexone versus standard oral naltrexone versus placebo for opioid use disorder: the NEAT three-arm RCT. *Health Technology Assessment*.

[14] Nixon, J. et al. (2019) Comparing alternating pressure mattresses and high-specification foam mattresses to prevent pressure ulcers in high-risk patients: the PRESSURE 2 RCT. *Health Technology Assessment.*

[15] Ashburn, A. et al. (2019) Exercise- and strategy-based physiotherapy-delivered intervention for preventing repeat falls in people with Parkinson's: the PDSAFE RC. *Health Technology Assessment.*

								therapists and trial researchers. Then, interview transcripts were coded to quantify. And patient completed forms.		economic literature.	
TEAMM[16]	Drug	1 year	Yes: CUA - cost per QALY gained at 16 weeks	NHS and PSS.	Yes.	Databases: BNF, PSSRU Unit Costs of Health and Social Care 2015 and the Department of Health and Social Care's NHS Reference Costs 2014 to 2015.	No.	Collected from case report forms (CRFs), patient diaries, hospital data and patient completed forms.	No.	No.	
BRiMS[17]	Procedure	27 weeks	Yes: CEA.	NHS, PSS and societal.	Yes	Database: PSSRU Unit Costs of Health and Social Care 2016.	No.	Collected from CRF entries.	Yes – researchers executed pilot study.	No.	
Oral Theophylline[18]	Drug	1 year	Yes: CUA – cost per QALY.	Not noted.	Yes.	Databases: BNF, NHS Reference Costs 2015 to 2016, Information Services Division (ISD) and PSSRU.	No.	Face-to-face assessments (assumed to be done by trial researchers); patient-completed forms.	No.	No.	
SAFFRON[19]	Procedure	N/A	No.	N/A	N/A	N/A	N/A	N/A	Yes – adopted formats that had been piloted in	No.	Study was closed by NIHR due to slow progression to recruitment.

[16] Drayson, M. et al. (2019) Prophylactic levofloxacin to prevent infections in newly diagnosed symptomatic myeloma: the TEAMM RCT. *Health Technology Assessment.*

[17] Gunn, H. et al. (2019) A self-management programme to reduce falls and improve safe mobility in people with secondary progressive MS: the BRiMS feasibility RCT. *Health Technology Assessment.*

[18] Devereux, G. et al. (2019) Low-dose oral theophylline combined with inhaled corticosteroids for people with chronic obstructive pulmonary disease and high risk of exacerbations: a RCT. *Health Technology Assessment.*

[19] Gessler, S. et al. (2019) Stepped approach to improving sexual function after gynaecological cancer: the SAFFRON feasibility RCT. *Health Technology Assessment.*

									similar studies.		
TICH-2[20]	Drug	3 months	No: did look at cost outcomes briefly but not EE.	Not noted.	No.	Not noted.	No.	Not much detail – seems like interviews between trial researchers and patients.	No.	No.	
PREDNOS[21]	Drug	16 weeks	Yes: CUA – cost per QALY.	NHS.	Yes.	Databases: BNF, Unit Costs of Health and Social Care 2015 and The National Schedule of Reference Costs.	No.	Patient completed forms.	Yes – researchers executed pilot study. [Had a chapter on the pilot study, findings and the lessons learnt].	No.	
HEALTH[22]	Procedures and Device	15 months	Yes: CUA – incremental cost per QALY gained.	NHS.	Yes.	Databases: Unit Costs of Health and Social Care 2017, NHS Reference Costs 2016–2017, BNF.	Yes.	Patient diaries, patient completed questionnaire and trial researchers completed forms.	No.	Yes - conducted a review of published economic literature.	
LASER[23]	Device	12 months	Yes: CUA - ICER.	NHS; societal (separate models).	Yes.	Databases: Unit Costs of Health and Social Care 2015; NHS Reference Costs 2015 to 2016; BNF; Holland and Barrett.	Yes.	Patient completed forms and diaries; taken from CRFs; forms completed by attending clinician.	Yes – researchers executed pilot study.	No.	

[20] Sprigg, N. et al. (2019) Tranexamic acid to improve functional status in adults with spontaneous intracerebral haemorrhage: the TICH-2 RCT. *Health Technology Assessment*.

[21] Webb, N. et al. (2019) Sixteen-week versus standard eight-week prednisolone therapy for childhood nephrotic syndrome: the PREDNOS RCT. *Health Technology Assessment*.

[22] Cooper, K. et al. (2019) Laparoscopic supracervical hysterectomy compared with second-generation endometrial ablation for heavy menstrual bleeding: the HEALTH RCT. *Health Technology Assessment.*

[23] Kapoor, M. et al. (2019) Nocturnal temperature-controlled laminar airflow device for adults with severe allergic asthma: the LASER RCT. *Health Technology Assessment.*

BEADS[24]	Procedures	6 months	Yes: CUA - cost per QALY	NHS and PSS; societal (separate models)	Yes.	Database: PSSRU unit cost publication.	Yes.	Patient and carer completed forms	Yes – researchers executed pilot study.	No.	
ANODE[25]	Drugs	6 weeks	Yes: a cost-benefit comparison.	NHS.	Yes.	Databases: BNF 2017, Unit Costs of Health and Social Care 2017, NHS Reference Costs 2017/18	No.	Collected from medical records, patient completed forms.	Yes – researchers executed pilot study.	Yes – consulted with health care professional.	
BREATHE[26]	Device	6 months	Yes: CUA – incremental cost per QALY gained.	NHS and PSS; societal (separate models)	Yes.	Prescription Cost Analysis – England, 2016 database, PSSRU, Unit Costs of Health and Social Care 2015, Prescription Cost Analysis – England, 2016 database, NHS Supply Chain's National Catalogue (2014–15).	Yes.	Collected from CRF; patient completed forms.	Yes– researchers executed pilot study.	No.	
CEDAR[27]	Drugs	8 days	Yes: CEA and cost-consequence analysis (CCA)	NHS and societal.	Yes.	Australian pharmacy costs (not in national databases); BNF	No.	Patient (and parent) completed form, from GP records	Yes– researchers executed pilot study.	No.	
CIRCLE[28]	Procedure	18 month	Yes: CUA – cost per QALY and ICER	NHS and PSS.	No.	CSRI, PSSRU, NHS reference costs.	No.	From medical records	Yes – researchers executed pilot study.	No.	

[24] Thomas, S. et al. (2019) Behavioural activation therapy for post-stroke depression: the BEADS feasibility RCT. *Health Technology Assessment.*

[25] Knight, M. et al. (2019) Intravenous co-amoxiclav to prevent infection after operative vaginal delivery: the ANODE RCT. *Health Technology Assessment.*

[26] Perkins, G. et al. (2019) Protocolised non-invasive compared with invasive weaning from mechanical ventilation for adults in intensive care: the BREATHE RCT. *Health Technology Assessment.*

[27] Hay, A. et al. (2019) Anaesthetic analgesic ear drops to reduce antibiotic consumption in children with acute otitis media: the CEDAR RCT. *Health Technology Assessment.*

[28] Johnson, S. et al. (2019) A contingency management intervention to reduce cannabis use and time to relapse in early psychosis: the CIRCLE RCT. *Health Technology Assessment.*

The perspective of which the economic evaluation (EE) is conducted from is the perspective that resource items are costed. The perspective used out of the 25 papers are as follows: 3 UK NHS; 8 NHS and Personal Social Service (PSS); 1 NHS and societal; 3 NHS, PSS and societal; 1 societal; 1 NHS and societal separately; 2 NHS and PSS, then societal separately; 2 do not note the perspective; and 4 do not complete an economic evaluation. There appears to be a lack of clarification on what a "societal" perspective is. Ridyard and Hughes note that this would be better defined as an NHS and patient perspective. Additionally, on occasion, papers do not show evidence of costing from the perspective claimed. For example, some papers claim that they are costing from a UK NHS and societal perspective, however do not show evidence of costing from a societal perspective, only from the NHS' perspective. The results are relatively similar to that found by Ridyard and Hughes, with the majority of papers including the NHS' perspective. The results from 2019 display a greater inclusion of PSS' perspective than from 2000 to 2010. Ridyard and Hughes note that 26 of the papers that they studied included the "patients' perspective" of which none of the papers in this studied stated.

The majority of the papers provide evidence of how resource items for costing were identified: 17 of 25. Only 4 of 25 did not provide such evidence, and for 4 papers this was not applicable. Similarly to Ridyard and Hughes, the source of unit costs was predominantly from databases, including the British National Formulary (BNF), Unit Costs of Health and Social Care by Netten and Curtis, Personal Social Services Research Unit (PSSRU) and the NHS reference cost database. 8 of the 25 papers modelled costs beyond the time horizon of the trial, often using the Markov model. A comparison with Ridyard and Hughes' findings cannot be made since they do not note whether studies model costs beyond the time horizon of the study,

The resource use data collection methods varied and most used more than one method. In total: 16 papers use patient-completed forms, 3 use patient completed diaries, 7 use carer-completed forms, 9 use medical records, 2 use relative-completed forms and 2 use databases. These results are in-line with the results found by Ridyard and Hughes for 2000 to 2010. Notably, 14% of the papers they study use a database, compared to 8% in this paper.

15 of the 25 papers provided evidence of piloting the resource use data collection instrument. Ridyard and Hughes found that less than half piloted the resource use data collection instrument, suggesting that there has been an improvement. Similarly to Ridyard and Hughes, few papers showed evidence that they validated the resource use data collection method, for example by consulting the method with a health-care professional. 8 of the 25 papers provided such evidence and Ridyard and Hughes found 22 of 95 did so, showing no considerable increase.

Conclusion

The results of this review of HTA-funded primary research papers from 2019 display a high variability in methods used across papers and no considerable alignment since Ridyard and Hughes study of HTA-funded primary research papers from 2000 to 2010. HTA studies are still over-reliant on patient-completed forms which are costly and suffer from biases. HTA studies are lacking important data collection exercises, such as piloting and validating data collection methods. Such exercises are fundamental to ensuring reliable data collection. Additionally, the methods in estimating costs still lack transparency and are not fully documented on. Improvements and standardisation are still required in order to achieve good practice in data collection methods among HTA-funded primary research papers.