After The QALY: Training for a New Start Paradigm in Health Technology Assessment

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INTRODUCTION
There is a need for a new paradigm to support health technology assessment (HTA). A recent evaluation of the status of the standards for therapy assessment in HTA concluded that practitioners were locked into a meme, rather than a paradigm. A meme that denied a commitment to the evolution of objective knowledge, the discovery of provisional new facts, in favor of the creation of approximate information through a commitment to construction of assumption driven simulations that support non-empirically evaluable claims for cost-effectiveness. This commitment in health technology assessment to the construct of assumption driven modeled simulations to create lifetime imaginary claims for comparative cost-effectiveness is being increasingly recognized as an analytical dead end. Introduced as a framework for creating non-evaluable approximate modeled information it lacks any commitment to the standards of normal science or the requirements of Rasch or modern measurement theory; none of the claims that are made for product pricing and access meet standards for credibility, empirical evaluation or replication[1]. Based on the mathematically impossible quality adjusted life year (QALY), there is a pressing need for a new start in health technology assessment to ensure that the standards for product assessment meet those of the physical and more mature social sciences such as education, psychology and economics. There is a recognized need to move from supporting non-evaluable modeled claims to inform formulary decisions to a framework for HTA endeavors to support the standards of normal science and those of fundamental measurement. Our focus must be on meeting the standards of the physical sciences and the advanced social sciences. The adoption of a new framework will not be easy. It is not an option but an imperative if HTA is to retain any attempt to be taken seriously in health care decisions. To achieve this a commitment to minimum standards in HTA are essential and where pharmacy teaching programs can play a key part.

A NEW START IN HEALTH TECHNOLOGY ASSESSMENT

Health care decisions cannot be based on imaginary, assumption driven claims for cost-effectiveness. Unfortunately, current analytical standards in pharmacoeconomics or health technology assessment (HTA) fail to meet the required evidentiary standards. We have to do better than rely on the multiattribute QALY as a gold standard in creating approximate information; unless the QALY can be demonstrated to have linear interval measurement properties, capturing a single unidimensional attribute, health technology assessment has no claim to relevance. Rather there is a concern the current standards in health technology assessment encourage a belief in the importance of consciously rejecting the standards of normal science and fundamental measurement.

By focusing on disease specific value claims, and rejecting multiattribute generic preferences and quality adjusted life years (QALYs), there is a pressing need to understand the impact of modern or Rasch measurement theory to construct patient reported outcome (PRO) instruments that support meaningful claims for response to therapy[2]. Rasch measurement is not new; it was proposed and accepted in the 1950s but ignored in health technology assessment with the commitment to multiattribute generic instruments and patient reported outcomes that produce nothing but ordinal observations. We have to backtrack; to admit that the commitment to observations rather than measurement has effectively crippled health technology assessment. What was overlooked, and continues to be overlooked, is that meaningful measurement is based on the properties of interval scales and that Rasch measurement is the only necessary and sufficient means to transform ordinal observations to interval, linear measures[3]. If this lesson is rejected, then health technology assessment has nothing to say in capturing patient response to therapy. We have to do better.

This new start in HTA rests on three premises:

- All value claims for therapy impact, whether for clinical endpoints, PRO, drug and resource utilization must meet the standards of normal science for credibility, empirical evaluation and replication;
- All value claims must be for instruments supporting single attributes that meet Rasch measurement standards or rules as interval or ratio scores in order to capture response to therapy; and
- All value claims must be supported by a protocol detailing how the claim is to be assessed and reported.

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The proposed new start demonstrates that the commitment to assumption driven modelled simulation to support cost-effectiveness claims is an analytical dead end. It meets neither the standards for normal science not the required measurement standards. The new start delivers a comprehensive package to support formulary submissions, prospective research programs to discover new facts for therapy response as well as the necessary inputs for outcomes-based contracting.

ESSENTIAL PROGRAM REQUIIREMENTS

The focus of this program is to examine the appropriate theoretical and practical foundation for the methods and application of techniques in health technology assessment (HTA) that meet the standards of normal science and fundamental measurement; a new start in HTA. This involves meeting the evidence needs of formulary committees, practitioners, patients and other health system decision makers which is critical for effective health care delivery, together with the meaningful assessment of pharmaceutical products and devices by pharmacists in everyday practice. The program is supported by extensive notes and references, supported by a slide/audio MP4 presentation for each module. The notes can be downloaded along with the slides/audio materials.

Any training program that is designed to reject the existing HTA meme and move to an endorsement of a new paradigm in HTA will face entrenched opposition; there are too many people with too much to lose. The purpose of the 'new start' paradigm is to bring HTA in from the cold. The program must aim to make the case for rejecting 30 years of much misplaced and wasted effort in HTA. In the early 1990s, the decision was made that in order to make the case for new pharmaceutical products at product launch; hypothesis testing was to be abandoned in favor of creating assumption driven modeled approximate information to support formulary decisions[4]. This was uncritically accepted by leaders in the field and detailed in textbooks and practice guidelines[5]. It was also uncritically accepted by academic centers, government agencies and analysts despite warnings to the contrary[6, 3]. The result was the acceptance for publication of thousands of cost per quality of life (QALY) assumption driven imaginary claims which fail to meet the standards of normal science and fundamental measurement and their continued application by groups such as the Institute for Clinical and Economic Review (ICER)[7,8]. At the same time this acceptance of assumption driven modelled claims is open to abuse and bias[9] . We are still locked into this belief system with the recent publication of the Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) guidance for submitting imaginary modeled claims to academic journals[10 11] as well as the mooted successor to the QALY, the EQ-Health and Wellbeing (EQ-HWB) multiattribute instrument which, unfortunately, continues the tradition in patient reported outcomes of ignoring the standards of Rasch measurement, confusing polytomous observations with measurement[12].

The new start paradigm provides a theoretical and practical foundation for the appropriate methods and application of techniques in HTA that meet the standards of normal science and fundamental measurement. Meeting the evidence needs, including outcomes contracting, of formulary committees, practitioners, patients and other health system decision makers, is critical for effective health care delivery and the meaningful assessment of pharmaceutical products and devices [13]. This program proposes a new start in HTA to meet the needs of health system decision makers; a framework of analysis that is not only consistent with the standards of normal science and Rasch or modern measurement theory [2], but one that focuses on capturing needs-fulfillment quality of life of patients and caregivers. The importance of rejecting non-evaluable value claims for conducting and assessing outcomes research will be emphasized. This rejection provides a firm empirical basis for evaluating long-term clinical, quality of life and resource utilization outcomes, including engaging with health systems to identify and even contract for key value claims as part of disease area and therapeutic class reviews.

Many practitioners are aware of the manifest deficiencies in modelled claims[14]. Yet the majority persevere in the belief that formulary committees are prepared to accept imaginary claims to support pricing and access decisions. The problem is that by changing assumptions any number of competing modeled claims can be presented[15].

It is not often appreciated, but the current analytical framework supports a belief system in imaginary value claims that is unique in the physical and social sciences; rejecting the standards for the discovery of new, yet provisional facts, that has been unconditionally accepted since the scientific revolution of the 17th century[13]. While practitioners in HTA or pharmacoeconomics claim it is a branch of economics, this is wishful thinking. It is totally at variance with the standards of analysis both in mainstream economics and in the applied discipline of health economics, the study of the production and consumption of health and healthcare; we must not confuse the demarcation 'standards' and commitment to falsification of science with non-science. HTA follows a belief system, which has more in common with that prevailing in the middle ages; one beginning only to be overthrown with the scientific revolution of the 17th century by figures such as Bacon, Galileo, Descartes and Newton. In this context it is worth remembering the motto of the Royal Society (founded in 1660): *nullius in verba* (take nobody's word for it). This is rejected in HTA by asking, with assumption driven claims, that we take anybody's word for it; any assumption driven non-empirically evaluable claim is presumably as good (or bad) as any other.

It is worth quoting Richard Dawkins, the evolutionary biologist, on differentiating science from non-science (or simply faith in creating non-evaluable approximate information value claims):

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> *...the selective forces that scrutinize scientific ideas are not arbitrary or capricious. They are exacting well-honed rules and they do not favor self-serving behavior. They favor all the virtues laid out in textbooks of standard methodology: testability, evidential support, precision, quantification, consistency, intersubjectivity, repeatability, progressiveness, independence of cultural milieu and so on*[16].

Measurement is critical if value claims for competing products are to have any credibility. If the tools used to support claims for measuring response are irrelevant, failing to meet required measurement standards, then we have to question almost all direct and indirect generic preference scores and the overwhelming majority of patient reported (PRO) instruments. Most fail the axioms of fundamental measurement and the tools of simultaneous conjoint measurement that have been practiced in other social sciences for 60 years.

At the same time, value claims must be disease specific tailored to specific attributes relevant to formulary decisions whether these are for clinical claims, quality of life claims or drug and resource utilization claims. The target must be to develop instruments that meet ratio or interval measurement properties. Assumption driven simulated blanket claims for comparative cost-effectiveness are insufficient.

The Wyoming Certificate Program, sponsored by the School of Pharmacy, University of Wyoming and credited for 20.5 hours by the ACPE, is available for training in HTA under a new paradigm. It is guided by three premises: (1) value claims that are for single attributes and meet the standards of normal science, (2) value claims that meet the standards of Rasch measurement and (3) value claims that are supported by evaluation protocols.

OVERVIEW: LAUNCHING THE CERTIFICATE PROGRAM

The Program was launched by the School of Pharmacy, University of Wyoming in March 2023. Although the principal audience is for registered pharmacists in the US, the reach is global for HTA practitioners, especially for decision-makers in single payer health systems with gatekeeper requirements.

For those in pharmacy colleges and schools who may be interested in this package, it is also available as a 3-credit course program for PharmD and M.Sc. students. The program is presently being delivered as distance education by the School of Pharmacy, University of Wyoming.

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APPENDIX

CONTINUING PHARMACY EDUCATION

Accreditation Council for Pharmacy Education

UNIVERSITY OF WYOMING

SCHOOL OF PHARMACY

CERTIFICATE PROGRAM
(ACPE 0653-23-001-CP)

A NEW START IN HEALTH TECHNOLOGY ASSESSMENT

The University of Wyoming, School of Pharmacy, is accredited by the Accreditation Council for Pharmacy Education (ACPE) as a provider of Continuing Pharmacy Education. This Certificate program, which is open to pharmacists seeking annual accreditation as well as others who may only seek a Certificate, is designated as an online/live activities program.

The Wyoming Certificate Program is in three parts:

- Part I: Required evidentiary standards for product and therapy assessment (4 modules);
- Part II: The failure of approximate modelled information for therapy decisions (5 modules); and
- Part III: Formulary submission value claims and protocols for a new start in product evaluation (5 modules)

Each of the 14 modules comprises: (i) a PowerPoint slide show with audio; (ii) Downloadable PowerPoint slides (each with audio); (iii) detailed notes to support the presentation; and (iv) a combined true/false and multiple choice assessment. As well there are two live sessions to provide opportunities for dialogue for the first seven modules and then for the balance of the modules.

PROGRAM MODULES: PART I

The four modules in Part I have two objectives. First, to detail the required evidentiary standards for any value claim for product performance in terms of (i) the standards of normal science and (ii) the failure of assumption driven multiattribute modeled simulations to produce value claims that meet the required standards; this is achieved by deconstructing the recently released CHEERS 2022 Guidance for creating imaginary cost-effectiveness claims.

The first three modules represent a theme that underpins the role for a new start in health technology assessment: understanding the importance of demarcating science from non-science, the critical role of Rasch or modern measurement theory to transform observations to measurement and the need to reject assumption driven modelled simulation based upon the notion of the realism of assumptions to justify model claims for cost-effectiveness.

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The modules are:

Module 1: Science versus non-science*: Understanding the importance of demarcation in the acceptance of value claims*

Module 2: Ratio and interval measures: *Appreciating the importance of interval and ratio measures to support value claims*

Module 3: Assumptions and Hume's problem of induction; *Understanding that assumptions cannot be used to validate modeled value claims*

Module 4: CHEERS 22 - Tenacity of false belief systems in pharmacoeconomics: *Consider the potential impact given the limitation of CHEERS 2022 guidance* [

PROGRAM MODULES: PART II

The five modules that comprise Part II of the program focus on the failure of assumption driven modeled simulations in health technology assessment, in the quest for approximate information, to pass the demarcation test: they fail to meet standards for credibility of claims, the ability to be empirically evaluated and replicated in other target patient populations within a disease area. The practice of health technology assessment with the belief in assumption driven simulations means that it is non-science or pseudoscience.

The modules are:

Module 5: Truth is not consensus: *Consider whether there is any justification for lifetime modeled claims in formulary decisions*

Module 6: Failure of multiattribute generic preference measures: *Understand the case for rejecting multiattribute preference measures in value claims for therapies*

Module 7: The impossible QALY: *Understand why, despite its acceptance, why the QALY based on ordinal scores must be rejected*

Module 8: Impossible value claims: *Consider the case for single attribute ratio value claims in formulary submissions*

Module 9: Abandoning models in value claims: *Consider the circumstances under which modeled value claims are acceptable*

PROGRAM MODULES: PART III

Finally, the modules in Part III of the program set out the standards for establishing and evaluation value claims for therapies in health technology assessment that ensure that they are a firm basis for formulary submissions. Not only must all value claims be presented as single attributes whether for clinical claims, patient reported outcome claims, drug utilization and resource utilization, but they must be supported by an evaluation protocol and, if required, support outcomes-based contracting and ongoing disease area and therapeutic class reviews.

The modules are:

Module 10: Guidelines for value claims in formulary submissions: *Introducing a proposed format for therapy value claims that meet required evidentiary standards*

Module 11: The patient voice: need fulfillment quality of life: *Introducing the needs-fulfillment quality of life measure for patients and caregivers*

Module 12: Selecting PRO claims: *Introducing criteria for evaluating measurement standards for disease specific PRO claims*

Module 13: Formulary submission guidelines: *Proposal for a formulary submission package for value claims and protocols*

Module 14: Questions a formulary committee should ask; *Questions to address to ensure value claims meet standards of normal science and fundamental measurement*

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PROGRAM MODULES: Live sessions

Live Session 1: Modules 1 – 7

Live Session 2: Modules 8 – 14

FURTHER INFORMATION

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Conflicts of Interest: The Program was developed by PCL and EMS. PCL has a financial interest in fee income from the Program.

Note: The opinions expressed in this paper are those of the authors.

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