Quantified control in healthcare work: Suggestions for future research

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Abstract
This paper outlines promising avenues for empirical research on quantified control in healthcare work. A review of key insights from accounting, organization studies, and the emergent sociology of quantification indicates that numbers are productive as well as deceptive and seductive, that they enable control but can be evaded, and that they typically have unintended effects. It remains to be further explored how multiple forms of measurement and quantified control play out in everyday healthcare work. Other questions worth probing concern the limits and capabilities of numbers as a shared language, the differential and disciplinary effects of numbers on social groups, the use of numbers for impression management, and how people manage to resist or mobilize numbers for different purposes. Calling for additional qualitative, close-up studies, the paper proposes a research focus on everyday practices and the interactions of diverse control measures. It sets out several fruitful methodological pathways, both the well-established approaches of ethnography and Actor-Network Theory and the more novel approaches of investigating numbers as communicative acts or as dramaturgical performances.

KEYWORDS
calculative practice, control, ethnography, healthcare, quantification

“And what do you do with five-hundred millions of stars?”
“Five-hundred-and-one million, six-hundred-twenty-two thousand, seven-hundred-thirty-one. I am concerned with matters of consequence: I am accurate.”

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“And what do you do with these stars?” [—]

“I administer them,” replied the businessman. “I count them and recount them. It is difficult. But I am a man who is naturally interested in matters of consequence.”

The little prince was still not satisfied. [—]

“But you cannot pluck the stars from heaven …”

“No. But I can put them in the bank.”

“What does that mean?”

“That means that I write the number of my stars on a little paper. And then I put this paper in a drawer and lock it with a key.”

“And that is all?”

“That is enough,” said the businessman.

“It is entertaining,” thought the little prince. “It is rather poetic. But it is of no great consequence.”

Antoine de Saint-Exupéry, The Little Prince

1 | INTRODUCTION

Quantification is central to the governing of contemporary society. Ever since the “avalanche of printed numbers” relating to population statistics in the early mid-19th century (Hacking, 1982), techniques of notation and computation have been essential in modern forms of expertise-based rule (Miller & Rose, 1990). In the past three decades, there has been a renewed avalanche of numbers in public life, with prominence given to performance numbers expressed in economic or financial terms (Kurunmäki, Mennicken, & Miller, 2016). Accounting numbers are increasingly important, such as the performance measures involved in New Public Management reforms (Hood, Dixon, & Wilson, 2009; Lapsley, 2008, 2009). Today, we appear to live in a “metric society” where digitization and big data technologies enable ever mounting data processing and practices of measurement, evaluation, and comparison (Mau, 2019).

Research in various fields including the sociology of quantification, critical accounting, and critical management studies has demonstrated considerable problems with these developments, especially as regards New Public Management reforms and the intensified financial control of professional practice. There are consistent gaps between policy and practice, recurrent unintended consequences, and series of quantified control devices that fail, only to be replaced by new but similar instruments (Lapsley, 2008; Northcott & Llewellyn, 2005; Power, 2004). Close-up, qualitative studies of specific organizational microprocesses have been particularly effective in uncovering problematic consequences following grand reforms (e.g., Chua, 1995; Kurunmäki, 1999; Llewellyn & Northcott, 2005; Lowe, 2000; Wadmann, Holm-Petersen, & Levay, 2019; Wallenburg, Quartz, & Bal, 2019). Still, as Kurunmäki et al. (2016) point out, instruments to quantify performance are also integral to ambitions to hold officials to account and may be used for critical debate and political activism. They even warn for phobic responses to numerical control and argue for a distinction between quantification as such, which is not necessarily problematic, and the economizing and marketizing it is often connected to.

In our view, the potential for meaningful, practice-relevant research on the role of numbers and quantified control in organizations is far from exhausted. This is not because previous scholarship displays any particular knowledge gaps but because it suggests intriguing aspects that deserve further study, a central one being that “numbers are powerful and fragile, simple and qualified, trusted and distrusted simultaneously” (Power, 2004, p. 779). In this paper, we focus on quantified control in healthcare work and propose topics and approaches for future research. Healthcare is an interesting area for investigating these issues. It is an arena of ideal–typical professionalism (Freidson, 1970), where dynamics that may also be present in other professionalized human service fields, such as education or social care, are particularly pronounced and accessible for study. It involves several kinds of quantification connected to different, sometimes conflicting institutional logics, notably professionalism, market control, and politics (Blomgren & Sahlin,
Medical science and practice have long been thoroughly quantified (Weisz, 2005). Evidence-based medicine has meant further quantification of doctors’ work and become an ally of New Public Management-inspired efforts to render clinical medicine more calculable and standardized (Gebreiter, 2016, Weisz, 2005).

The aim of this paper is to outline an agenda for further research focusing on the microprocesses that play out in quantified control in healthcare. Other recent publications provide literature reviews and directions for research on accounting in healthcare (Malmmose, 2019) and clinicians’ approach to accounting information systems (Oppi, Campanale, Cinquini, & Vagnoni, 2019). In this paper, we do not seek to detect gaps in the existing literature but rather to identify mysteries and paradoxes that merit closer exploration to propose promising avenues for future work (Alvesson & Kärreman, 2007) and to suggest how such exploration could be designed. Our ambition is to refer to studies from various disciplines that exemplify our ideas and thereby make our claims credible rather than providing the reader with an exhaustive treatment of the field.

We start by problematizing quantified control, drawing on insights from previous studies in critical accounting, organization studies, and the emerging field of sociology of quantification. We then point at mysteries as well as fruitful methodological approaches and research designs. The aim in the problematizing section is not to provide an exhaustive review but, rather, an illustrative survey structured around various themes that address the question “what do numbers do.” In other words, we do not systematically report on “the literature” as defined by specified journals and a keyword search (see, e.g., Oppi et al., 2019). In our view, the domain in focus is interdisciplinary, so a review requires a more open approach. Accordingly, the themes drawn upon here have been inductively generated from our ex ante familiarity with the literature and refined thereafter as the review proceeded.

2 | PROBLEMATIZING QUANTIFIED CONTROL

The use of numbers in healthcare governance and management can no doubt bring considerable benefits in terms of improved planning and care delivery. For example, health statistics are used to expose inequalities between countries and social groups and to mobilize and design broad public health efforts that are advantageous to vulnerable populations (e.g., Marmot, 2005). Clinically relevant and collegially shared data on healthcare quality can also motivate physicians to engage in quality and safety work (Taitz, Lee, & Sequist, 2012). Comparative quality data that are pooled in clinical collaborative can prompt quality improvements by rupturing rooted assumptions that there are no problems to address and by providing feedback on improvement efforts once they are undertaken (Dixon-Woods, Bosk, Aveling, Goeschel, & Pronovost, 2011). It is also reasonable that healthcare provider organizations are held accountable for the quality and efficiency of their services through measures that are comparable between providers and over time. To make that happen in reality, however, is fraught with difficulties, and the ever-increasing ability of government agencies and managers to amass and calculate performance data has not solved fundamental problems (Lapsley, 2009).

The basic assumption of managerial efforts to control healthcare by numbers is that well-chosen measures can truly capture central aspects of healthcare quality and performance, in a neutral and objective way, and thereby be used to evaluate services and make informed decisions about how to improve them. However, as Pflueger (2015) points out, this does not ring well with findings from social studies of accounting, which persistently demonstrate that measurement and quantified control are fundamentally constitutive activities that tend to displace and even exacerbate underlying problems. In the context of healthcare, it is worth noting that numbers are both productive and deceptive, that they enable control but can be evaded, and that they have unintended effects.

2.1 | Numbers are productive

Quantified information does not neutrally reflect reality but actually participates in creating the social worlds it depicts (Chua, 1995; Diaz-Bone & Didier, 2016; Espeland & Stevens, 2008; Hacking, 1982; Morgan, 1988). To count, you need to know what you are counting—for example, men and women, physical and mental symptoms, and unit costs and
expenditures—and these categories shape the identities and phenomena they signify. For instance, our understanding of social class is rooted in early national statistics and the invention to classify people by their work (Hacking, 1982). Accounting implies numerical representations that actively reshape classify people by their work (Hacking, 1982). Accounting implies numerical representations that actively reshape organizations and their activities. For instance, when accounting systems based on diagnostic-related groups (DRG) were introduced in Australian hospitals, patients were transformed into consumers, doctors into resource managers, and administering a public hospital was equated with managing a private enterprise (Chua, 1995, p. 137). Some numbers are particularly productive because they commensurate, that is, transform disparate qualities into a common metric, such as a quality indicator (Espeland & Stevens, 2008). Commensuration simplifies and produces new, decontextualized numbers that appear authoritative and are easy to present, such as in public hospital rankings. Commensuration turns what is otherwise intangible into something ostensibly measurable and comparable.

Numbers and calculations also recreate the perceptions and identities of those who are doing the counting. For example, when hospital doctors and managers are trained in the use of medical management computer systems, doctors learn to review their work in relation to resource usage and managers learn to work with medical activity information (Bloomfield, 1991). By linking together responsibility and calculation, such systems generate responsible and calculating individuals (Miller, 2001). In a similar but more empowering way, patients who measure their own temperature or their own blood sugar level become active agents of their own therapy, in a sense reappropriating their malady (Vorland & Weisz, 2005). Similarly, Essén and Oborn (2017) found that regularly rating their illness experience enabled rheumatology patients to make more sense of their symptoms and medication over time. However, they also observed that numbers had boundary effects for both patients and clinicians. For physicians, apart from facilitating comparison and evaluation of their work, numbers created a boundary between their responsibility and nonresponsibility. Although patients had their self-perceived feelings of their illness confirmed by the numbers, they also experienced that their overall health (nonmeasured) fell outside of the physicians’ scope and became their own responsibility. Physicians and patients were sometimes skeptical about the numbers and these were subject to negotiations, but numbers still remained a salient part of the interaction between patients and physicians.

2.2 Numbers are deceptive

Numbers convey a sense of precision and objectivity that is often misleading, at least when used to designate medical and social phenomena. Any data collection involves a series of approximations and interpretations that make the resulting numbers less exact than they may seem. Even an apparently straightforward measure such as infection rate is, at a closer look, a complex matter. An ethnographic study of infection auditing (Dixon-Woods, Leslie, Bion, & Tarrant, 2012) found evident variability: different hospitals had different procedures for data collection, and the definitions for classifying infections were seen as subjective and messy. As a result, reported infection rates reflected localized interpretations rather than a uniform dataset—not because of any deliberate obscuring, but because “counting was as much a social practice as a technical practice” (p. 549).

Many important things are not readily quantifiable, such as healthcare quality in its various dimensions (Gebreiter, 2017; Levay, 2016; Pflueger, 2016). Instead, different types of indicators, proxy measures, and scoring systems are deployed to measure intangibles, providing a kind of “invented accuracy” (Power, 2004). This can be used for strategic purposes. Potter, Wetherell, and Chitty (1991) describe how different numbers and calculations were used to make rhetorical points for a television show about cancer research. By using an ambiguous concept such as “being cured,” it was possible to use an arbitrary rhetoric that connected curability to cancer research funding. Money spent on incurable forms of cancer could thus rhetorically be constructed as poorly spent—despite its potential to improve life expectancy and quality of life.

Composite measures and systems add further obscurity and instability. For example, in the former “star rating” of English hospitals, small changes in the underlying indicators could lead to large changes in how hospitals were rated (Chang, 2009; Hood et al., 2009). The system was publicly disputed and replaced with a new, presumably improved grade system (Lapsley, 2008). This is typical—the accuracy and pertinence of specific measurements are frequently
questioned, but new measures and refinements are typically proposed, and performance metrics are reconstituted rather than abandoned (Lapsley, 2008; Power, 2004).

2.3 | Numbers are seductive

The usage of numbers involves a certain kind of seduction. Quantification systems typically aim to follow the ideals of finely calibrated control. Kurunmäki et al. (2016) point out that such systems have the effect of ousting judgment or at least marginalizing it. This entails a quest for ascribing objectivity to the numbers at the heart of the system, an aspiration that has a long history (Power, 2004). Accounting practices, such as classification systems, are thereby not just institutionalized common sense but also emerge as what is collectively believed to constitute best practice (Power, 2004). Accordingly, quantification brings about a transformation of subjective experience of work practices into objectified knowledge, which sets up possibilities for alternative modes of governing (Kurunmäki et al., 2016). Affording a set of numbers with the status of objectivity, common sense, and best practice as opposed to judging or guessing is clearly a seductive prospect.

Moreover, the greater the precision, the more seductive the numbers are. The seductive appeal of quantification not only lies in the possibilities it offers in terms of uncertainty reduction and greater predictability through more effective forms of control. It also lies in reducing a complex organizational reality to something much more clear-cut. For example, the entire complexity of an organization can be reduced to a balance sheet on a single sheet of A4 paper (Power, 2004). Or, alternatively, in a healthcare context, a complex decision on a clinical procedure can be simplified by reference to the metrics of evidence-based practice that might, for example, be stored in quality registries.

Increasingly, various indicators are used to translate organizational phenomena into simple, measurable terms. In turn, these can be used to guide healthcare practitioners, organizations, and health authorities in establishing both policy and work practices. These practices and the numbers that enable them become seductive. However, as argued by Merry (2016), in the process of translating the complexity of healthcare practice into neat categories for measurement and comparison, we inevitably strip it of context and meaning—and risk hiding or distorting as much as we reveal. Much of this concerns a rather optimistic view that numbers can provide us with offers of both objectivity and precision as a means of helping us to make sense of a complex organizational reality. Such beliefs may well be misplaced, however, or at least there may be greater precision and objectivity in clinical diagnoses than there can ever be in accounting practices.

2.4 | Numbers enable control

By ordering and representing people and objects, numbers make them governable (Diaz-Bone & Didier, 2016; Miller & Rose, 1990; Power, 2004). Mundane techniques of classification, notation, and calculation have a significant role in the management of contemporary organizations and societies. They render some things visible and leave others in obscurity. They enable control at a distance from centers of calculation, by making people and objects knowable to managers and governmental agencies (Latour, 2005; Miller & Rose, 1990). For example, the widespread body mass index as a standardized measure of body weight makes it easy to collect and compare uniform data from different countries to apply numerically defined categories of normal weight, overweight, and obesity and to design and evaluate interventions down to the level of specific cities, treatment groups, and individuals (Levay, 2014).

In the workplace, social psychological techniques such as surveys render human relations measurable and provide managers with material upon which to calculate, diagnose problems, and evaluate the consequences of initiatives. Such control through calculative technologies is indirect and subtle; it works by offering “self-steering” mechanisms, and individuals can be governed without breaching their formal autonomy (Miller & Rose, 1990). Accounting has proved an especially effective form of quantified control which has spread far outside the world of business. By calculating and recording the cost of an activity, one alters how it is thought about and made amenable to control (Miller, 2001). Accounting also has a certain rhetorical and symbolic appeal. As soon as it was introduced, double entry bookkeeping
signaled a prudent and disciplined mind, whereas its neglect signaled character weaknesses such as slothfulness and ignorance (Carruthers & Espeland, 1991).

In healthcare organizations, systems of accounting that combine clinical and financial figures afford new types of visibility. They connect treatment activities more firmly to resource use and incite clinicians to consider the financial aspects of their practices (Bloomfield, 1991; Doolin, 2004; Lowe, 2001a). By employing numerical information, specific categories of illnesses can be defined and the corresponding symptoms quantified, and such data may then be used in negotiating care unit, treatment, priority, and risk (Andersson & Liff, 2012; Essén & Oborn, 2017). Doctors and other professionals may be critical and reluctant, but due to the all-encompassing nature of the technology, they can find themselves obliged to contribute (Lowe, 2001a).

### 2.5 Numbers can be evaded

Despite their potency, numbers and calculations can be resisted, ignored, diverted, and escaped from. Even when affected, people in organizations may reshape the influence of quantified control efforts (Levay & Waks 2009; Wallenburg et al., 2019). In healthcare organizations, professionals often perceive performance measurement as a challenge to their professional autonomy (Levay, 2016; Levay & Waks, 2009). Professionals can counteract numbers by gaming them, that is, manipulating measures to their own advantage, or by decoupling from them, that is, conforming on the surface but continuing to work as before (Sauder & Espeland, 2009). Patients too can game numbers that affect them. For instance, Essén and Oborn (2017) found that patients who regularly rated their symptoms could manipulate their self-assessments scores in order to align the score to their preferred treatment.

Apparently pervasive systems of performance management can prove remarkably ineffectual. For example, one study found that a newly implemented medical information system had a clear potential to mobilize norms associated with economic and management perspectives on healthcare, but it was difficult to find evidence of any self-disciplining actually occurring among doctors (Doolin, 2004). The system was not widely used in their everyday work and talk, and after some years it was rendered obsolete by a new reorganization (Doolin, 2004). Evasive responses of different types are particularly relevant in healthcare organizations, because they are typically sites of several control systems and institutional logics and decision makers cannot attend to them all equally. Responses may be harmful, such as when healthcare providers avoid seriously ill patients to improve on a quality indicator (Levay, 2016) or beneficial, such as when providers disregard an indicator in what they believe is the best interests of patients (Wallenburg et al., 2019).

### 2.6 Numbers have unintended effects

Quantified control is a risky endeavor with dynamic and often inadvertent consequences (Espeland & Stevens, 2008; Sauder & Espeland, 2009). Managers and health professionals can benefit from sophisticated performance measurement systems, but the lack of robust measures tends to inhibit the realization of central objectives (Lapsley, 2008). Perfectly well intended control efforts can restructure social worlds unexpectedly, make people react in unforeseen ways, and unleash chains of developments that go beyond or against the planners’ intentions (Hacking, 1982; Hood et al., 2009; Lapsley, 2008; Power, 2004). For example, between 2009 and 2014, in an attempt to reduce queuing times in Swedish healthcare, a financial incentive system was put in place. In principle, 1 billion SEK was earmarked for county councils that managed to provide 80% of their patients with an appointment within 90 days after seeking medical attention. However, incentives applied only to first time visits and as a consequence subsequent visits became less prioritized, which had adverse effects on long term and chronically ill patients (Hansson, 2014).

Documented adverse consequences of intensified quality measurement in healthcare include resistance from those being measured, gaming, “target fatigue” and “target myopia,” unwillingness of the public to use and trust in public measures, and a general inability to prevent recurrent quality failures and healthcare scandals (Pflueger, 2015). The very collection of data may affect daily work in problematic ways, such as when nurses are pushed to attend to computer screens rather than the patients they have in front of them (Swinglehurst, Greenhalgh, & Roberts, 2012). Data
collection and processing is time consuming, which is a major problem when it comes to clinical quality registries (Levay, 2006). Increased standardization practices have also been shown to call for increased demands of emotional labor, because such demands are made invisible due to not being accounted for as standardized and quantified output (Kamp & Dybbroe, 2016). An ethnographic study observed that increased work intensity and emotional labor led to increased stress and risk of burn-out among nurses. It also found that this jeopardized not only their wellbeing but also the quality of care (Selberg, 2013). Taken together, these findings mean that quantified control potentially undermines the very goals it is meant to further: efficient and high-quality care.

Numbers also have a tendency to proliferate. As shown by Kurunmäki et al. (2016), a seemingly straightforward measurement—mortality statistics for hospitals—is not simply about the number of people who die in hospitals. To be meaningful, the measure also necessarily embraces comparisons of deaths with previous years, comparisons between patients and ailments in the same year, comparisons between different hospitals adjusted, quantitatively, for differing case mixes as well as calculations involving a wide range of further variables such as age, ethnicity, admission source and type, level of deprivation, period of admission, co-morbidity, and so on. Even health professionals who are skeptical of excessive measurement may become enrolled in elaborating and managing numerical control systems and inadvertently end up contributing to their intensification (Wadmann et al., 2019). In other words, numbers beget more numbers.

3. TENSIONS, PARADOXES, AND MYSTERIES OF QUANTIFIED CONTROL

As much as the previous research has generated important insights about numbers and quantified control, it also gives rise to new questions. All these insights could be investigated further in their own right, but we see certain mysteries and paradoxes that are particularly intriguing that merit additional work. That numbers can enable control is uncontroversial, but to wholly understand how, we believe it is important to consider that such forms of control can have multiple forms and meanings and to ask to what extent numbers can perform as a shared language. In addition, given that numbers can be productive, we would contend that they have differential and disciplinary effects on social groups. The insight that numbers can be evaded prompts a further research focus on the resistance, escaping, and mobilization of numbers by actors. The deceptiveness and seductiveness of numbers raises questions of how people may use them for image management. The final insight that numbers can have unintended consequences suggests further work in relation to how the deployment of numbers relates to healthcare goals. We will now explore further each of the themes identified here.

3.1. Multiple forms and meanings of quantified control

It has been noted that healthcare organizations are objects of multiple forms of control and measurement that interact and impinge on the effects of one another (Pflueger, 2015). Still, virtually all empirical studies concentrate on the introduction of one or a few specific means of control, such as DRG-based accounting (Chua, 1995; Preston, 1992), hospital benchmarking (Llewellyn & Northcott, 2005; Northcott & Llewellyn, 2005), new budgeting systems (Lowe, 2000; Preston, Cooper, & Coombs, 1992), or medical information systems (Bloomfield, 1991; Doolin, 2004). We therefore have little knowledge of the simultaneous effects and interactions of different forms of management by numbers. It would be valuable to conduct studies that examine the interaction of diverse control measures at the level of everyday care, with a focus on numbers and calculations, and consider the implications of several controlling numbers at once. These could ask how different numbers relate to each other—which numbers count most, and which can crowd out and trump others? In that way, a better understanding of the complex and puzzling dynamic of management by numbers may be gained.

Previous scholars have also highlighted the central role of inscriptions in quantified control (Chua, 1995; Robson, 1992). Numerical inscriptions such as accounting reports, tables, lists, and graphs are mobile, stable, and combinable,
which allows for calculation, aggregation, and comparison and thus enables action on distant and multiple localities. Furthermore, as numbers move within and across organizations, they serve multifarious purposes and confer different meanings, which tend to change and become more authoritative and less ambiguous along the way (Espeland & Stevens, 2008). How this happens in the daily lives of clinical staff and patients remains an important question to be explored. Future research could focus on how numbers “travel” across an organization and how meanings are lost or gained. That is, it would trace numbers and compare the meanings, purposes, and intentions that are attributed to them as they travel. In this way, an increased understanding of why some numbers become powerful while others fall short may be gained.

3.2 Numbers as a shared language

Previous research suggests that it may be useful to consider numbers as symbolic resources rather than as fragmented representations of reality (Arrington & Schweiker, 1992; Carruthers & Espeland, 1991; Potter et al., 1991). Quantification can be seen as a social action that closely resembles speech, with multiple purposes and meanings. In this vein, Essén and Oborn (2017) found that numbers could serve as a “shared language” between patients and physicians that reduced knowledge asymmetry and empowered patients by acting as a communicative resource. Although patients were able to “game” or invoke numbers to favor their treatment of choice, they also experienced difficulties in mobilizing arguments for treatments that were nonmeasured. Physicians also experienced that numbers enabled them to explain their decisions to patients, yet they were perceived by patients as paying little attention to nonnumerical arguments. Moreover, as patients attempted to make sense of their overall lives in terms of specific medical numbers, various elements of life such as diet, exercise, and sleep were inferred, and medical numbers were attributed with greater significance and meaning. While making such connections, many struggled to understand the meaning and implications of this connection.

Seen in this way, then, numbers are a powerful, but limited, communicative resource. They may empower communication, but at the expense of possible alternatives. The language of numbers appears as paradoxical in its capacity to both facilitate and restrict speech and to reveal and obscure alternatives. Consequently, we believe more research on the capabilities and limits of numbers as a shared language is called for. Such research would offer possibilities for valuable contributions on how and in what way patients and clinical staff attribute meaning to various numbers and to what extent numbers can act as a shared language.

3.3 Differential and disciplinary effects of numbers on social groups

It is clear from previous research that quantification is intimately linked to issues of gender and diversity. Major systems of counting and calculation in society and healthcare, such as censuses and classifications of diseases, produce and reproduce fundamental social categories of gender, sexual orientation, ethnicity, and social class (Diaz-Bone & Didier, 2016; Espeland & Stevens, 2008; Hacking, 1982). Throughout history and today, quantification and quantified control have played a key role in overt as well as subtle forms of differentiation and discrimination based on racial categories (Clough, 2016). Colonization is an early example of domination through quantification; information brought home from distant places to “centers of calculation” in Europe enabled an indirect rule of colonies at a distance (Miller & Rose, 1990). In healthcare, medical specialities are basic categories that structure treatments, work organization, and occupational identities (Halpern, 1988). Their relative status has much to do with quantification, gender, and ethnicity. Specialities treating conditions that have measurable symptoms and are common among working age men have higher status than specialities treating conditions that have more diffuse symptoms and are common among women and the elderly. Low status specialities such as primary care and psychiatry have more female and immigrant physicians than high status specialities such as surgery (Einarsdottir, 1997).

Medical specialities with easily measurable results are more amenable to systems of quantified control and evaluation such as quality registries (Levay, 2006) and are therefore more likely to thrive in regimes of quantified control.
There is also reason to believe that gender and ethnicity are important factors in the dynamics of quantified control in healthcare—that they play in to the social categories underpinning medical and managerial counting and that they influence which occupational and patient groups benefit from management by numbers. At the same time, quantification may serve the interests of underprivileged groups, because it can be used to make visible discriminatory patterns that would otherwise be hidden. Authors have also pointed out that quantification shapes and challenges the subjectivities of those whose activities it aims to control, that is, both public service providers and users (Kurunmäki et al., 2016). In other words, attention needs to be drawn to how the instruments of quantification can alter the possibilities for both personhood and collective identities (Foucault, 1982).

By paying attention to these aspects, new contributions can be made to an increased understanding of how gender and diversity shape processes of control with numbers—and how control with numbers shapes gender and diversity. We may therefore ask “what do numbers do to people?” In part, this means exploring how the handling of numbers affects work routines and relations in daily work, how social categories such as profession and gender are presumed and reinforced by numbers, and what the disciplining effects are.

### 3.4 Resisting, escaping, and mobilizing numbers

Another core issue that calls for further exploration is the commonly adverse consequences of numerical control and how people in organizations may counteract them. As already indicated, previous studies of different forms of quantified control show a complex nexus—on the one hand, control measures have impacts beyond and sometimes against what was intended, and, on the other hand, actors can manage to evade or draw advantages from them, but still be affected in terms of work and identities (Doolin, 2004; Power, 2004; Sauder & Espeland 2009; Wallenburg et al., 2019).

In the context of healthcare, it is particularly relevant to consider how professional groups relate to and are affected by quantified control, which may differ across and between professional and national contexts. For example, doctors in Finland willingly adopted the calculative techniques of managerial accounting, thereby becoming a hybrid profession (Kurunmäki, 2004). This contrasts with how professions have reacted in the United Kingdom, Germany, and Italy. Here, rather, the picture is better understood as polarization rather than hybridization as the logics of accounting and medicine remain in uneasy tension (Jacobs, 2005). As to nurses, one study found that nurses who sought to assert a professional identity of administrative leadership were largely positive to quantified performance management, whereas those who promoted an identity of expert caregiving were more conflicted (Blomgren, 2003).

We believe that in this context, how the presence of different sets of calculative techniques offsets or reinforces one another is an overlooked feature of contemporary organizational life. Closer attention to their mutual dynamic in relation to professional identities should yield new insights into the power and limits of management by numbers. An important question is therefore “what do people do with numbers?” This concerns how people relate to different numbers that call for attention. How do health professionals and managers use them or ignore them, more or less successfully—for what purposes and in what ways do they mobilize, resist, or escape numbers?

### 3.5 Managing image and numbers

Numbers can be employed to forge an image of what may otherwise be perceived as lacking in substance. As authors have previously emphasized, numbers hold significant authority as trusted signs of objectivity, rationality, and precision (Porter, 1996; Power, 2004). Moreover, numbers have strong rhetorical appeal (Carruthers & Espeland, 1991; Potter et al., 1991) and can be aesthetically mobilized in various ways (Espeland & Stevens, 2008). They fashion an image of what is measured, such as healthcare quality or performance. Regardless of its authenticity, this image enables results, rankings, and subsequently comparisons over time between both actors and institutions (Roberts, 2018; Sauder & Espeland, 2009). In this context, the utility of numbers as persuasive tools may be seductive to managers and decision makers.
Managers in knowledge-intensive organizations, such as healthcare services, may find it difficult to show what results they are actually producing and instead engage in persuasion efforts and image management (Alvesson, 2004, 2013). Managers may feel pressured or draw advantages from managing the image of "quality" or "performance," rather than managing or attending to actual quality or performance. In other words, managing by numbers may turn to managing numbers. As argued by Tsoukas (1997, p. 838) "management becomes tantamount to keeping up appearances, and fighting shadows: managing via league tables leads to managing the league tables themselves." It would therefore be fruitful to investigate in what ways numbers are mobilized and presented to create desired impressions in healthcare organizations—by and to whom and for what purposes. By so doing, we may begin to understand how and why people are managing numbers rather than managing by numbers.

3.6 Management by numbers and healthcare goals

Management by numbers in healthcare often does not function as its designers intended, as is clear from much of the research reviewed here. For example, hospital benchmarking set up in the United Kingdom in order to raise standards actually made hospitals aspire to average performance (Llewellyn & Northcott, 2005). It is puzzling that quantified control is at the same time highly potent and impotent, exercising profound effects on professional work and identities and yet being recurrently and systematically circumvented by professionals. This deserves to be investigated further with a focus on the actual impact on clinical work.

Regardless of what numbers do more precisely, it is clear that they do something. That is, whether they are viewed as parts of an organization's formal façade, as something to be resisted, ignored or manipulated, or as tools for exercising control or for empowering communication, they affect people and organizations in significant and varying ways. It therefore remains to explore further the consequences of quantified control for healthcare goals and outcomes. This concerns how effects in everyday care compare with wider motives of quality and effectiveness—does quantified control lead organizations to hit the target but miss the point?

4 Designing close-up studies of quantified control

Previous research has shown the value of qualitative and in-depth studies at the micro level (e.g., Dixon-Woods et al., 2012; Essén & Oborn, 2017; Selberg, 2013). We propose that more studies within this tradition that focus on everyday practices are merited to address the questions raised here. The underpinning philosophy here is that social reality is recreated, interpreted, and made intersubjectively meaningful in the everyday lives and actions of those participating in it (Berger & Luckmann, 1967). An important aspiration for research is thus to show how social reality comes into being through the meanings attached to social interactions, objects, and events through local interpretations and sense making by the actors involved (Prasad, 2005).

Going forward, we will present what we believe to be promising avenues for how such studies can be designed in meaningful ways. We will begin by discussing how ethnography and Actor–Network Theory (ANT) may be applied to the questions raised here, building on previous research taking these approaches. Next, we will propose methodological approaches that have not, to our knowledge, been extensively applied to the problematics of quantified control, namely, to investigate numbers as communicative acts and discourse or as dramaturgical performances. In principle, any of these approaches could be deployed to explore any of the tensions, paradoxes, and mysteries discussed in the previous sections. Although some approaches might seem to be more easily applied to particular questions, such as using a dramaturgical approach to study numbers and image management, we encourage researchers to consider various combinations. Due to the inherent complexity of this kind of research, we do not consider any particular methodology alone to be sufficient in order to get a full grasp of the intricacies in play. The approaches discussed below are therefore best seen as methodological alternatives that can be enrolled, depending on particular sets of circumstances, to enrich our understanding of quantified control in healthcare.
4.1 Investigating the everyday practices involved in quantified control in healthcare

As a potentially fruitful foundation for pursuing our agenda for researching quantified control at the level of everyday care, we envisage ethnographic studies that pay due attention to everyday work practices as well as to actions and experiences of clinicians and patients. Such studies would ask, in an open manner, what happens in daily clinical work when it is the site of multiple forms of quantified control. By utilizing an ethnographic approach, it would be possible to gain an understanding of the everyday practices through an intensive presence at the research site over a prolonged period of time (Silverman, 2011). Well-established ethnographic methods—such as nonparticipant observation, shadowing of actors in work settings, hanging around, capturing anecdotes and more mundane interactions, systematic observations of meetings, prolonged immersion, in-depth interviewing, and document studies—have proven fruitful in uncovering what actually happens in organizations when quantified management is applied (e.g., Chua, 1995; Huzzard, Hellström, Lifvergren, & Conradi, 2014; Kurunmäki, 1999; Llewellyn & Northcott, 2005; Lowe, 2000; Swinglehurst et al., 2012; Wadmann et al., 2019; Wallenburg et al., 2019).

Specifically, attention should be paid to work practices and the lived experience of working with numbers. This could mean mobilizing or manipulating numbers for securing professional identities, advancing personal agendas, or perhaps consciously evading numbers and resisting their intended performative implications. A particularly fruitful design could be to utilize multi-sited ethnography (Prasad & Prasad, 2009; Silverman, 2011). This would make it possible to perceive, in these sites, the full range of numbers that are presented, employed, and referred to in everyday work—clinical threshold values, diagnosis codes, monthly activity report numbers, and so forth. It could be particularly valuable to identify quantitative measures that increasingly serve as indicators of quality of care, such as lead times, recovery or mortality rates, and a wide array of metrics contained in national quality registries (Huzzard et al., 2014).

Despite often being conceptualized as a method for collecting data, it is important to emphasize the ethnographic ambition to apprehend and interpret the multiple layers of meanings and local interpretations that are interwoven in complex symbolic systems (Prasad, 2005). Ethnographic studies may be particularly valuable as a way of providing “thick descriptions” of how numbers actually operate and how people are engaged with these (Geertz, 1973). The key lies in offering rich interpretations of the narratives and the different sets of local meanings that are being depicted. This requires a flexible theoretical framework and a reflexive approach to the empirical material, in particular as an attempt to avoid simply reifying and naturalizing established structures (Alvesson & Kärreman, 2007; Alvesson & Sköldberg, 2009). In conclusion, ethnography facilitates a largely inductive approach to the study of quantified control in healthcare. Further work in this tradition may enable researchers to attend to the multiple and presumably contradictory local meanings at the sites subject to multiple forms of quantified control.

4.2 Tracing numbers and examining interactions of diverse control measures

As we have mentioned, we believe that the presence of different sets of calculative techniques that may offset or reinforce one another is an overlooked feature within healthcare organizations—and elsewhere. We therefore envision empirical studies that examine the interaction of diverse control measures at the level of everyday care. The focus would be on exploring how numbers and calculations in, for example, financial control systems and clinical measurement are used, brought together, interact, and have effects on practices and outcomes that can be both unexpected and unintended. ANT would be especially fruitful for investigating such combined interactions and effects. Numerous accounting studies in healthcare settings have used ANT (e.g., Chua, 1995; Funck, 2015; Lowe, 2000; Preston et al., 1992), often in combination with other theoretical perspectives, as noted by Jacobs (2012). Following Lowe’s (2001) suggestion, it is particularly valuable to engage with the central concept of ANT by applying its “symmetrical” treatment of human and nonhuman factors. In ANT, the main concern and focus are the connections made and remade between human and nonhuman entities. ANT accounts for how new connections in a network create new entities that are more than the constituent parts of the network. In ANT, the generic term “actants” is usually preferred to the more common term “actors” elsewhere in social science in order to include the nonhuman elements of interest in such studies.
Following this premise, nonhuman phenomena—such as numbers—are afforded equal ontological prominence to human phenomena (actors). For Latour (2005), the social world is “flat,” that is, there is no macro level that somehow contains the micro, only localities that are more or less connected to other places in ways that deserve more careful attention than commonly given. ANT accounts for how new connections in a network create new entities that are more than the constituent parts of the network (Latour, 2005). In a methodology inspired by ANT, numbers and their representations—tables, formulas, equations, and so forth—could be considered as actants, that is, as objects that can be enrolled, mobilized, and made into actors in networks of humans and nonhumans, thereby transforming other entities—including other numbers—and being transformed by them. Such a methodological approach could provide meaningful ways of probing what clinical and financial numbers do to work routines and to one another, or how accounting measures for static entities such as hospital clinics interact with measures intended for more processual phenomena such as care pathways (Gebreiter, 2017).

Inspired by the work of Latour (2005) and others, we suggest that an intriguing way of initiating research on quantified control could be to set out to trace the connections between actants, in this case numbers and calculations, in a healthcare setting. Such an approach could start in a clinical setting, investigate the different numbers and calculative control methods that occur there, and trace them across different sites, in order to establish their origins, evolution, and impact. Particularly interesting in this context are the inscribed numbers that circulate in daily work, such as figures, graphs, and tables, and the objects used to collect, calculate, and represent them, such as computers, survey forms, and medical instruments. Through such research, an increased understanding of the effects, meanings, and purposes that are attributed to or produced by numbers as they travel and make new connections may be gained.

An important criticism of ANT, as observed by Alcapani and Hassard (2010), is the perceived tendency for ANT scholars to analytically deconstruct and subsequently reassemble organizations. In this process, it is argued, the organizations’ structures are reified and naturalized. The capacity to challenge reifications is crucial as these may otherwise “turn us into prisoners of our own social constructions” (Prasad, 2005, p. 16). Specifically, ANT has been criticized for being incapable of delivering critical, reflexive, nonperformative, and denaturalized accounts of organizations (Whittle & Spicer, 2008). However, by focusing on ANT as an analytical resource aimed at unpacking the process of organizing, rather than the concept of organization, there is potential to recognize that an organization’s ordering is not inevitable—rather multiple orderings may appear as possibilities (Alcapani & Hassard, 2010). Combining more critical perspectives with ANT can prove fruitful in producing an enriched analysis. In other words, although ANT opens the process of organizing for description, multiple interpretations, and usages, a critical perspective facilitates a reflexive account of its performativity and perceived naturalness (Alcapani & Hassard, 2010). Such research could challenge the naturalness of numbers and look for possible alternatives for action that might otherwise be obscured by the pervasiveness and often taken-for-granted nature of numbers in modern organizations.

### 4.3 Investigating numbers as communicative acts and discourses

As we argued earlier, the notion of numbers acting as a shared language is interesting and deserves further attention. One way to investigate this issue could be by invoking Habermas (1984) concepts of ideal speech situations and communicative rationality. Habermas is perhaps best known for his general analysis of contemporary society, which has been critically characterized as overly abstract and lofty “grand theory” (Alvesson & Sköldberg, 2009; Llewellyn, 2003, as cited in Jacobs, 2016). However, as Jacobs (2016) points out, Habermasian theory has also been successfully used in accounting research to study specific micro practices empirically (e.g., Broadbent, Laughlin, & Read, 1991; Chua & Degeling, 1993).

The focal idea we propose is to point at possible alternatives and obstacles in communicative action that affect the ability to reach informed decisions in everyday life (Alvesson, 1996). An ideal speech situation is characterized by an equal right for all individuals to enter a discussion, an absence of hidden motives or self-deceptions, authentic representation, freedom of voice, and a possibility to rationally evaluate options (Prasad, 2005). Such evaluations should be possible for all actors for each communicative claim and are achieved by applying four validity criteria:
comprehensibility, sincerity, veracity, and legitimacy (Alvesson, 1996). The idea is that all actors who are participating in the communicative act should be able to reach genuine consensus (Prasad, 2005). This can be researched in an empirical setting, such as in patient–physician interaction or in meetings between clinical staff and management representatives where there is a reliance on numbers in the communicative acts. The point is not to view ideal speech situations as binary and absolute, but to analyze communicative acts in terms of their possibilities and limits for reaching ideal speech situations.

Here, systematically distorted communication whereby power relations and ideological dominance impede the ability to question claims in communicative acts can be explored (Alvesson, 1996). These acts are sustained by discursive closure (Deetz, 1992) that acts to shut down opposing views, thwart explorations of controversy, and subtly impede genuine dialogue (Prasad, 2005). By applying a framework of communicative action in everyday encounters that rely on numbers, an increased understanding of how numbers can function as a shared language with multiple functions, purposes, and unintended effects can be gained. Studies that employ this method may find it valuable to consider which conceptions appear to be dominant in communicative acts and which are being obscured or trivialized (Alvesson, 1996). Such conceptions could be managerial logics concerning effectiveness, transparency, and control or professional logics of ethics, discretion, and autonomy, and attention could be paid to how numbers are used, or not used, in order to sanction or discredit such conceptions. Such logics may be in conflict (Reay & Hinings, 2009), and the question then becomes how the conflicts play out.

Discourse analysis may provide a meaningful analytical approach for this purpose. In theory, a distinction can be made between small d “discourse” and big D “Discourse”; the former assumes that meaning is transient, and the formative range is local and situational, whereas the latter sees meaning as persistent and the formative range as universal (Alvesson & Kårreman, 2000a; Kårreman & Levay, 2017). For example, in patient–physician interaction, we might see numbers as part of a Discourse where they act as universally understood signs of accuracy and objectivity (cf. Car ruthers & Espeland, 1991) and their usage within the interaction as a small d discourse where numbers are brought up, mobilized, and understood locally. Such a differentiation may facilitate an increased understanding of how people can see numbers as trusted and authoritative while simultaneously finding them difficult to understand and interpret. However, there are significant problems of treating language as a way of mirroring reality (Alvesson & Kårreman, 2000b; Kårreman & Levay, 2017). This includes the ever-present possibility of lies, ignorance, and taken-for-granted assumptions (Van Maanen, 1979).

For a study to be performed in a meaningful way, we believe it is important to consider practice as well as talk and meaning, and to seriously consider what kind of empirical material is required to make insightful claims about how they are connected (Kårreman & Levay, 2017). Such research should not focus on producing accounts of what people are saying but rather carefully analyze what their talk is accomplishing (Alvesson & Kårreman, 2000b). Attention should be placed on what people are doing, saying, and accomplishing and in analyzing nuances, contradictions, and tensions in between these things.

4.4 Investigating numbers as dramaturgical performances

In this last suggestion of promising avenues for researching numbers and quantified control in healthcare, we draw on the dramaturgical tradition. In this tradition, focus is placed on micro-level analysis of social interactions (Prasad, 2005). In such an analysis, researchers rely on considering persons as either actors or audiences in the ongoing presentations of selves in their everyday lives, and a differentiation between their frontstage and backstage actions is made (Goff man, 1959). A focal point of Goffman’s reasoning is that individuals attempt to define and influence social situations by utilizing their personal front and various settings (Prasad, 2005). In contrast, the backstage represents a time and place where attempts to foster impressions cease and where facts that have been suppressed may appear (Goffman, 1959).

A dramaturgical approach offers valuable analytical tools for investigating the process of managing impressions. What makes it particularly appealing is its ability to help us go beyond the surface interactions of everyday life and uncover concealed dynamics such as hidden agendas, conflicts, and identity interests (Prasad, 2005).
The goal of dramaturgy, Prasad (2005) asserts, is to enliven our understanding of social interactions. For the proposed research, this concerns interactions that are reliant on numbers to manage impressions. The variety of different interactions in a typical healthcare setting makes it particularly fruitful for a dramaturgical approach. Doctors and nurses are, for example, expected to play different roles in interaction with patients compared to when they interact with each other (cf. Goffman, 1959). Moreover, different situations may call for different performances where the ambition is to explore how numbers are utilized in such performances. Given the increased saliency of New Public Management and managerial logics, different presentational acts may be attempted by professional groups toward management and vice versa.

Benford and Hunt (1992) recommend that researchers pay attention to commonly used techniques for influencing an audience, namely, scripting, staging, and performing. Scripts can be understood as flexible guidelines for actors, which are developed backstage for dealing with antagonists, protagonists, and supporting cast members. Scripts are particularly interesting as they are based on both structural and personal factors. Staging on the other hand refers to actors’ efforts to appropriate, manage, and direct materials and supporting cast members in order to impress the audience. Staging often refers to organizing performances that are consistent with a certain script—a clinical encounter may for instance be staged to convey a sense of objectivity, impersonality, and authority. The performance, finally, refers to the enactment of scripts. An interesting way of utilizing these guidelines could be to pay close attention to the scripts that are used in clinical, managerial, and administrative encounters relating to numbers and how these are mobilized in various staging activities.

A dramaturgical approach may also facilitate an increased understanding of interactions between groups and individuals at a micro-level and of how formal and informal organizations operate at a day-to-day level. This may be done by considering how members of different groups—such as management, clinical staff, and patients—attempt to foster impressions through the use, or nonuse, of numbers. By doing so, it may be possible to analyze at a micro-level how evasion tactics such as gaming or decoupling are employed in day-to-day interactions. Of course, not all attempts at convincing an audience of a certain impression are accepted. On the contrary, they may be challenged or ignored (Goffman, 1959). Yet the important thing here is not so much the effects themselves but rather the process of managing impressions through the use, or nonuse, of numbers. By such an approach, we believe that many insights on clinical interactions at everyday work in a healthcare setting can be gained.

5 | FINAL WORDS

In this paper, we have outlined key findings on quantified control and made suggestions of yet unexplained tensions, paradoxes, and mysteries for closer investigation. Building on previous research from various disciplines, we have shown that there are still intriguing questions that can be fruitfully addressed at the level of everyday work in healthcare. We have suggested further research on different aspects of the central mystery that numbers are both powerful and fragile (Power, 2004), most notably how diverse forms of quantified control interact and allow actors to evade or mobilize the numbers involved for their own purposes, including impression management. We have also proposed promising methodological avenues for close-up studies that may shed new light on these issues. Although ethnography and ANT have already been drawn upon to investigate the themes discussed, our suggestions to study numbers as communicative acts or as dramaturgical performances are more novel in this context.

Neither the questions raised nor the research approaches drawn upon are exhaustive. This can be seen as a limitation of the paper. We have been guided in our reasoning by what has inspired us from previous research as interesting and relevant themes rather than any ambition to capture the literature systematically in an objective sense. The suggestions for further research focus on studying effects and interactions of numerical control at the organizational level, through idiographic case studies. That also implies certain limitations, because it is also valuable to investigate the formation of wider calculative regimes and infrastructures (e.g., Kornberger et al., 2019) and to conduct comparative case studies that enable more systematic consideration of generalizable causal relations (George
& Bennett, 2005). Our suggestions do, however, represent ways through which meaningful contributions can be made to further what we know about how quantified control operates in the everyday lives of patients and clinical staff and, potentially, in other professionalized human service organizations.

Finally, the research agenda proposed here is of considerable societal relevance. It responds directly to topical concerns and debates around the nature of contemporary healthcare reforms and their impact on organizational practices, including the knowledge-intensive work of healthcare professionals.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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