*Social Science and Medicine*

**Evidence-Making Interventions in Health: A Conceptual Framing**

**Introduction**

In this paper, we outline a framework for conceptualising interventions in health as ‘evidence-making interventions’. An ‘evidence-*making* intervention’ (EMI) approach is distinct from a mainstream ‘evidence-*based* intervention’ (EBI) approach in that it attends to health, evidence and intervention as matters of local knowledge-making practice. An EMI approach emphasizes *relational materiality* and *performativity*, engaging with interventions, and their knowing, as matters-of-practice. Rather than concentrating on how ‘evidenced interventions’ are implemented ‘into’ given ‘contexts’ – as if evidence, intervention and context were stable and separate from one another – an EMI approach focuses on the processes and practices through which ‘evidence’, ‘intervention’ and ‘context’ come to be. Both evidence and intervention are in-the-making, matters of *becoming*. This means that *evidencing makes intervention* at the same time as *intervening makes evidence*.

An EMI approach invites a critical shift away from thinking with evidence primarily as a matter of *epistemology* – the different ways interventions can be known – towards thinking with evidence as a matter of *ontology* – how interventions are performed, and thus come into being, through knowledge-making practices. This thinking has implications at once for evidencing and intervening. It questions evidence, interventions and their effects as fixed and stable, instead proposing them as relational and emergent, and thus also, multiple rather than singular (Mol, 2002). It also highlights the multiple ways that evidence and interventions are made-to-matter in health, not only as acts performed to assess, improve, maintain, promote or modify conditions (WHO, 2018), but as inherently ontopolitical practices which interfere with (and enact) realities (Mol, 2002; Barad, 2003; Moser, 2006). By attending to health interventions in this way, an EMI approach challenges presumptions of separation between the material and social, nature and culture, and evidence and practice, which dominate mainstream EBI paradigms, instead proposing these as entangled and performative (Latour, 1999, 2005; Barad, 2003). It thus expands notions of agency beyond those of human actors to include the effects in practice of non-human actors (such as diagnostic tools, clinical guidelines, intervention devices, and surveillance measures) (Callon, 1984; Latour, 2005; Timmermans and Berg, 2003; Busch, 2013). An EMI approach expands notions of intervention beyond discrete health technologies to include all knowledge-making practices in an implementation event, including those of expertise, experience, science and technology.

*Evidencing intervention translations*

Implementation science has recently emerged as a gathering of scientific practices oriented to optimizing how evidenced interventions translate in their implementation contexts (Madon et al., 2007; Peters et al., 2013). The burgeoning field of implementation science reflects the “creep” of the evidence-based medicine movement out of clinical decision-making and into the world of interventions beyond medical practice (Bell, 2012: 314). It is through approaches like implementation science that evidence-based medicine (EBM) reaches beyond its original preserve of determining effective treatments for a given condition to promoting the fidelity of translated EBIs in populations at scale. Accordingly, implementation science increasingly orientates towards relational approaches which treat implementations as effects of social practices in complex adaptive systems (Hawe et al., 2009; Gabby and May, 2011; Byrne, 2013, 2018; May, 2013, 2016). The shift of implementation science towards treating interventions as situated and complex extends evidence-based intervention accounts of controlled experimentation to much less predictable, and messier, social settings. Yet while these approaches engage with contingency and complexity, it is our contention that they fall short of appreciating the role that material practices play in constituting evidence and intervention as emergent fluid objects. While making claims to relationality, implementation science approaches in health are not relational enough. They fall short of engaging with *ontological* questions of evidencing and intervening, which an EMI approach seeks to address.

As with implementation science, an EMI approach treats *translation* as a core matter-of-concern, but in addition shifts investigation towards the ontological relations of translational practices to notice how the very objects of intervention, evidence and context transform (Callon, 1984; Law and Singleton, 2005; Moser, 2006). An EMI approach focuses on what interventions *become* through their implementations; how they are worked-with into *different thing*s with *multiple effects*; and crucially, how they are *made-to-matter* locally. Following Latour (2005), this involves some *reassembling* to notice how apparently stable EBIs are *transformed* as EMIs in practice into different things. In science and technology studies, ‘translation’ troubles simple transferral (for instance, of knowledge ‘into’ action, or intervention ‘into’ context) by emphasising hybridity (the altered things that become through translation) (Callon, 1984; Petrakaki and Klecun, 2015) but also ontological multiplicity on account of objects or phenomena only becoming as matters-of-practice (Mol, 2002; Barad, 2013). Whereas hybridity holds onto some element of underlying entity, a relational materiality approach, as proposed by Mol and Barad, and which we use to frame EMI, does not. This is why we emphasise that translations constitute *transformations*, of effects and things. In our reading, all intervention translations are transformations, in some way or other, but how boundary shifting they become, and how stabilised these versions appear to be, are matters of event and situation (Law, 2004; Michael, 2017; Moser, 2011).

*This analysis*

Conceptualizing an EMI approach is thus an effort to reassemble EBIs as matters of relational materiality and performativity. We do this in two main ways. First, we draw on established ideas in science and technology studies (STS), feminist science studies, as well as from poststructuralist theory, to identify some concepts which are useful to think with in an EMI approach to health. Second, we illustrate this thinking and its implications through selected case examples in evidence-making intervention. We draw on examples from our own research on methadone as a treatment for opioid addiction and as a technology of HIV prevention (Rhodes et al., 2016; Rhodes, 2018; Rhodes et al., 2019a), on antiviral treatments for hepatitis C (Rhodes et al., 2019b; Rhodes and Lancaster, 2019; Lancaster, Rhodes and Rance, 2019), and on wastewater analysis as an evidencing device in drug epidemiology (Lancaster et al., 2019a,b). We also draw on STS applied to health (Mol, 2002; Moreira, 2007; Moser, 2006, 2011; Zuiderent-Jerak, 2015; Fox and Alldred, 2017). The paper starts out by reflecting on implementation science in the health field to distinguish how an EMI approach thinks differently. We select implementation science as our entry point given how it seeks to engage with the complexity of evidence-based intervention translations in ‘real worlds’. We draw attention to the relational limits of implementation science approaches to emphasise evidence-making as situated performances made in practices. We then elaborate some concepts useful for developing an EMI approach into practice. Our analysis provides a theoretical synthesis bringing ideas from science and technology studies into conversation with implementation science to suggest conceptual tools for building a ‘relational material’ approach to implementation science in the health field.

Taken together, our aim is to outline a different way of thinking with evidence, an approach which treats evidencing *as* intervention. We hope that this affords a more critical, but also more careful, way of knowing and doing health intervention; an approach which opens up possibilities for thinking of what is enacted in science and implementation practices as an *ontological politics* (Mol, 1999, 2002; Law, 2011; Moser, 2006). As we discuss below, if the realities of health interventions are done in practices, then they are also open to being done differently (Law, 2011). By addressing what we see as the problematic analytic and ontological limitations of existing EBI approaches, we seek to hold apart a space to critically consider the conditions of possibility we live with, the political effects of evidence-making interventions, and the ways realities might be enacted (Law, 2004).

**Implementation science**

Health interventions are said to be evidence-based when informed by rigorous controlled intervention studies and by systematic reviews or meta-analyses of these (Sackett et al., 1996, 2000). Being evidence-based is largely a function of *method*, a question of *epistemology*, of how we judge an appropriate, and optimum, way of knowing an intervention and its effects (Timmermans and Berg, 2003; Green, 2000; Mykhalovskiy and Weir, 2004; Greenhalgh and Russell, 2009). This hierarchy of how to know best, where the optimum evidence of intervention effect is the randomised controlled trial (RCT) (Sackett et al., 1996), is based on claims that the evidence produced is free of value-based judgement or other forms of bias, and thus, generates objective and reliable truths about interventions, presumed to exist independently of research methods and their experimental contexts. It is the presumption of isolated causality which affords controlled intervention designs their capacity as knowledge-making devices for producing EBIs (Cartwright, 2013; Rosengarten and Savransky, 2018).

In the field of health, the complexity of ‘real-world’ intervention translations involving human engagement and situated multiplicity troubles the internal validity as well as generalisability of prior evidenced intervention (Deaton and Cartwright, 2018; Victoria et al., 2004). The ‘real-world’ makes RCTs and other optimum ways of knowing sometimes unfeasible, unacceptable or unavailable. Implementation science is a gathering of scientific practices oriented to optimising how evidence is put-to-use in translating health interventions into practice. It is deserving of particular attention as a case for exploring how EBIs in health have shifted towards relational understandings of the ‘real world’ complexity of intervention translations ‘in context’. Interventions invariably do not translate as cleanly as imagined (Durlak and DuPre, 2009; Greenhalgh and Wieringa, 2011; Cartwright, 2013). Implementation science emerges as a technical response to this complexity (Madon et al., 2007; Peters et al., 2013; Ridde, 2017; Reed et al., 2018; Connelly, 2007). It is characterized as bridging the ‘gaps’ between evidence and practice, and intervention and context, in moving prior evidenced interventions into actualities (Wood et al., 1998). Implementation science thus offers some critique on overly reductionist or abstracted versions of EBIs, including those informed by controlled experiments, which may assume linear causal connections between intervention and outcome, with undue attention to the adaptive potentials of implementation contexts (Hawe et al., 2009; Byrne, 2013; Reed et al., 2018; Greenhalgh and Wieringa, 2011).

Yet, the relational claims of implementation science are not without limits, and these in large part link to how implementation science draws on realist ontological assumptions. Most implementation science tends to hold health interventions as *separate* from, yet *shaped* by, their implementations; as *pre-existing* but *travelling* objects made *prior* to their situated implementations. In EBIs, the constitution of an intervention object as evidence-based is *independent* of its material translations into practice (and ideally made-up through experimentations). Implementation science thus does not lose sight of an intervention’s fidelity and universal effect potential (Connelly, 2007; Hawe et al., 2009). There are certain ontological limits then, in the performance of complexity and contingency according to the theory and practices of implementation science (Byrne, 2013; Mowles, 2014; Callaghan, 2008). We consider this a ‘*within-limits* *contingency*’ which does not trouble claims to building a universal evidence-base about intervention effects which science incrementally progresses towards (and which implementation science helps implement). Realist ontologies informing EBI approaches imagine interventions as ‘immutable mobiles’; objects which shift in their translations in context but without changing their overall shape or effect potential as they are stabilized into larger networks (Latour, 2005). Within versions of implementation science which emphasise intervention translations as relational, translated interventions may also be entertained as ‘hybrids’; altered objects which nonetheless retain an underlying and internal entity (Petrakaki and Klecun, 2015). The translation of EBIs through networks of global health and into local implementation networks provide examples (Adams, 2013), for instance, in the global scale-up of HIV treatment and prevention technologies (Nguyen, 2009)*.*

*Realist oriented evidence-based interventions*

One increasingly advocated version of implementation science in the health field is realist evaluation (Emmel et al., 2008). This is a critical realist approach that holds on to there being a reality ‘out there’ existing independently of its actualization through evidencing (Bhaskar, 2008; Archer, 2003; Pawson, 2013; Van Belle et al., 2017; Williams, 2018). Here, the aim of implementation science is to identify and explain the *hidden* *yet* *underlying* generative mechanisms making-up interventions in their contexts (Pawson and Tilley, 1997; Pawson, 2013; Callaghan, 2008). Realist evaluation offers the implementation scientist a set of tools for postulating an intervention’s causative mechanisms in relation to its outcomes in light of its implementation contexts (Pawson and Tilley, 1997; Pawson, 2013). This is a relational interpretation, in which elements of mechanism, intervention, outcome and context interplay in recursive fashion, and where pre-existing social structures are theorized to impose limits on individual actions but without determining them (Bhaskar, 1997; Archer, 1995, 2003). Social structures are thus envisaged as providers of resource potential enabling human agents to adapt these same social structures (Lacouture et al., 2015). Realist implementation science accordingly informs how health interventions can be translated to “reconfigure underlying causal mechanisms situated within pre-existing social structures to generate change” (de Souza, 2013: 146). This invites notions of complex intervention as relatively unpredictable, subject to the feedback loops in agency-structure interactions affecting its iterative adaptations (Bhaskar, 1997). Importantly, postulated causative mechanisms may not bridge the gap between the ‘actual’ (what is observed) and the ‘real’ (what is underlying), especially in circumstances where the health interventions studied are not tightly controlled as in RCTs (Williams, 2018).

The conception of contingency afforded by implementation science approaches based on realist ontologies is a narrow one. Realist approaches do not challenge the idea that objects pre-exist their evidence-making. Rather, science is presented as incrementally evidencing – theorizing, stabilising, standardising – what interventions are and how they become. This ‘within-limits contingency’ is distinct from an ontological commitment which treats all objects and effects – interventions, mechanisms, outcomes, contexts – as *entirely relational*; that is, as contingent and fluid *enactments* of material practices (including of science) rather than *revealed* through a certain science (Latour, 1999; Mol, 2002; Barad, 2003; Stengers, 2005). Realist implementation science tends to treat the ‘in here’ of situated intervention adaptations as hybrids of essentially the *same thing* ‘out there’ in the universe of prior evidence-based knowledge (Petrakaki and Klecun, 2015). Intervention adaptations instantiate ‘local universals’ (Timmermans and Berg, 1997), with implementation science performing an iteration of fixings ever closer to an assumed truth (or theory) of underlying intervention causality. Realist implementation science narrows attention towards an increasingly *closed* system of complex relations. Indeed, in realist performances of implementation science as evidence-based health care, intervention objects *need* to retain a certain ontological stability and assumed generative causality during their translations to successfully *work* as EBIs (Law, 2009; Rosengarten and Savransky, 2018; Timmermans and Berg, 2003).

*Practice-oriented implementations in complex systems*

Recent shifts in implementation science accentuate intervention and implementation as practice-based accomplishments in adaptive complex systems (Hawe et al., 2009; Byrne, 2013; Mowles, 2014; Reed et al., 2018). While the general tendency is to emphasise individual and reasoned action theories in public health (Moore and Evans, 2017), there is increasing overlap between relational approaches in implementation science and broader sociological theories-of-practice (Bourdieu, 1977; Giddens, 1984). These view structures and actions as taking shape in dialectical relationship, with neither simply determining the other, and this accentuates human interpretive actions as *pre-reflective*, emerging from patterns of habit and practice in particular social fields (Nettleton and Green, 2014; Blue et al., 2016; Gabbay and Le May, 2011). This is distinct from placing primary agentic emphasis on the cognitive reasoning of individuals as a contingent resource, as imagined in some critical realist theorising (Pawson and Tilley, 1997), since it is *knowledges of practice* that underpin, implicitly, actions in relation to health interventions in a given social system.

One practice-oriented theory of implementation gaining traction in the health field is Normalisation Process Theory (NPT) (May, 2013a,b; May et al., 2016). Here, agency is cast as the capacity of people to make their contexts “plastic”, with implementation an “interactive accomplishment” contingent on a “complex bundle” involving “many moving parts” (May, 2013a). Implementation is made-up through “agents” who “mobilise resources”, which are “both structural and cognitive”, and who then invest in these “in enacting the ensemble of practices that make up the work of implementation” (May, 2013a: 10). Implementation is thus conceptualised as the “operation of social mechanisms that are energised and operationalised through agents’ contributions” (May, 2013a: 10). NPT is a systems-oriented account in which human agency is privileged. Implementation is what is made to work through a “deliberately initiated process, in which agents intend to bring into operation new or modified practices that are institutionally sanctioned” (May, 2013a: 5).

Two points arise here to foreground our outlining of an EMI approach: first, a distinction between intervention implementations as ‘many’ and as ‘multiple’; and second, a distinction between human and nonhuman forms of agency in making-up knowledges of practice. On the first of these, practice-oriented implementation science emphasises that intervention is not a “single thing”, for it is a “complex intervention” of many adaptive parts (May, 2013a,b; Callaghan, 2008). This results in a process of “intervening” (rather than simply one-off intervention) through iterative interventions (Reed et al., 2018: 15). An imagined immutable mobile or hybrid intervention travels across boundaries through *iterations* involving processes of in-scription and de-inscription (Timmerman and Berg, 1997). An EMI approach draws a distinction, however, between thinking of intervention implementations as a process made-up of ‘many’ iterations and thinking of *all* iterations as becoming objects-in-practice and as ‘multiples’ (Mol, 2002). It is not merely that implementation comprises many separate interventions or that an intervention comprises many separate parts, but that such objects cannot be known or held stable outside of their moments of enactment. They are less hybrids of things existing than new relational effects. A commitment towards *ontological multiplicity* emphasising the *becoming* of objects-in-practice, treats any apparent singular object as not merely *adapted* through *translation* but *transformed* in its *enactment*, as *fluid* and *on-the-move*, at once a *singular-multiple* (Mol, 2002; De Laet and Mol, 2000). The ‘within-limits contingency’ of implementation science holds even practice-oriented versions to a critical realist account of isolatable causal mechanisms (Jessop, 2005). We find, for instance, that the mechanistic parts of imagined complex systems are stabilised in often binary terms in relation to ‘agents’ and ‘structures’, mediated by ‘endogenous’ and ‘exogenous’ effects, between ‘inner’ and ‘outer’ contexts, impacting at ‘macro’, ‘meso’ and ‘micro’ levels (for example: May, 2013a; May et al., 2016; Reed et al., 2018; Mowles, 2014; Greenhalgh et al., 2005). As we outline below, an EMI approach does not afford entities of ‘context’ or ‘system’ or ‘mechanism’ such immutability or stability.

Second, the weight of agentic contribution in practice-oriented implementation science remains decidedly *human*. Alternatively, an EMI approach builds on the related ideas of ‘actor-network’, ‘assemblage’ and ‘intra-action’ to notice how multiple human *and* nonhuman actors entangle to affect limits and potentials (Latour, 2005; Law, 2009; DeLanda, 2006; Barad, 2003). The multiple bodies of an actor-network or assemblage (humans, technologies, organisations, discourses) have the capacity to affect and to be affected in relation to one another (Deleuze and Guattari, 1988; Duff, 2014). Barad describes this as a process of ‘intra-action’ to recognise that “distinct agencies do not precede, but rather emerge through, their intra-actions” (Barad, 2007: 33). As we argue below, by thinking differently about agency as more than human and distributed relationally (Andrews and Duff, 2019), an EMI approach prompts new understandings about how interventions generate power, as well as how interventions are *made to work*.

*Interventions evidence-made in practices*

Let us consider some examples of interventions ‘evidence-made’ through their translations in practices. Here we draw on our previous work on the implementation of methadone treatment (MT) (Rhodes, 2018; Rhodes et al., 2019a). Methadone is an agonist therapy used in treating opiate dependence. It is also promoted globally as a technology of HIV prevention for people who inject drugs. Systematic and meta-analytic reviews link MT to reductions in drug injecting, HIV risk practices, and HIV transmissions (McArthur et al., 2012). These discourses of EBI emphasise universal effect potential (that is, the promise of the same effects on health outcome across settings). Accordingly, there are coordinated efforts to maximise the coverage of MT as HIV prevention around the globe (Larney et al., 2017). The object of MT as HIV prevention can be imagined as an immutable mobile. But what happens when evidence-based MT travels? Are its translations as smooth as imagined? Does this intervention retain its shape?

Let us first consider how MT translates in Kenya (Rhodes, 2018). Here, we can envisage MT as a *fluid intervention* of its shifting relations. MT entered Kenya in December 2014 as an experimental policy solution to the problem of HIV linked to drug injecting (Rhodes et al., 2015). The performance of MT as HIV prevention in national policy chimes with its assembly in global health discourses of HIV concern. Yet we find that the methadones-in-practice are distinct from the methadone-in-policy. These methadones are materialised differently. Using qualitative data, our work has focused on how local actor-networks – including methadone users, treatment providers as well as community and family members – make-up methadone as an object of *addiction recovery*, and related to this, *hope of normalcy* (Rhodes, 2018). MT promises a technical solution to personal and community ills related to addiction problems. This ‘addiction recovery’ methadone coexists with other versions, including policy-mediated ‘HIV prevention’ methadone. Addiction recovery methadone also co-exists with the methadone enacted in the drug-dens, by users and dealers of heroin who resist this new medicine as a harmful colonising experiment of Western intervention in which local drug users are persuaded to participate as subjects (Rhodes, 2018). By *re-assembling* methadone from a prior matter-of-fact to a local matter-of-concern (Latour, 2004), we notice the different methadone objects made possible. Methadone becomes a *fluid object* (De Laet and Mol, 2000; Law and Singleton, 2005). Yet despite its multiple translations, ‘methadone’ is held together as a *composite*, retaining its overall shape (Mol, 2002).

Next, we can consider how MT translates in Eastern Europe. This region is enacted as in particular need of MT as HIV prevention (Alistar et al., 2011; Vickerman et al., 2014). Methadone’s potential is subject to the intervention being translated efficiently to scale. And here there is a problem. There is a history of resistance, including at the level of national governments, to the incorporation of MT into some Eastern European countries, especially Russia (Latypov, 2011). Policy discourses in Russia have constituted methadone a toxic drug of addiction, a cause of criminality, a failed treatment of the West, and as a resource for resisting international donor assistance (Rhodes et al., 2010). Methadone intervention becomes a site of translation in East-West relations. There are multiple methadones being made-to-matter differently in relation to particular (social and political) matters-of-concern.

Let us now turn to the specific situation of Kyrgyzstan (Rhodes et al., 2019a). Kyrgyzstan is one of only three countries in Eastern Europe and Central Asia offering MT in prison settings. Kyrgyzstan instantiates progressive translation towards incorporating globalised EBI against the legacy of Soviet narcology emphasising criminalisation above public health. The prison implementation context presents particular promise (Subata et al., 2016). Yet, treatment uptake is low and prison-based MT highly unpopular (Azbel et al., 2018). Evidence-based MT does not translate smoothly. In the prisons of Kyrgyzstan, MT translations constitute rupture (Rhodes et al., 2019a). Unlike Kenya (Rhodes, 2018), MT translations are not made up of gentle flows but of “jumps and discontinuities” (Law and Singleton, 2005: 343). The object differences between the methadone-in-policy and the methadones-in-practice in Kyrgyz prisons depend on what they make absent, on what they juxtapose, on what they are in friction with. Using qualitative data from three prisons (Rhodes et al., 2019a), we notice that methadone is a *fiery object*, characterised by transformations of a combustible nature (Law and Singleton, 2005). First, we notice that the methadone enacted in Kyrgyz prisoner society is a ‘bad’. This version of methadone is *toxic*. Users of this substance “complain of sores, blisters, bad teeth, bad lungs, bad livers, an addiction worse than heroin, and unparrlalleled drug withdrawal” (Rhodes et al., 2019a: 7). This is the *becoming-methadone-body*. Second, we notice that methadone effects merge with those of Dimedrol (diphenhydramine); illicitly acquired antihistamine pills which are are crushed for injection in an attempt to turn methadone into an euphoric high. Here, methadone is ‘tinkered with’ in its relation with Dimedrol to unleash new unforeseen potential (Pols and Willems, 2010). An altered substance assemblage is in-the-making. The effects afforded by methadone encompass those of Dimedrol, a particularly messy ingredient in its associations with bodily damage. This qualitative study describes how the becoming-methadone-body enacts a *less-than-human* body. In light of methadone’s incorporations with Dimedrol, agency alters in the assemblage, flowing from human to nonhuman actors. The methadone-Dimedrol subject becomes Othered, as something different, disturbing and unknown (enacted, for instance, as a “zombie”, “monster” and “animal”; Rhodes et al., 2019a: 9). The methadone made in Kyrgyzstan prisons is a *different thing*, ontologically distinct and multiple, from that enacted in ‘evidence-based’ HIV prevention policy and imagined to be in translation.

These examples of the ‘methadone multiple’ accentuate that technologies are never ‘given’ because their possibilities and power-of-acting are situated in implementation practices (Mol et al., 2010). As we move from EBIs as presumed singularities and immutable mobiles to enacted multiples and mutable mobiles in practice, we also alter how we think with implementation science. Implementation science becomes something other than a mere technical service intervention acting ‘on’ an EBI translation. Rather, implementation science is alternatively enacted as a *situated intervention* (Zuiderent-Jerak, 2015). Mainstream implementation science tends towards the rhetorical reproduction of EBI approaches as the solution to EBI implementation problems. For instance, the uptake of clinical practice guidelines, themselves designed as a solution to the problem of adherence to EBI interventions, seek a standardisation of EBI in practice to which implementation science is presented as the solution when uptake fails to materialise as intended (Grol and Wensing, 2004; Zuiderent-Jarek, 2015). An implementation science approach alternatively oriented towards situated and adaptive intervening invites a process of *situated standardisation*, wherein intervention experiments in practice are not polarised towards the extremes of EBM universalism against individualised concern but fall somewhere in the middle ground. According to Zuiderent-Jerak (2015), situated intervening seeks to overcome “the fallacy of one size fits all” and “the tyranny of structurelessness” by experimenting “in between” (Lamplamd and Star, 2009: v). This incorporates implementation science as an *experimentation*. A situated intervention “privileges neither complexity nor standardisation as a harbinger of good medical practice” but invites a science which makes experiments through particular situated interventions, standardisations and tinkering efforts (Zuiderent-Jarek, 2015: 72; Mol et al., 2010). Situated interventions, including sociological experiments in implementation science, are “learning devices” (Zuiderent-Jarek, 2015: 92). In short, they are ‘*evidence-making* interventions’ which potentiate a more speculative, more experimental, more relationally situated, implementation science.

**The performativity of evidencing and intervening**

In an EBI approach to implementation science, the uncertainties which ensue when evidence in relation to interventions and effects is doubted tend to be reduced to matters of *epistemological* methodological concern. The complexity of ‘real world’ intervention translations, and the immanence of their entangled causal effects, is thus *tamed* by epistemological closure linked to an underlying realist ontology of EBIs. By contrast, in an EMI approach, which additionally focuses on the *ontological* relations of evidencing, moments of uncertainty or controversy offer useful sites for observing how different forms of knowledge come into play as evidence (Latour and Woolgar, 1979; Whatmore, 2009; Moreira, 2015), and more particularly, how evidence and EBI become objects in the process of being made (Moreira, 2007; Lancaster, 2016; Rosengarten and Savransky, 2018; Rhodes et al., 2019b). Evidencing is treated as a matter of process and performance; a fundamental distinction between approaches which secure interventions as ‘based’ in evidence (EBIs) and those which treat evidence as ‘made’ through intervening (EMIs). Importantly, our interpretation of ‘performance’ does not imply the existence of a ‘backstage’ of the ‘real’ or a central or singular performer (Mol, 2002), but envisages performance as enactment (Law, 2012; Michael, 2017).

An evidence-making approach thus makes visible how interventions are objects made relationally in particular practices of knowledge-making, including through science. A key performative role of RCTs and other forms of EBI, for instance, is the generation of relative certainty, against a standard, in situations of evidencing complexity (Pope, 2013; Timmermans and Berg, 2003). Evidence-based claims perform a sense of security through knowability linked to claims to objectivity based on an assumed or postulated single, fixed and anterior intervention reality (Wood et al., 1998; Mykhalovskiy and Weir, 2004; Green, 2000; Cartwright, 2013). In an EMI approach, implementation science is not treated as ‘outside’ or ‘after’ the interventions and systems it imagines but as an evidence-making intervention *inside* the knowledge assemblages giving rise to such objects. One accomplishment in the performative work of implementation science, for instance, is the making-up of virtal complex ‘systems’ and ‘contexts’; objects which are put-to-use by implementation science in particular ways, including as rhetorical claims to addressing ‘real world’ problems of complexity and messy intervention translation.

An evidence-making intervention approach enacts a situated implementation science which is inseparable from the complex systems and contexts it seeks to describe and adapt (Zuiderent-Jarek, 2015; Mowles, 2014; Callaghan, 2008; Greenhalgh and Russell, 2009). This is a significant and necessary shift from implementation science as we know it in the health field. According to Mowles: “It proves impossible to let go of the idea of a system with a boundary, outside which the evaluator stands, comprising abstract, interacting parts”, which “still cleaves to notions of predictability and control, and a linear understanding of time where thought precedes action” (Mowles, 2014: 169). While implementation scientists might recognize that “we frame the system by describing it in a certain way (for a certain purpose)” and that we should therefore “think of a boundary as something that *constitutes* that which is bounded”, the system is nonetheless held as “neither a function of our description, nor [as] a purely natural thing” (Cilliers, 2001: 141). This is the double hermeneutic of critical realist attempts to interpret that which is said to pre-exist, giving rise to recursive feedback loops in the complex systems being enacted (Giddens, 1984; Jessop, 2005). While the ‘within-limits’ versions of complexity and contingency afforded by realist ontologies of EBI, and enacted in critical realist approaches to implementation science, protect the claims that science makes to knowing interventions as causal effects of certain underlying mechanisms and conditions, it limits the capacity of implementation science to fully embrace situated relationality, in which science itself is a constitutive part.

*Evidence made in scientific practices*

Let us illustrate implementation science as an evidence-making intervention. Our first example focuses on the emergence of knowledge controversies about the curative effects of new ground-breaking pharmaceutical treatments for hepatitis C (Rhodes et al., 2019b). A systematic review, undertaken by the Cochrane Collaboration, of 138 RCTs of the clinical effects of direct-acting antiviral (DAA) treatments, questioned tacitly accepted knowledge informing clinical practice: that DAAs cure individuals of their viral infection, and that such viral cure confers health benefits (Jakobsen et al., 2017). In contrast, and claiming its epistemological superiority as a performance of EBI, the Cochrane review declared there to be “no evidence” to judge if DAAs reduce mortality or other liver complications from chronic hepatitis C. The critical intervention of this review was to question the legitimacy of the non-randomised observational evidence which has been put-to-use in clinical practice to perform DAAs as clinically effective. DAA treatment effect is indicated by a *surrogate marker*, “Sustained Virological Response”, which measures the absence or near absence of virus in the blood. This, according to the Cochrane reviewers, is a “flawed surrogate” because it has “never been validated” clinically (Koretz et al., 2018: 240). A surrogate marker of viral elimination in the *blood* – a cure of infection – need not confer long-term clinical benefit in the *body* – the cure of disease. The authors drew attention to the uncertainty of non-randomised observational evidence available. They argued that RCTs of actualised clinical benefit is the *only way* of knowing hepatitis C cure with certainty, and in questioning tacitly accepted knowledge, this evidence-making intervention generates considerable ‘ontological disturbance’ regarding the knowing of treated hepatitis C (Rhodes et al., 2019b).

Following an ethnographic tradition in STS (Latour and Woolgar, 1979), this example illustrates controversies as evidence-making events (Whatmore, 2009; Moreira, 2015). While the debate in relation to the knowing of hepatitis C cure is played out in primarily *epistemological* terms, inside the bounded lexicon of *methodological concern* performed by EBM, we can notice that there are other ways of knowing (Rhodes and Lancaster, 2019). We have put-to-use the Cochrane review and its linked publications as sources for analysing how the objects of hepatitis C cure and EBM are in the process of being performed by their knowledge-making practices (Rhodes and Lancaster, 2019; Rhodes et al., 2019b). This approach to treating evidencing as performative reveals how apparent matters-of-fact – such as claims to evidenced treatments and cures – are enactments of practice in relation to everyday matters-of-concern (Latour, 2004). Viewed as performative, the evidence negotiations surrounding hepatitis C treatments not only attend to EBM as an object being performed as a matter of epistemological concern, but notice the ontological implications of these practices for how interventions and evidence emerge in relation to what *matters* socially, clinically, and politically.

Our second example concerns the development of wastewater analysis as an epidemiological technique informing the implementation of policy responses to community problems of illicit drug use (Lancaster et al., 2019a,b). Wastewater analysis, also called ‘sewage epidemiology’, was originally used by environmental scientists to monitor ecological risks of excreted pharmaceutical drugs and personal-care products in aquatic environments, but is being translated as a method for estimating population-level drug consumption (EMCDDA, 2016). Unlike epidemiological surveys of people who use drugs, proponents claim wasterwater analysis is non-invasive, free of bias associated with self-reporting, and more accurate as a measure of true prevalence (Van Nuijs et al., 2011). Yet viewed performatively, this method can be appreciated to enact its objects in particular ways with specific material effects (Lancaster et al., 2019a). The epistemological claim to producing more accurate and cleaner evidence, for example, reproduces people who use drugs (the subjects of surveys) as illicit, hidden, untrustworthy, and lacking as knowledge producers. This in turn reproduces stigmas common to popular discourses about drug problems. Importantly, the evidence produced by wastewater analysis closes off drug problems as constituted primarily as a matter of the evidenced metabolic presence of drugs, giving no indication of health harm (or benefit) in relation to patterns or experiences of drug use (Lancaster et al., 2019b). An evidence-making approach makes visible how evidence, interventions and problems are constituted through, rather than precede, their enactments in knowledge-making practices. Importantly, evidence enactments (of interventions, problems, patients, subjectivities, bodies) relate to a politics of situation, a hinterland of practices, which mediates as well as restricts possibility (Law, 2009; Moser, 2006). There is then, a particular ontopolitics of evidence-making which is performed in the device of wastewater analysis in drug epidemiology which positions ‘evidence’ and ‘drug users’ in particular ways, including in relation to trust and truth as performed in epistemological EBM claims.

A key ingredient of an EMI approach then, is investigating how evidencing performances are done, and the effects these make for patients, providers and the ordering of care. Let us offer a final example, from the work of Moreira (2007) on knowledge-making in systematic reviews. Noticing the systematic review, and meta-analyses of these, as critical to decision-making in EBM, Moreira uses ethnography to investigate how the laboratories conducting systematic reviews go about producing them. He identifies parallel processes of *disentangling data* (from their original texts and sources) and *requalifying data* (presenting data in new ways, including graphically and through devices of methodological comparison), which taken together afford systematic reviews their persuasive power as rhetorical and decision-making tools. Processes of *qualification* are particularly important as this is the ‘evidence-making’ space wherein review data are not merely reproduced but *modified*. Data abstractions, for example, while standardised in protocols become *rewriting* events where data are refashioned. One instance of this is when extrapolating from source material into mathematical *recalculations* which extend beyond the data that are ‘found’ into projections that are ‘made’. These data take on additional properities in their representations through equations and various graphical platforms, where studies may be afforded more or less power or significance, including in new ways, as part of how they are being enacted through synthesis. Upon leaving their laboratories of production, meta-analyses are further subjected to evidence-making qualifications on account of *political* matters-of-concern, including negotiations regarding epistemological claims, data inclusions and exclusions, and the values to be afforded certain analyses.

In a similar approach, we have investigated how disease eliminations are evidence-made in scientific and target setting practices (Lancaster, Rhodes and Rance, 2019). Whilst not without controversy (see above), new direct-acting antiviral medicines herald the potential to eliminate hepatitis C at the level of the individual and population. In 2016, the World Health Organization set targets for the global elimination of viral hepatitis as a major public health threat by 2030. Drawing on poststructural theories of ‘problematisation’ (Bacchi and Goodwin, 2016), we can investigate how policies and targets constitute health problems and their solutions in particular ways with particular effects. The WHO global targets are technologies that not only make viral hepatitis visible as a major problem but make it *governable* through elimination (Lancaster, Rhodes and Rance, 2019). Through practices of target setting, and related quantification, viral hepatitis is transformed into a technical and controllable problem. Mathematical modelling plays a critical role in evidence-making viral elimination potential, including through processes of data qualification, modification and recalculation (Moreira, 2007), enacting elimination futures with material effects in the present.

**An evidence-making intervention approach**

In distinguishing evidence-based from evidence-making interventions, the tenets for an alternative way to think with evidence emerge (See: Box 1). As we have seen, an evidence-based intervention (EBI) approach is an *epistemological* concern, which shapes the translation of health interventions on the basis of a methodological hierarchy of evidence-making (that idealises the isolation of objective and reliable knowledge from the practices of its production, as epitomised by RCTs, other controlled interventions, and meta-analyses of these). In contrast, an evidence-making intervention (EMI) approach is an *ontological* concern, which treats the translation of health interventions as matters of becoming in relation to situated knowledge-making practices, scientific and otherwise. Whereas EBI approaches treat health interventions in relation to how they are best known (that is, evidence-based), EMI approaches treat health interventions as matters of how they come to be known (that is, evidence-made). As the examples above have illustrated, the focus of an EMI approach shifts attention towards evidencing and intervening as matters of *relational materiality* and *performativity*. In an EMI approach, an ‘intervention’ might be technological, affective or epistemic, but always materialised in practices. Importantly, research and science are investigated as actors entangled in events of evidence-making and intervening. Rather than standing ‘outside’ of interventions and evaluating their effects, an EMI approach treats evidence-making practices as part of the assemblage making-upinterventions and effects from the ‘inside’. We are no longer talking about evidence *and* practice, as if these can be isolated from one another or bridged through translation work. Instead, as we noted at the outset, *evidencing makes intervention* while *intervening makes evidence*. Implementation events thus become sites of investigation to notice the making-up of interventions in practices. The implication is that interventions are never fixed nor stable or universal but always in process as matters of becoming. A particular benefit of this ontological commitment to realities as relational, material and multiple is that it points to how evidence, interventions and effects might be *made otherwise* (Mol, 2002; Law, 2004). But how do we shift our attention? How might we begin to think differently so as to notice the making-up of evidence and interventions in implementation events? In the remaining sections we outline concepts useful for developing an EMI approach into practice in relation to: objects and practices; effects and events; and concerns and care.

**>>INSERT: BOX 1: Some tenets of an evidence-making intervention approach**

*Objects and practices*

An emphasis on relational materiality orientates towards a flat ontology (Law, 2004; Fox and Alldred, 2017). This collapses separations between society and nature, or subject and object, as it does also, the human and nonhuman, evidence and practice, and interventions and contexts (Latour, 1999; Barad, 2007). It is a way of thinking about health intervention that does not privilege human actors, or their sciences, as the primary agentic force or access to knowing (Andrews and Duff, 2019). In their different ways, the contributions of actor-network theory (Latour, 2005), assemblage theory (DeLanda, 2016; Deleuze and Guattari, 1988), and ideas of agential intra-action (Barad, 2003, 2007) are important here. In these, all objects, human or otherwise, have *equal ontological footing*. In ANT, an actor is *entirely relational*, and no more than what it “transforms, modifies, perturbs, or creates” (Latour, 1999: 122). All objects are made in material-discursive practices, as “objects-in-practice” (Mol, 2002). As Mol (2002: 150) describes: “The relation between objects is not hidden in the order of things, but enacted in complex practices”, and “there are as many frictions between objects enacted as there are between the practices in which their enactment takes place”. We shift our attention then, from “presumed objects to the relations involved in their becoming” (Bacchi and Goodwin, 2016: 33). In assemblage theory, some of which emphasises an ontological realism (Bhaskar, 1997), objects may be given greater autonomy, with the ‘real’ of objects said to run deeper than what is actualised (DeLanda, 2016). For some, this gives rise to realities as “thoroughly *non-relational*” because they are “never fully actualised” and only ever *immanent* (Harman, 2009: 171; Bryant, 2011). However, we position an EMI approach closer to thinking with interventions as *objects-in-practice* (Mol, 2002; Law, 2004) rather than assuming objects to have a deeper essence of the real as envisaged in some ‘new materialist’ and object-oriented ontologies (Harman, 2009). The relational materialism of an EMI approach does not resist the idea of the real, but emphasises phenomena and the real as entirely relational; an effect of intra-actions in actor-networks or assemblages rather than of interactions between entities with pre-existing essence (Barad, 2007). While Barad prefers the term ‘phenomena’ over ‘object’ or ‘thing’ to accentuate indeterminacy, following Mol and Law, we are arguing that an EMI approach deals with the concept of object *differently* than in EBI approaches.

Treating objects as relational has implications for how we conceptualise health intervention translations. A particular problem of EBIs – as we have illustrated in examples above – is that they may not translate as cleanly as imagined. Health interventions are situated *achievements* rather than underlying transcendental truths (Stengers, 2005). An EMI approach thus thinks with objects differently than realist oriented EBIs. Here, we draw on three ‘object lessons’ outlined by Law and Singleton (2005). They note that the complexities of intervention translation tend to be addressed as *technical* problems. First, they are usually approached as an *epistemological* problem: it is not that the intervention under translation is messy or unknowable but that the methods of knowing are in a mess (Law and Singleton, 2005). This mode of thinking is familiar to implementation science and interventions research. As noted above, there is also *performative work* going on here, with EBI approaches reproduced as devices for ‘cleaning-up’ evidence uncertainty while preserving the object of EBI as the optimum mode of knowing (Timmermans and Berg, 2013; Moreira, 2007).

A second way of addressing messy intervention translation is to consider these as effects of complex implementation deliveries and contexts. Here, the knowability of interventions becomes a *managerial* problem, requiring structural intervention. Law and Singleton (2005) use the example of alcohol liver disease to show that it does not have a definite or typical trajectory as assumed, but instead, a multiple and indeterminate one. So, in the case of the diagnosis and treatment of a health condition being indeterminate, systems of illness diagnosis and health care might need to make better order of themselves. Thus, intervention objects reveal themselves to knowledge when their implementation systems are tidied up: “Managerialism becomes an executive tool of methodological clarity”, since “it makes a world fit for study” (Law and Singleton, 2005: 333). Implementation science (see above) is a tool for managing implementation contexts to allow interventions to retain their shape as they travel.

Alternatively, we can think differently, shifting from epistemological to ontological matters-of-concern, from a focus on what counts as knowledge to what counts as an intervention object. Law and Singleton (2005: 335) push us to work with “different models for imagining objects”. An EMI approach is one such different model. Rather than the immutable mobile or hybrid, an EMI approach works with mutable mobiles or *fluid objects* of evidence and intervention (De Laet and Mol, 2000; Law and Singleton, 2005). De Laet and Mol’s (2000) foundational study of the diffusion of the Zimbabwe bush pump, and why its diffusion was successful, points to an object’s shape changing capacity, making it a ‘fluid technology’. The water pump starts out life with the same shape, and is installed and maintained in a uniform way, but over time, as bits wear out and are replaced, the pump takes on a different shape, as villagers innovate to keep their pumps going. The uniformity of the water pump *disappears* technically, but also socially in how the pumps are differently cared for within local communities: “It is fluidity, the capacity for shape changing and remaking its context, that is the key to its success” (Law, 2004: 81). We earlier enacted methadone treatment as a fluid technology; an object which starts out as a uniform technology which is translated into something different through its local adaptations (Rhodes, 2018). If the actor-network making-up an object does not hold it together as immutable, an object will change its shape, and crucially, the practices that define and produce its ‘success’ will also change (Latour, 1999).

An intervention’s reality, what it becomes, is thus an *ontological multiple,* situated in relation to how it is performed locally. A growing body of work draws on thinking in STS to investigate health technologies as situated fluid multiples (Berg and Timmermans, 2003; Moser, 2006, 2011; Zuiderent-Jerak, 2015; Fox and Alldred, 2017; Rhodes, 2018; Farrugia et al., 2019). Zuiderent-Jerak, for example, refers to the different ways in which patient safety is enacted through national quality improvement interventions in the care sector in the Netherlands as a case of “multiplicity realism”. He finds that national patient safety targets need not suit the ‘real world’ complexities faced by local teams exploring new ways of doing medication safety. National patient safety targets are not only adapted locally through their enactments into different things, but the same targets may be put-to-use in diametrically opposing ways. Multiple ontologies of patient safety are thus enacted at the same time. Zuiderent-Jerak argues that local multiple enactments of intervention constitute experiments, which are productive to investigate because they adapt implementation science in relation to what is useful locally rather than in relation to the ‘gold standards’ of realist evaluation and controlled experimentations.

Conceptualising an object as ‘singular-multiple’ is thus a *strategic intervention.* It is an effort to work with ontologies of multiplicity to question the presumption of intervention singularity rooted in realist ontologies. In an EMI approach, the coordinating practices which make-up interventions as if singulars can be treated as works of performance which ‘more or less cohere’, for instance, by one reality winning out over another, or a new composite reality being created (Mol, 2002; Law, 2001). In this perspective, implementation science can be treated as an object-in-practice which works to coordinate common ground to hold together multiple and ontologically different knowledges. One set of composite coordination practices, for instance, includes how the objects of causality, mechanism and context are preserved through their adaptations and in the face of being ontologically disturbed by relational shifts towards practice-oriented versions of implementation science (see above). Just like the objects of methadone treatment (Rhodes, 2018) and hepatitis C treatment (Rhodes et al., 2019b) that we have discussed, *implementation science*, is a singular-multiple which hangs together, more or less. This means that an object made multiple does not necessarily fall apart, though it also can (Mol, 2002), and when it does, its ontological ruptures become particularly noticeable (as we saw with methadone’s translations in Kyrgyzstan; Rhodes et al., 2019a). Whether intervention translations are fluid or fiery, diffused or abrupt, an ontology of multiplicity invites an implementation science which focuses on noticing the practices that perform interventions as singulars, as multiples, and as otherwise.

*Effects and events*

Thinking of health interventions as matters of performance troubles the presumption of isolated and underlying causality in EBI approaches informed by realist ontologies. An EMI approach emphasises effects as emergent gatherings of relational material association (Latour, 1999; Barad, 2003, 2007). This means that we cannot hold on to ‘intervention’ as a bounded entity which ‘has’ or ‘causes’ certain effects. Our interpretation of intervention thus expands beyond that of a specific isolatable technology being followed (as in EBIs) to incorporate the multiple forms of agential effect which emerge from intra-actions within a network or assemblage (of which intervention technologies are part). Interventions and effects, and evidencing of these, are never separate but always entangled. While EBI approaches give primacy to the actor of ‘the intervention’ (usually a specific health technology) which is held apart to enable the delineation of its effects, in an EMI approach the health intervention is one of multiple intra-actants, and perhaps only the starting point in investigating the relationality of effects. We thus move from bounded interventions as technologies with causal effects yet to be actualised (EBIs) to emergent fluid intra-ventions of multiple entangled actors (EMIs) (Barad, 2003, 2007). An EMI approach invites an ‘*emergent causation*’ (Connolly, 2014; Race, 2014).

Let us consider ‘context’. We select context as this is a staple object of implementation science, also used to hold implementation science apart from other variants of EBI (Orton et al., 2017). While the systems distinguished in complex intervention approaches are said to be adaptive and emergent, in an EMI approach they are inseparable from, and translated in, their step-by-step entanglements with all other objects, and thus cannot be held as having any pre-existing or distinct presence as entities. Indeed, it can be said that there is no such thing as a ‘context’ (or ‘system’ or ‘society’) outside of its enactments: “There is no such thing as either man [sic] or nature now, only a process that produces the one within the other” (Deleuze and Guattari, 1983: 3). With all forms of entangling object afforded equal ontological footing, ‘context’ cannot easily be separated out as a container or whole, a kind of “super-object”, into which other objects are presumed to inter-lock as sub-multiples (Bryant, 2011: 271). Rather, the common objects of explanatory causation of intervention effect – such as mechanism, outcome and context – *dissolve* as constituents of *entangled* effect in the assemblage. Equally then, ‘intervention’ and ‘effect’ dissolve into one another. It no longer becomes useful to talk of intervention ‘*and*’ effect, or of an intervention ‘*having*’ an effect. The flat ontology of an EMI approach unsettles the stability of structurally ordered explanations, including those guided by mechanistic theories of ‘agency’ and ‘structure’ interaction (see above). As Mol suggests: “There is no fixed point of comparison” (2002: 157). As noted: “Emergent causation issues in real effects without being susceptible to full explanation or precise prediction in advance, partly because what is produced could not be adequately conceptualised before its production” (Connolly, 2004: 342-3; see also Race, 2014).

The case of drug effects offers an illustrative example. The effects of drugs emerge out of entanglements between multiple bodies which affect one another in an assemblage, including for example: drugs and medical substances; bodily desires and sensations; drug use technology and equipment; space and place; dealers and marketing; discourses and norms; and laws and policies (Malins, 2004; Dennis, 2019; Duff, 2014; Fraser et al., 2014; Fraser and Moore, 2011; Race, 2018). One foundational study is Gomart’s analysis of how methadone effect is made-up multiply according to the assemblages of two different clincal trials (2000). Rather than a substance stabilised in evidence to produce a universal effect across implementation contexts (as conceived by EBI approaches), Gomart argues that there were multiple effects ‘in search of a substance’, and thus a need to shift attention from the *substances* in translation to the *events* of implementation when exploring effect. Here then, effects do not precede their enactments in practices but emerge through their ‘intra-actions’ (Barad, 2003), including through the *affective flows* produced in actor entanglements (Duff, 2014; Andrews and Duff, 2019).

Let us retun to our earlier case example of methadone’s implementations in Kenya (Rhodes, 2018). This study notices that a critical force in the translation of methadone as addiction recovery is *affect*, and specifically, how methadone’s embodied effects transmit a *sense* of recovery from one (recovering/addict) body to another. Bearing *witness* to embodied change is at the root of recovery’s becoming. Recovery is made through embodied interactions, with effects *seen to be believed*. One’s own self-change is *felt* in relation to others’ witnessing, and thus *incorporations*, of it. It is this transmission of communication, this movement and connection between bodies, that is the ‘evidence-making’ of recovery’s becoming. Embodied change affects recovery capacity in others, accentuating recovery as an *affective flow* of its relations (Andrews and Duff, 2019). This study also traced how the apparatus of methadone’s delivery materialises addiction recovery through affect. Following Fraser (2006, 2008), the methadone queue at the dispensing clinic enacts a rationing of recovery hope through the sense of discipline it affords, especially through the process of *waiting*. Hundreds were observed to be waiting in this queue with methadone distributed through a single dispensing hatch during a tightly controlled time window. The ‘patient patients’ cannot afford to miss the dispensing time cut-off. Everybody is at risk of opioid withdrawals in the absence of their medication. The queue becomes a disordered ordering of hustle and bustle, involving some jostling, queue jumping and even occasional violence, as tensions rise. This waiting is an *anticipation*, which is embodied, sensory, felt. We notice that the methadone queue materialises sensory effects which loop back to the world of drugs (the hustling, the fear of withdrawal). Methadone’s delivery *affects a sense* of the clinic and its recovery potential as less than separated from the world of drug dens and heroin withdrawal. The methadone queue affects “coexistence at a single moment” (Mol and Law, 2002: 8). It instantiates a ‘methadone multiple’ – of potentiality, of actuality – as a liminality, as a “living in two or more neighbouring worlds, worlds that overlap and coexist” (Mol and Law, 2002: 8).

These examples illustrate that causation in an EMI approach shifts from the evaluation of outcomes of a particular *intervention*-in-translation to noticing the contingent effects of *intra-ventions* as elements in translation *events* (Michael, 2017; Michael and Rosengarten, 2013). This shift to focusing on translation events has implications not only for how we study intervention effects, but also *politically* for how we understand the constitution of health problems and interventions. Michael and Rosengarten (2013: 46) note that the term ‘event’ means giving attention not only to the *processes* by which intervention objects emerge, but can also “entail the potential for redefining the ‘problems’” which interventions are believed to address. The focus on events “directs attention to the transformations undergone by *all* the elements that enter into it” (Race, 2018: 4, emphasis added). This engenders “more active forms of attention to the manner in which their constituent elements come together, their contingencies, and the differences these make to worlds and lives” (Race, 2018: 4). An EMI approach does not seek to close the event by finding or fixing solutions but attempts to “unravel the possibilities” that are enabled (Michael and Rosengarten, 2013: 64).

Evidence-making approaches therefore work with rather than against indeterminacy to trace some of the complexities involved. This is an ‘open contingency’ rather than a ‘within-limits contingency’. This version of implementation science does not promise to explain the precise mechanisms of an emergent intervention, but no longer ignores questions of “what else was going on” (Tsing, 2015: 22). Unlike ‘within-limits contingency’, an EMI approach does not preclude the possibility of noticing the “divergent, layered, and conjoined projects that make up worlds”, and in so doing, “makes it evident that indeterminacy also makes life possible” (Tsing, 2015: 20).

*Concerns and care*

An EMI approach reassembles matters-of-fact as matters-of-concern with the aim of noticing health intervention as an *ontological politics* (Mol, 1999, 2002; Moser, 2006). It does this to speculate on how knowing health intervention might be done otherwise (Latour, 2004; Stengers, 2005, 2018; Puig de la Bellacasa, 2011). Latour positions apparent matters-of-fact as matters-of-concern to make visible the social basis of objects presumed to exist independently of their descriptions. As we have seen, the objects of hepatitis C cure and methadone treatment, for instance, do not hold as ‘facts’ either prior to, or outside of, their implementations as specific material ‘concerns’ (Rhodes et al., 2019b; Rhodes, 2018). A specific thrust of Latour’s reassembling of matters-of-fact as matters-of-concern seeks to make visible the situatedness of scientific critique (Latour, 2004). The constructionist (relativist) critique of objectivist (realist) science risks simply ‘debunking’ facts as mere ‘constructions’, and this kind of critique can just as easily be levelled at constructionist accounts themselves. Instead, attending to how realities are multiple, and enacted in practices, is more productive, for it enables *dialogue* between the singular-multiple versions of reality enacted, as well as reflection regarding how each are made as matters of their contingent relations (Stengers, 2005). With realities emergent, they cannot be treated as mere matters-of-fact but come-to-be as matters-of-concern, which nonetheless *perform* (multiple) matters-of-fact. This shifts critique from the simple debunking of epistemological binary differences between nature against society, facts against concerns, objects against subjects, and indeed, evidence-based against evidence-making interventions, towards an implementation science which is made-up of dialogue within differences and multiplicities (Stengers, 2005; 2018).

Following Stengers (2005, 2018) and Latour (2004, 2005), an EMI approach does not seek to merely expose facts as something constructed but rather accepts all versions of reality (facts and concerns) as performative assemblies. This pushes the focus towards a science of ‘*implementing* science’; an approach which asks not merely what is assembled, but also how, and how well, and with what effects. The question to think with is not only ‘How are things done?’ but ‘How they might be done *well*?*’* (Mol, 2002: 7). This moves implementation science from a narrow focus on the health effects or outcomes of particular interventions towards a broader concern regarding the effects of intervening. It provokes us to ask how to “value contrasting versions of reality”, and to consider “Which version might be better to live with? Which worse? How, and for whom?” (Mol, 2013: 381). That is to say, it opens up “a profoundly political space” (Law, 2009: 243). We shift our matter-of-concern from ‘implementation *science*’ (where the emphasis is on the science of knowing intervention implementations) to ‘*implementing* science’ (where the emphasis is on evidence-making as a matter of intervening). This is a move to implementing *another* implementation science, one attuned to noticing the ontopolotical effects of intervening to speculate on differences (Stengers, 2018). An EMI approach treats *evidence-making as* *political intervention*. It is orientated to how knowledge assemblies intervene. As Mol writes: “Attending to the multiplicity of reality is also an act. It is something that may be done—or left undone. It is an intervention.” (Mol, 2002: 6). And as Moser indicates of evidence-making as intervening:

“There is a lot at stake in the decisions we make about our objects of study and the practices we follow. Our knowledge practices are also performative. They help articulate, make present and real certain realities at the expense of others. They help to disarticulate, make absent and invisible certain practices and realities” (Moser, 2011: 717)

Our own work on methadone treatment in Kyrgyz prisons accentuates evidence-making as an ontopolitical intervention (Rhodes et al., 2019a). As we earlier noted, this qualitative study describes the methadone-becoming-body of Kyrgyz prisoner society as a world apart from the methadone imagined by EBI HIV prevention translations. By attending to the local multiplicity of methadone treatment (in this case, as an intervention situated to afford rather than reduce harm), as well as to the multiplicity of heroin (in this case, as a substance situated to afford capital, especially relative to methadone), we are making a strategic intervention. We are drawing attention to local prison-based governing practices which materialise how an intervention comes to matter differently. Within the actor-networks which make-up prisoner society, methadone is afforded agency as informal governance. Methadone becomes an object of translation between the diametrically opposing governing rationalities of the State, “the Reds”, and the informal Criminal Code of prisoner society, “the Blacks”. Signing-up to State supported methadone constitutes a failure of citizenship and a loss of virtuosity. State methadone also disrupts vital prisoner society matters-of-concern. A core governing practice of the Criminal Code is the distribution of resources among its collective as rewards for good works in the name of the Code. The primary exchange is heroin; an economy threatened by the implementation of free medicalised methadone. Those signing-up to State methadone become excluded and Othered in various ways. The methadone on the inside of Kyrgyz prisons has diametrically opposing effects to that made on the outside in HIV prevention policy. Methadone as an object of HIV prevention and harm reduction has fallen apart. It is little wonder that there is such low uptake within Kyrgyz prisoner society for this particular methadone-in-practice. Our evidence-making invites us to speculate how intervening might be done otherwise. How might prisons experiment differently with methadone? Might they experiment therapetucially with heroin? These are *ontopolitical* questions for they attend to the possibilities of making present or absent particular local enactments and situated experimentations (Moser, 2011).

Following Latour (2004, 2010) and Stengers (2005, 2018), a critical implementation science is a diplomacy which engages the diversity of knowledge forms and actors involved in knowledge assembly. Stengers (2018: 3-4) writes: “The essential thing with ‘matters-of-concern’ is to get rid of the idea that there is a single ‘right answer’, and instead put what are often difficult choices on the table, necessitating a process of hesitation, concentration and attentive scrutiny”. She argues that “another science is possible”; one which treats difference and uncertainty as *productive*, for it generates a critical hesitancy which enables concerns to be performed in ways that are *made-to-matter*. This is a more careful reflexive science than the ‘faster’ sciences reproducing matters-of-fact. In this more careful way of knowing “what is messy is not defective” – a technical problem of research method to erase before facts become possible – but a material concern that we can “learn to live with and think with” (Stengers, 2018: 120). The limited lexicon of EBIs in which the practices of implementation science are deliberated restricts the boundaries of debate without opening-up grounds for engagement (Latour, 2010). Science knowledge deliberations tend to “systematically downplay anything that doesn’t directly contribute to the cause of advancing specialised knowledge” (Stengers, 2018: 102). As we have argued, these are the ‘within-limits contingencies’ common to realist implementation science approaches. We can imagine another version of implementation science; one focused on *mattering* by creating the space for all forms of knowledge actor to “take seriously the matters-of-concern arising from the innovations they promote” (Stengers, 2018: 102). A more careful implementation science does not simply ask ‘What *is* the evidence?’, but also asks ‘*How* is evidence *made*?’, ‘How is evidence *put-to-use*?’, and ‘How is evidence *made-to-matter*?’.

**Conclusions**

We have outlined a conceptual framing of evidence-making intervention (EMI) as a means to reassemble evidence-based intervention (EBI) approaches towards matters of ontological concern. This positions health intervening and evidencing as matters of their enactments in practices. An EMI approach treats intervention realities as *fluid, emergent* and *multiple*, and thus intervention translations as *transformative* (Mol, 2002; Law, 2005). Following Barad (2003), we might better treat interventions in health as ‘intra-ventions’ to acknowledge these as material effects of their situated entanglements in assemblages rather than as entities with some prior stable essence. Consequently, we can no longer hold on to evidence-based intervention assumptions of isolated or underlying intervention-effect causality. Rather, we move to treating intra-ventions as matters of emergent effect (Connelly, 2004; Race, 2014). In turn, this shifts the focus of implementation science from following the translation of particular interventions across contexts, to an *implementing* science in particular implementation *events* (Michael and Rosengarten, 2013; Race, 2018). A critical difference between the ‘within-limits contingency’ we describe of EBI approaches and the ‘open contingency’ of EMI approaches is that the latter notices *more* to speculate on *how things could be otherwise* (Law, 2004; Tsing, 2015; Stengers, 2018). Noticing intervention realities as multiple and mutable is a means to altering. As Mol (2013: 381) argues: “As long as ontology is taken to be stable and singular, it may either be within our reach or out of reach, but *good* and *bad* have nothing to do with it. If, by contrast, realities are adaptive and multiple, if they take different shapes as they engage, and are engaged, in different relations, then questions of ontological politics become important.”

**>>INSERT: BOX 2: Some methodological implications of an evidence-making intervention approach**

An EMI approach seeks to make another implementation science possible (Stengers, 2018). Box 1 summarises a number of key tenets of this approach (Box 1). A next step is to map practical considerations regarding how an EMI approach to implementation science is to be done. How might the tenets of an EMI approach be translated into research methods and practices? How might implementation scientists do their science in relation to ideas of situated and experimental evidence-making intervention? In light of moves to consider the methodological implications of researching from a relational materialist perspective (Law, 2004; Mol, 2002; Duff, 2014; Fox and Allred, 2017; Dennis, 2019), our analysis prompts some initial pointers (Box 2). First, the focus of implementations research is *processual* rather than outcomes driven. It is not oriented towards tracing assumed isolatable effects of particular interventions into implementation but instead to how an intervention and its associated effects emerge, adapt and perform in relation to a particular time, space and practice of local implementation. This emphasises an overarching ‘praxiography’; an ethnography of how objects are performed in practices (Mol, 2002). Second, the unit of analysis is the actor-network or assemblage in which multiple elements entangle to make-up an intervention effect. This decentres the intervention technology as a primary actor in the evaluation of outcomes in favour of focusing (and sampling) in relation to the implementation *event* (Fox and Allred, 2017; Michael, 2017). Third, there is specific attention given to the *nonhuman actors* participant in the assemblage making-up an implementation event, as well as to the *affective and sensory flows* giving rise to intervention effects. This emphasises methods which are oriented to enacting evidence-making beyond that made in talk and discourse (Pink, 2016; Race, 2018; Dennis, 2019). Fourth, *all forms of evidencing* are afforded equal ontological and epistemological status, with the aim that these multiple forms of evidence are brought into *dialogue* together about how intervention realities are made in relation to what matters locally. This emphasises an approach to research which does not privilege particular versions or objects of science and knowledge but engages with multiple materials, artefacts and discourses in combination as they relate to particular local implementation events (Law, 2004; Stengers, 2005, 2018.) Fifth, and fundamentally, the aim is to bring multiple forms of evidence and expertise into dialogue as a means to generate an *evidence-making intervention*. This emphasises an approach which uses evidence-making deliberatively and speculatively as a means to experiment in relation to the tweaking, adapting and developing of new or different ways of intervening in relation to local social and ethico-political matters of concern (Puig de la Bellacasa, 2017; Wilkie, Savranksy and Rosengarten, 2017; Tsing, 2015; Chilvers and Kearnes, 2015; Whatmore, 2009). Lastly, and also fundamentally, the evidence made through implementation science itself is considered an actor in the *methods assemblage* which enacts knowledge of interventions and their implementations in particular ways (Law, 2004; Moreira, 2007; Stengers, 2018).

To conclude, there are two main ways we propose an EMI approach might be taken up in the health field. First, EMI can be put-to-use as a conceptual lens through which to explore the making of evidence, intervention and context in the situated present. That is, to examine what is being made and performed in a particular site or event of implementation, and crucially, not to neglect how science itself is an entangled actor in this process. This conceptual lens is already being taken up in sociological health interventions research (Holt et al., 2019; Savic et al., 2018). The case examples we have used in this paper also orientate towards such an application. Second, an EMI approach links with developments in science and technology studies, feminist science studies and poststructural theory to invite new ways of thinking about health interventions and effects as a means to speculate on doing health and care differently (Puig de la Bellacasa, 2017; Zuiderent-Jerak, 2015). Taking up the possibility that things could be made otherwise opens up potential for a more speculative and political ‘evidence-making intervention’ implementation science (Mol, 2002; Stengers, 2018). We might refer to this as an *implementing science*; a science which is performed as an intervention; a science which participates in the relational materiality of implementing and evidencing; a science that makes interventions that matter.

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**FOR INSERTION: BOX 1**

**Box 1: Some tenets of an evidence-making intervention (EMI) approach**

An EMI approach assumes that interventions are made in material-discursive practices, and that a multiplicity of practices generates multiple realities of intervention.

An EMI approach does not assume a singular reality of intervention with universal effect potential which is subject to variable construction, but treats evidence, interventions and their effects as emergent, contingent and multiple.

An EMI approach focuses on the processes and practices of intervention translation and implementation for the study of evidence-making intervention.

An EMI approach draws attention to the performative work of science and other knowledge-making practices in how they relationally make-up interventions, including how EBIs perform underlying intervention realities as stable and knowable.

An EMI approach reassembles intervention translation from a ‘matter-of-fact’ and of ‘knowing concern’ to a practice-based ‘matter-of-concern’ regarding how interventions are made-to-matter locally.

An EMI approach fosters dialogue across multiple divergent forms of knowledge and knowledge actors to speculate how interventions might be constituted differently, drawing attention to the politics of intervention knowledge and the realities they make.

**FOR INSERTION: BOX 2**

**Box 2: Some methodological implications of an evidence-making intervention (EMI) approach**

An EMI approach shifts attention from particular interventions and their outcomes to the effects of intervening in situated implementation events.

An EMI approach seeks a ‘praxiographic’ account of how interventions are performed.

An EMI approach shifts attention from particular intervention technologies to the actor-networks and assemblages of their production.

An EMI approach attends to effects linked to human and nonhuman actors, and to affective flows.

An EMI approach gives equal ontological and epistemological footing to all forms of knowledge which make-up local implementation events, and seeks to bring these into dialogue with one another.

An EMI approach seeks to make an evidence-making intervention by deliberatively and speculatively experimenting with new forms of knowledge intervention locally, including through dialogue across different forms of knowing.

Am EMI approach considers implementation science and research as actors in the methods assemblages which generate evidence-making interventions.