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COMMENTARY

Teaching by (bad) example: what a confused attempt to "advance" EBM reveals about its underlying problems: commentary on Jenicek, M. (2015). Do we need another discipline in medicine? From epidemiology and evidence-based medicine to cognitive medicine and medical thinking. Journal of evaluation in clinical practice, 21:1028-1034

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Abstract

Professor Jenicek's paper is confused in that his proposal to 'integrate' what he means by 'evidence-based scientific theory and cognitive approaches to medical thinking' actually embodies a contradiction. But, although confused, he succeeds in teaching us more about the EBM debate than those who seem keen to forge ahead without addressing the underlying epistemological problems that Jenicek brings to our attention. Fundamental questions about the relationship between evidence, knowledge and reason still require resolution if we are to see a genuine advance in this debate.

Introductory remarks: on being smart enough to feel confused

A philosophy student developing an inquiry into the field of 'bad arguments' would face two immediate and underlying puzzles: Firstly, why is the field so large, and secondly, why are so many very well qualified academics amongst its contributors? [1] Our intuition on reading Professor Jenicek's article in the recent EBM thematic edition of the Journal of Evaluation in Clinical Practice (hereafter referred to as "EBM-Cog") was that there was something not only deeply confusing but also fundamentally confused about it. Of course there is a need for extreme caution when reacting in this way, especially to the work of a well-qualified and well-published contributor to a most serious debate. One needs to consider the possibility that the work expresses some insight that one has just failed to grasp, despite one's best efforts. So it is worth stressing that what follows is simply our best attempt to make sense of Jenicek's piece in the context of the broader debate to which he contributes and to use it to identify and explore what we regard as a fundamental problem for that debate. Should it turn out that we have just missed the author's key point, we invite him to explain the point we have missed in language we can understand.

Given that much of Jenicek's prior work has had to do with how to construct scientific arguments, many readers may, like us, react to EBM-Cog by wondering: 'what is this about?' Quite often such a question expresses not anti-intellectualism or a failure to grasp a set of complex claims, but rather the exercise of critical faculties generating the sense 'that a conclusion does not follow, that a line of argument someone has presented to us is either incomplete or just plain spurious'. [2] Sometimes understanding the nature of the problem will require examining fundamental assumptions that we bring with us to the debate – for instance, assumptions about the nature of knowledge, evidence and reasoning and the relationships between them. In that case, whether we use the term or not, in our critical questioning we are doing philosophy. [1,2] On this point, we suspect that Jenicek would agree with us, though we find that a philosophical analysis of his own assumptions suggests that the confusing nature of his paper is not simply the result of the difficulty of the subject matter nor is it merely the product of the terminological overload that characterizes his work. Rather, at the core of his thesis is a contradiction. He is committed to incompatible claims about medical knowledge and clinical reasoning.

What makes EBM-Cog interesting is what it tells us about the broader debate and the fundamental problem the author is addressing. There is a method of argument in logic called *reductio ad absurdum*: if by asserting the truth of a particular thesis we find we are committed to a contradiction, then, however plausible that thesis may seem, it must be false. Jenicek is one author amongst many making serious efforts to resolve problems for Evidence-based Medicine (EBM). In answer to the question in our opening

paragraph, arguments can sometimes be bad ones despite being well informed and well thought through. This is because all arguments take place in the context of an intellectual history that is not complete. [3,4] If our best efforts to defend a dominant intellectual starting point lead us to contradiction and confusion, or some other manner of practical and/or intellectual 'crisis', [5] then it may be time not to expand or develop the existing 'paradigm'[6] but to revise our thinking in a more fundamental way. Jenicek deserves credit for identifying a deficit in EBM and attempting to supplement its conception of 'scientific' medicine with alternative 'cognitive approaches'. [5] We will argue that the failure of these identified 'approaches' to 'interconnect' requires us to give more explicit attention to the underlying epistemological assumptions that frame the EBM debate. While we think he fails to solve the problem he identifies, that failure can, in itself, teach us something about its fundamental nature. There are times when proposing a confused solution to a problem is a better way to move a debate forward than simply insisting that there is nothing to feel confused about.

Jenicek and evidence-based medicine

For over a decade, Milos Jenicek has offered himself as a 'voice of reason' in relationship to EBM. Specifically, he has published books and articles asserting the need to integrate principles of logic and clinical reasoning into the fabric of EBM for the latter's goals and aspirations to be realized. [7–10] EBM-Cog goes a step further, calling for the development of a new healthcare related cognitive science to bridge the gap between medical science and clinical practice. EBM-Cog proposes that such a science should pertain to the care of individual patients, to community medicine and to public health. Jenicek aims to draw the building blocks of his proposed new science from EBM, epidemiology, biostatistics, medical specialties and health management, as well as from philosophy and the humanities. He refers to developments and progress in these and other spheres but does not elaborate what he means by them. In many cases his references are limited to self-citations. The references to 'developments in the arts and humanities', although particularly vague, suggest an awareness of the need to add a phenomenological dimension to the integration and emergent cognitive 'discipline' that he seeks.

To his credit, and in contrast to some recent literature, [11] Jenicek stops short of attempting to expand the meaning of EBM *per se* to encompass the other disciplines at play in his vision. Jenicek's call is nonetheless salient to contemporary issues surrounding EBM. EBM has for years espoused the integration of domains other than the results of clinical research into decision making, namely, patient values and priorities, available resource issues and clinical circumstances. [12,13] However, it has never provided practical guidance as to how such integration is to be achieved. [11] Calls for the integration of the research literacy offered by EBM with humanism in healthcare and person-centered care have largely emanated from other sources. [14–17] Jenicek's previous critical reviews suggest that EBM's epidemiological approach to evidence and decision making needs to be supplemented by attention to principles of logic and inference, [7] and furthermore that EBM needs to acknowledge literature that is broadly critical of it and its precepts. [18]

Table 1 EBM-Cog's representation of the process leading from inquiry to decision and action has been condensed and simplified and abbreviated for the purpose of comparison to the standard EBM formula for 'evidence literacy' as typically taught in EBM workshops. Steps 1 and 5 are characteristically omitted from the EBM formula

EBM-Cog (Jenicek 2015)	EBM (Dawes *et al.*[19])
1. Delineating a healthcare problem	1. -----
2. Identifying key questions and information needs	2. Ask a question
3. Collecting and summarizing relevant evidence, observations and measurements	3. Acquire the evidence
4. Evaluating relevant evidence, observations and measurements using the tools of epidemiology, biostatistics and qualitative research	4. Appraise the evidence
5. Reasoning about the results of the previous steps	5.-----
6. Formulating recommendations, such as those found in clinical practice guidelines; decision making	6. Apply the evidence to decision making ('evidence to action')

The nature of the argument

What, in fact, is Jenicek seeking? His call is richly infused with what seems at times like an avalanche of arcane philosophical terms, including 'iatrosophy', which strains the ability of even standard dictionaries to decipher, but which apparently is intended to mean the study of thinking related to medical examination and treatment. Our discussion therefore reflects interpretation, or translation, of the gist of the proposal embedded in EBM-Cog.

In his text and using two figures, Jenicek unfolds a description of a process that may be simplified, abbreviated and summarized for purposes of comparison with the standard EBM formula (Table 1). Jenicek's description can be seen as interpolating two additional steps (numbers 1 and 5 of the Table) into the standard EBM formula for clinical problem solving, a formula that can be summarized as 'ask, acquire, appraise and apply'. [19] The EBM prescription for problem solving conforms closely to the standard formula for 'information literacy' that dates from 1980s visions of the information age. [20] EBM, in the process of moving from clinician empowerment via passive skepticism to a more dynamic literacy movement, [11] adapted the information literacy model to the practice of medicine. [21] Insofar as this formula is strictly adhered to, EBM regards the information needs encountered by clinicians in the course of evaluating and treating patients to be self-evident and inherently related to research designs. [22] A related shortcoming of EBM has been observed to carry over into medical education, starting at the undergraduate level. Maggio *et al*. [23] reviewed published reports of EBM related educational interventions for medical undergraduates and found that only one in five included attention to the process of identifying information needs, that is, step 1 in the Table. The others took the process as self-evident for the purposes of their structured curricular approaches. In the later stages of the problem solving cycle, the EBM literature considers the integration with other knowledge domains of information gleaned from review of published research to be entrustable to a process with which EBM need not be

concerned. The EBM literature does not go beyond superficial acknowledgement of the relevance to that process of clinical and social context as well as patient values and preferences. [12,24–29] In other words, step 5 of Jenicek's schema, as simplified in our Table, is omitted. It is here that his quest seems most importantly to come to bear.

Jenicek's solution to evidence-based medicine's problem

Familiarity with intellectual history helps to explain why EBM literature typically omits Jenicek's step 5. It has been argued that EBM's intellectual heritage is 'positivist' in nature, [24–29] and while this claim has been at least partially contested by EBM advocates, [30] EBM's consistent association with a conception of clinical reasoning that places research evidence at the top of a generic epistemic hierarchy (where famously mechanistic reasoning/'pathophysiologic rationale' and clinical judgment sit somewhere below) strongly suggests a link between the core ideas espoused by EBM authors and conceptions of causal reasoning developed by empiricist philosophy. The positivists' model of reasoning is typically characterized as 'deductivist' because it effectively equates rational argument – the presentation of good reasons to believe a conclusion - with logical validity. A deductively valid argument is one in which the conclusion follows logically from the premises presented, meaning that to deny the conclusion while asserting the truth of the premises is to be guilty of a formal contradiction. Deduction as a logical process cannot generate knowledge, because a deductively valid argument simply makes explicit a conclusion already 'contained' within the premises. And the great positivist thinkers [31–33] are clear that it is the process of observation, the acquisition of empirical data, that generates the knowledge reported by true premises. Thus, all knowledge (including any knowledge expressed in highly abstract, theoretical statements) is ultimately based on, or 'comes from', empirical evidence. As the great empiricist philosophers (most notably Locke [34] and Hume [35]) argued, 'reason' is not the source of knowledge. The positivists (or 'logical empiricists') add to this a focus on meaning, asserting that theories are simply ways of organizing data, and that their meaningfulness, even in the most complex scientific theories, is entirely a matter of their function in arranging large amounts of empirical information. Ultimately, by this view, the adequacy of any theory depends entirely on its ability to describe and predict the empirical data that will serve either to verify, confirm or falsify the theory.

Hume famously argued that necessity is not a feature of experience and that experience simply reveals 'constant conjunctions' of observed facts. [35] This idea provides the basis of the claim that there can be no way of establishing causal connections other than identifying large-scale correlations of data. As Locke observed, systematic empirical science is the best way to gather and describe large amounts of data, such that all disciplines devoted to the study of reasoning (most notably philosophy) must regard themselves as 'under-labourers' to the empirical sciences. [34] Thus, positivism bolstered the view that only empirical data acquired in certain quite specific ways could provide 'objective evidence', giving rise to an intellectual culture in which judgment, personal experience and context-specific information were regarded with suspicion as 'subjective' factors, and even mechanistic reasoning was accorded a lower epistemic status than the gathering of information. [2,3,36,37]

Positivist assumptions are so deeply embedded within our contemporary 'common sense' that they may strike some 'practically minded' authors as too obvious to require defense or even explicit articulation. [2,37] In fact, far from being sheer common sense or 'just plain obvious', this philosophical position has been subjected to extensive criticism, and the problems it creates for scientific practice have been well documented. [4,38,39] Rationalist thinkers have argued that an adequate account of many forms of scientific reasoning requires positing innate human capacities 'not based on experience' to 'generate hypotheses about what in general the world might possibly be like' and then to 'reject those we see could not include ourselves and our experiences'. [4] The debate has by no means been 'settled' one way or the other, but few would now defend the strict empiricism of the logical positivists, precisely because it seems too restrictive to explain how many ordinary cases of reasoning are legitimate. [3,37]

That said, the influence of positivist ideas on the development of EBM seems clear – its privileging of research evidence over expert opinion, limited, personal, context-specific experience, intuition and mechanistic reasoning would seem to follow (strictly and deductively) from the conceptions of knowledge and reasoning developed in the empiricist tradition. The one clearly epistemological thesis associated with the various statements of EBM over the decades has been the idea of a 'hierarchy of evidence'.

Tonelli [40] argues that, in EBM, the results of empirical research function as 'the major premises' from which conclusions about particular cases are deduced. The problem, of course, (as numerous authors have noted over a number of years [1]) is that the process is invalid as no conclusion about any specific case follows deductively from general premises. Hence, despite all of the references in EBM literature to the need to 'integrate' other warrants for practical conclusions to bridge the logical gap, the process goes largely unexplained. [40]

This seems to be Jenicek's point of entrance to the debate. He hopes to supplement EBM with 'gnostic processes' which, it seems, we should construe as forms of reasoning that go beyond the strict empiricist model of deductive validity. He characterizes these 'gnostic or epistemological processes' as 'those processes that generate knowledge' and his whole point seems to be that you need much more than the Humean/positivist model of 'observation plus deduction' to arrive at any substantive conclusions. If the 'gnostic process' is anything other than strict logical deduction (from premises derived from observation) and it does really 'generate knowledge', then that seems to imply some form of rationalism in epistemology. In short, he supplies a rationalist solution to the problem created by EBM's empiricism. Step 5 of his proposed 'new medical cognitive science' simply inserts a conception of reasoning that is logically incompatible with empiricism into a process whose basis and legitimacy derives from empiricism. This perhaps explains why standard EBM literature has tended to omit this step.

Quite apart from the difficulties in understanding the specific nature of this supposed solution, (for example, how precisely the forms of reasoning Jenicek proposes work, especially against the background of his own, deeply confused, approach to

philosophical logic [41,42]), we have a problem with the idea of 'supplementing' one approach with another when the two seem logically incompatible. EBM-Cog is confusing not just because it adopts a general stylistic approach of 'why choose one familiar word when five unfamiliar ones will do just as well?' It is confusing because at its own 'base', there seems to be a fundamental confusion. If EBM's whole basis for privileging certain sorts of evidence over others is philosophically unfounded (i.e., if empiricism is the wrong philosophy, which it must be if Jenicek's implicit rationalism is tenable) then the correct thing to do is not to supplement this philosophy with something else but to reject it altogether.

Jenicek's characterization of clinical reasoning might be defended by claiming either that medicine is not a science, or that science is not the strict, empirical-deductive process described by the positivists. At points he seems to be saying both of these things. But either way, he no longer has a position that seems compatible with EBM. What we need is not a 'paradigm extension' but rather a new (or different) paradigm. Or even better, (dropping the unnecessary and inappropriate use of Kuhn's jargon, an intellectual pretension for which Jenicek cannot be held responsible as it has been part of the debate since 1992 [6]), what we need is a different way of thinking about rationality and decision-making in clinical practice.

Conclusion: implications for 'the evidence-based medicine debate'

For this commentary we have chosen to avoid dwelling on the many points of unclarity that make EBM-Cog a confusing read and to focus on an issue that may not immediately strike some readers as crucial, but whose significance cannot be overstated in any serious analysis of the current EBM debate. That is, the question of epistemic commitment: a phrase we use here to indicate the underlying presuppositions about the nature of knowledge to which contributors to a discussion commit themselves by the claims they make. At a time when influential authors are calling for the 'science' of EBM to be 'expanded' and for its underlying knowledge base to be 'supplemented', [11] it is crucial that we are clear on which assumptions about knowledge we are committed to if we accept certain claims. We therefore begin our conclusion by recapitulating our interpretation of EBM-Cog.

Evidence-based medicine has consistently been proposed not as a trivial or platitudinous claim, but as a substantive thesis concerning medical knowledge. [1] While the term can of course be used in many different ways, key defenders of EBM have, from the outset, asserted the idea of a generic epistemic hierarchy of evidence, with evidence from clinical research at the top and with the randomized trial constituting the only 'real evidence' one can admit to support causal conclusions regarding effectiveness. [43] Other clinical research designs may be admitted, but only on the understanding that they are imperfect surrogates for randomized trial data. We have argued that, if such a thesis is indeed entailed by what its defenders have called the EBM 'paradigm', [6] then it is thoroughly grounded in, and, logically committed to, empiricist epistemology.

In EBM-Cog, Jenicek proposes a 'new medical cognitive science'. The specific quest appears to be for a construct or model to enhance our understanding of what the EBM literature terms 'the movement from evidence to action'. [44] Whereas EBM has at times verged on a denial of the difference between evidence, defined as information from clinical research, and knowledge (as a consequence of its own epistemic commitment), Jenicek recognizes the need for a cognitive process going beyond the evidence *per se* for the latter to have meaningful impact on practice. While he refrains from explicit alignment with a philosophical school or tendency, we have argued that such a view commits him to some version of rationalism in epistemology. Indeed, EBM-Cog's concluding statement is as follows: 'Rational uses of medical evidence are as important as evidence itself'. While there is nothing evidently absurd in such a commitment, it is clearly logically incompatible with a commitment to empiricism. It is hard to overstate the seriousness of the error in attempting to defend a position by 'supplementing' it with claims that are logically incompatible with its own underlying assumptions.

EBM-Cog, perhaps because of the confused natured of its argument, has provided us with a useful vehicle with which to explore the philosophical underpinnings of the longstanding EBM debate. Perhaps the most useful principle illustrated by our exploration is that, in the quest to remedy the ills and limitations of the EBM paradigm, a viable philosophical and epistemological framework is the essential starting point. Adding one nonviable framework, in this case Jenicek's version of rationalism, to another such framework (empiricism) can never adequately fix the latter.

However, precedents pointing beyond the rationalist–empiricist dilemma exist within healthcare, and we will identify a few potentially guiding examples. We resist prematurely plunging into a full-scale attempt to define a path or formula for achievement of the mission proposed by Jenicek, or to identify a comprehensive list of ingredients. Indeed, a list of generic disciplines such as suggested in EBM-Cog, many of which are themselves populated by conflicting epistemologies and traditions, is premature. Only after defining a philosophically viable overall framework will it possible to harvest the fruits of empiricist methodologies in a fashion that maximizes their value.

Jenicek himself has at least flirted with bodies of work that suggest pathways beyond the rationalist/empiricist conundrum. One is the accumulating literature on 'dual process' theory, a construct that acknowledges that both intuitive and analytic modalities of cognition operate in the context of clinical practice, particularly diagnostic reasoning. EBM-Cog cites one source article on dual process theory without mention of its content. [9] The construct does not itself define an epistemology and is subject to reductionist interpretations. [45] However, by acknowledging tacit processes at play in medical cognition, it is also consistent with more explicitly non-reductionist concepts. Another example is the notion of reflective practice introduced by Donald Schon. [46] Schon rejected the notion of professional expertise as the perfection of the ability to apply fixed rules and principles to practical problem solving and emphasized the improvisational dimension (reflection in action) in tandem with analytical reflection (reflection on action). Schon's model of

expertise informed the development of the relationship-centered care construct. [16,17] The latter is an excellent example of an approach framed with explicit reference to philosophical frameworks leading beyond the rationalist–empiricist dichotomy, particularly the phenomenology of Merleau-Ponty [47] and the writings of Polanyi.[48] Another source cited but not explored by EBM-Cog is Montgomery's 'How Doctors Think.' [49] Montgomery's casuistic approach to clinical problem solving is based on a reduced importance of empiricist science as the foundational basis of clinical practice, but not as a crucial dimension of healthcare. These examples, while not providing the finished blueprint of medical cognition and reflection apparently sought by EBM-Cog, may nonetheless, at least preliminarily, point the way to such a thing by demonstrating that one can be empirical without being an 'empiricist' and that it is possible to know without succumbing to rigid hierarchies of knowledge or of research designs such as those promulgated by EBM.

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