Learning from other Evidence-Based Practices: The Case of Medicine

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Abstract

Evidence-Based Practice is all around us. Not only has medicine embraced its principles, but so have education, social welfare, criminal justice and, last but not least, management. With only slight exaggeration, Evidence-Based Practice can be said to be emblematic of the modern professional. This chapter addresses the implications of this trend toward Evidence-Based Practice, by taking a close look at its first introduction, in medicine. Given Evidence-Based Medicine’s almost paradigmatic status, we then will cover the similarities and the differences between the two professional fields. In doing so, we will show that the hindrances that block the further development of Evidence-Based Management today are the same hindrances that blocked the development of Evidence-Based Medicine two decades ago.

Keyword: Evidence-based medicine, differences from evidence-based medicine

Hierarchy of evidence
Evidence-based practice
Clinical judgment
Systematic review
Best available evidence
Randomization
Causality
PICO
Trust, in professionals
Cochrane Collaboration
The Rise of Evidence-Based Medicine

As a concept, “Evidence-Based Medicine” was coined in the 1990s. It was defined as “the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients” (Sackett, Rosenberg, Gray, Haynes, and Richardson, 1996). This definition is striking, because it implies that the practice of medicine was not always “conscientious, explicit and judicious.” In the 1960s and 70s, people like Alvan Feinstein, Archie Cochrane and Henrik Wulff -- generally considered as the pioneers of the Evidence-Based Medicine movement -- were struck by the fact that clinical practice was characterized by much diversity. In clinical decision making, experience, intuition and the wisdom of former teachers seemed to be more important than scientific first principles. Feinstein, Cochrane and Wulff found this intellectually disturbing, and tried to remedy this situation by writing books that became classics to the movement: *Clinical judgment* by Feinstein (Feinstein, 1967), *Effectiveness and efficiency* by Cochrane (Cochrane, 1972) and *Rational diagnosis and treatment* by Wulff (Wulff, 1976). Parallel to this self-reflection by physicians, there was growing criticism on medicine and physicians from outside medicine. Physicians were accused of being inconsistent in diagnosis and treatment, causing iatrogenic damage and for being responsible for a cost explosion in healthcare. This situation was especially disturbing because the average life expectancy at birth had remained much the same during the second half of the twentieth century.

An evaluation of the effectiveness and efficiency of healthcare was called for, and this is exactly what happened. A new discipline was created: clinical
epidemiology. Epidemiology, a branch of medical science dealing with factors affecting the health and illness of large populations, had existed for many years, but was associated with public health. Because of its political implications, public health was viewed with suspicion by both biomedical researchers and clinicians. Therefore, something new had to be created, to appeal to both groups and provide a viable solution to the problems of intra-physician variability in behavior and decisions and the cost explosion in healthcare at the same time. This is what clinical epidemiology set out to do: while the research questions of the new discipline were supplied by the clinic, its methods were solid enough to appeal to basic researchers and applicable to medically defined clinical populations. In the process, it moved from the periphery to the center of the medical enterprise.

Epidemiology -- once considered to be rather irrelevant discipline by clinicians -- had become clinical epidemiology.

The new discipline was developed at McMaster’s University in Canada, by a team of clinicians, biostatisticians, engineers and health economists headed by David Sackett. Greatly inspired by the work of Feinstein, Sackett successfully launched a program in which problem-based medical research was translated into a problem-based medical curriculum. The practical questions of medical students were taken as a starting point. The new approach was embraced and funded by the Rockefeller Foundation, and successfully exported to other western countries. It didn’t take too long before clinical epidemiology was institutionalized in a handbook, a journal and a network. In 1985, David Sackett, Brian Haynes and Peter Tugwell published *Clinical Epidemiology: a Basic Science for Clinical*
Medicine (Sacket, Haynes, Guyatt, and Tugwell, 1991). Two years later, the Journal of Chronic Diseases was rechristened the Journal of Clinical Epidemiology, and finally, INCLEN was established: an INternational CLinical Epidemiology Network to support clinical epidemiology worldwide.

Things were taken even a step further by Gordon Guyatt, an early graduate of the Department of Clinical Epidemiology and Biostatistics at McMaster’s. In an article published in the Journal of the American Medical Association in 1992, he inaugurated the concept of “Evidence-Based Medicine.” The article was subtitled “A new approach to teaching the practice of medicine” and sprang from his need to justify the training program in the McMaster’s medical school (Evidence-Based Medicine Working Group, 1992). Physicians of the future needed to be educated differently. Instead of being knowledge- and teacher-based, their education needed to be problem- and patient-based. To do so, physicians should be able to judge the value and the applicability of published research. On top of that, they needed to be able to identify the relevant articles from a plethora of literature. In this respect, Guyatt claimed that Evidence-Based Medicine represented a paradigm shift for medical practice. While the old paradigm had valued pathophysiologic first principles, teacher authority, experience and unsystematic clinical observation, the new paradigm stressed their fallibility. Clinicians should henceforth rely on evidence, and be able to decide what constitutes reliable evidence and what does not. To do so, they should be able to search, evaluate and apply original medical literature. The underlying belief was that physicians could gain the skill to make independent assessments of evidence -
that is: without the guidance of external authorities (e.g., their teachers) or the weight of tradition.

A few years after Guyatt’s article, his mentor Sackett published *Evidence-Based Medicine: How to Practice and Teach EBM* (Sackett, Richardson, Rosenberg, and Haynes, 1997), a book he again co-authored with Brian Haynes. In 1995, the bi-monthly journal *Evidence-Based Medicine* was founded, published by the American College of Physicians. Today, this journal scans over 100 journals and around 50,000 articles a year so that it can identify the most important and valid 120 research articles. Practicing clinicians assess the clinical relevance of the best studies. Key details of these studies are included in a succinct, informative expert commentary on their clinical application. In other words, the journal summarizes published findings from other journals to promote access to research relevant to patient treatment. This outlet allowed proponents of Evidence-Based Medicine to develop and apply criteria of critical appraisal, in order to reduce the mass of published material and boil it down to the two percent of articles that are both valid and of immediate clinical use.

**The Domain of Management**

The modern era of medicine began at the end of the 18th century. Organizational science as a discipline emerged more than 150 years later, during the first half of the 20th century. This period saw the introduction mass production, which was popularized in the 1910s and 1920s by Henry Ford’s Ford Motor Company. Managers began to ask questions surrounding the production of large amounts of standardized products on assembly lines and operational process efficiency. These
questions were answered by organization experts of the time, who include Frederick Taylor and Henri Fayol. Seen from a management perspective, classic organizational science developed over the course of the 20th century with the help of such concepts as systems and contingency thinking. During that time, the field was joined by the social sciences -- sociology, organization sociology, psychology and social and organization psychology in particular. The contributions from these disciplines often resulted from the questions or problems organizations faced in their internal and external environments. Whereas at the turn of last century Taylorism was the answer to the day’s predominant production issue, psychological insights offered help when problems surrounding employee motivation and profiles demanded attention in the management of organizations. When seen in terms of such disciplines as general and organization sociology, by the 1980s the management world had considerable high-quality “evidence” at its disposal. The associated knowledge and insights were developed through the codification of experience and high-quality empirical research conducted in the previous decades. It was chiefly towards the end of the 1960s and the start of the 1970s that evidence in the organization sociology field saw accelerated advancement. Nevertheless, the professional field we call management still appears to be in its infancy, as far as empirical foundations are concerned. Why is this, and is it really true? There are three possible explanations for this appearance of “infancy.”

First, universal recipes for success drove out attention for contingencies. During the 1980s, the previously carefully cultivated and nuanced contingency
thinking of the sixties and seventies (Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Woodward, 1958) were increasingly replaced by popular, universalistic recipes for success. This line of thought, into which notions of “the excellent organization” (Peters and Waterman, 1982) fit, flourished through the 1990s and the start of this century. During this period we encounter popular concepts as “Visionary Companies” (Colins and Porras, 1995), “Good to Great Organizations” (Collins, 2001) and “High Performance Organizations” (Holbeche, 2005). The fact that people speak of “the holy grail of management” in relation to these concepts, thus invoking the suggestion that there is a universal recipe for success, illustrates this development nicely. Comparable suggestions are made with respect to leadership and strategy, for example. In all cases these were studies which had the necessary impact in terms of publicity and among managers and were then subject to serious criticism. This criticism varies from comments on the tenability of the conclusions, such as in the case of the excellent organizations (Business Week, 1984) to fundamental criticism on the methodological quality of the research by Collins and Porras (Rosenzweig, 2007) and the concept of high performance organizations (Ten Have, 2007). Moreover, the one-size-fits-all character of these concepts don’t do justice to the context, history, and characteristics of individual organizations. In contrast, an Evidence-Based Practice approach treats the question “what works?” as less relevant than “what works, for whom, with which problem, in which context?”

Second, management is a synthetic field constituting an array of disciplines; as such in itself it is neither very cumulative nor integrated. In
addition to the search for universal solutions at the expense of attention to context, the nature of the management field itself provides an explanation for its image of infancy. Management, in its connection to business administration, is a field that like communication and change management are integration sciences: a science or professional field composed of, supplied by, or dependent on other sciences or professional fields. In the case of business administration, this usually concerns such fields as economics, psychology, organizational science, sociology and strategy. With regard to psychology, it has been noted earlier that this is a field with a strong empirical basis. Thus, the field of social psychology is characterized by scientific research with a high “level of evidence.” The question is, however, how to assess the business administration field and its associated management discipline using these “strong” suppliers of evidence. Is it a matter of tallying up the supplier's collective track records and research contributions? Or should management be chiefly assessed as a separate domain based upon its own reliance on empirical evidence? Various authors point to limited progress, which some attribute to a form of “balkanization” within the professional field. James March describes this phenomenon as follows:

“... Energized subfields have tended to seal themselves off, each seemingly eager to close further minds of the already converted, without opening the minds of others” (March, 1996). Other authors express themselves in similar terms and summarize this development under the term “compartmentalization” (Goia and Pitre, 1990). March looks back to around thirty years after the conclusions he drew halfway through the sixties and notes that since that time, very little in the
professional field has changed: “Plus ca change, plus c’est la meme chose.”
Management’s image of stagnation and absence of empirical foundation can be partially attributed to the fragmentary approach to research within the professional field itself.

A third possible explanation for this appearance of infancy is the strong normative view of what organizations are, can do, and the associated resistance against concepts such as “systematic and methodical” and “evidence-based.” In this view, much emphasis is placed on the human factor and the limits of (or limits to) the rational perspective and its associated concepts such as “planning,” “design” and “steering.” But then again, concepts such as “learning” and “development” are prized very highly by the followers of this approach. This contrast still appears to be current and touches on the possibilities and limits that the role that “design” and its associated concepts such as “systematic and methodical” and “evidence based” have in relation to the field’s professionalization (van Aken and Romme, 2011).

Peter Drucker views the professionalization of management as the most important technological development of the 20th century. He links the enormous economic growth that took place in the previous century to the development of “the management profession.” His position is that without professionalization of the field, economic growth would have been significantly lower and organizations would have not been able to make the contribution that is so common in our societies: “But surely if management had not emerged as a systematic discipline, we could not have organized what is now a social reality in every developed
country: the society of organizations and the employee society.” (Drucker, 1985).

Drucker stresses that organizations are systems in which a whole range of activities are consciously and purposefully coordinated. Moreover, an organization's right to exist is determined by its capacity to coordinate economic activities more efficiently than the market can. Joseph Bower notes this in connection to the assignment that managers have in relation to this right to exist and the action and operational orientation that is needed for that purpose: “It is one thing to recognize that a corporation is a complex non-linear system interacting with a very rich and changing environment. It is another to provide a map of that system that permits managers to act in an intentionally rational fashion” (Bower, 2000). We know of course, that intention rationality means trying to engage in systematic thoughtful decision making, despite human limits and in particular bounded rationality. Intentional rationality is the same as rationality per se. Drucker argues for a kind of management practice in which people work “systematically and methodically” and he makes mention of the “management profession.” But a critical question Drucker’s attribution of professionalization to management raises is this: If despite human limitations, attempts to be intentional rational aided management and organizations in the 20th century, how do we continue to develop management as a profession in the 21st?

One answer is the more systematic use of evidence in management and organizational decisions, in particular scientific evidence.
Comparing Medicine and Management: Implications for Evidence-Based Management

Levels of Professionalism: A Naïve Image of the Discipline of Medicine

One side of this issue is the common view that management is not really a profession, unlike medicine, a discipline that is regarded by many as the archetypal profession (Barker, 2010; Khurana, Nohria, and Penrice, 2005; Sutton, 2007; Walshe and Rundall, 2001). Walshe and Rundall, for example, argue that medicine, in contrast with management, has a formal body of knowledge which is shared by all members in the professional group and which acts as a common frame of reference during discussions and debates within the discipline. Moreover, access to the discipline is restricted in the case of medicine: only those who have studied medicine at a recognized university are qualified to be a physician. Even then they may not be allowed to perform certain medical procedures until they have had further training, during which the physician acquires greater knowledge and skills in a specific area of his discipline. To guarantee the quality of specialized training courses, training is periodically assessed by fellow specialists in a system of peer review and visits. A training course or institute can lose its accreditation unless it meets the specialty’s quality criteria. Many countries subject practicing physicians to an on-going system of evaluation. For a physician to be allowed to continue practicing medicine, he or she must demonstrate each year that he/she has had further training and met the formal minimum standard with respect to certain medical procedures.
It is often suggested that the situation in the field of management is quite different. Walshe and Rundall point out there are no formal or legal rules that set conditions for using the title of manager, so anyone can call him/herself a manager. Managers are therefore a diverse group and they come from various disciplines, often with a widely varying training and education background. Thus, according to Walshe and Rundall, an employee who after some years of experience (without any formal training) rises to management belongs to the same professional group as the CEO who received an MBA degree at a renowned business school and then gained experience in various sectors for years. Because of this difference in training and education and experience, managers do not have a common language and there are huge differences in their familiarity with the body of knowledge. Concomitantly, it is suggested there is little consensus as to which management techniques would be the best to apply, in which way and in which situations. As a result, management practice varies considerably not only between countries or organizations, but even within divisions or departments, and personal experience and self-generated knowledge play an important part in that. Finally, it is often pointed out that by and large, the training of managers takes place within the confines of the training institute and that students upon graduating can take up a management position immediately, without any related work experience. This is, according to the authors, in sharp contrast to medicine, where graduates after their formal training at a university, first have to hone their skills under the supervision of a senior colleague before they are allowed to practice independently. On these grounds, it is implied that management is not a
profession and, in consequence, the application of the principles of Evidence-
Based Medicine in management practice is barely possible.

The portrait presented above reflects a naïve image of the discipline of medicine, one which some writers espouse. In fact, medical practice is far from uniform. Clinical decisions and results of medical interventions can vary enormously from one physician to the next, in spite of shared educations and knowledge (O'Connor, et al., 1999). These differences cannot be explained by the seriousness of the illness or the patient’s preference, and must therefore be the result of the physician’s personal style, behavior and experience. And although it is true that within each medical specialism clinical practice guidelines exist that physicians are required to follow, research demonstrates that sometimes reality is a far cry from this lofty ideal. For example, asthma is a disorder for which there is an official guideline in the USA, but a study among physicians responsible for emergency aid in hospitals revealed that four years after publication of the guideline, only 45% of the physicians had heard about it and a mere 24% had actually read it (Crain, Weiss, and Fagan, 1995). A study among American pediatricians even showed that although 88% stated they were aware of the guideline, only 35% actually followed it (Flores, Bauchner, and Kastner, 2000). Similar percentages crop up in studies with respect to other guidelines, leading to articles with titles such as “Why don't Physicians follow Clinical Practice Guidelines?” (Cabana, et al., 1999). Also the statement that anyone without a formal education or formal training can become a manager proves to be somewhat at odds with reality. Although never formally investigated, it is not likely that
there are many top managers in big corporations without formal management training. Even managers of smaller companies and non-profit organizations such as hospitals tend to be well educated. The majority has completed advanced studies. As there is a great demand for well-trained managers, a self-regulating system has developed in most Western countries, emphasizing education credentials. As such, people without any formal management training face difficulties qualifying for a manager’s job. This is partly why management courses and training have sky-rocketed over the past few decades and various large international organizations now warrant the quality of MBA and other management courses through accreditation.

Unfortunately, this increasing professionalization doesn't say much about the levels of expertise of managers. Several authors are right in pointing out that in general, management training leaves future managers ill-prepared, at least with the current form in which the training is given (Mintzberg, 2005; Rousseau and McCarthy, 2007). The content of management training seems to be heavily influenced by fads, fashionable topics and theories based on poor evidence presented by management gurus. Goshal rebuked such renowned business schools as Harvard and Stanford for teaching pseudo-scientific management models (Ghoshal, 2005). This criticism is comparable to David Sackett’s observation in the 1990’s with respect to the medical training: “A group of us came together in the late sixties, rebels with a cause. We said, ‘We know a lot of stuff about medical education, we think it’s crap and we ain’t going to do any of that’. So we set up our own Medical School. We attracted a lot of brilliant young minds
because what we were doing was so iconoclastic: it allowed them a way of questioning the pervasive authority of leading clinical teachers... Attitudes to medical authority changed as students started asking their teachers, respectfully, “Why are you doing this with this patient? What is the evidence you have for this?” (Daly, 2005). The (correct) observation that in the present management training little attention is paid to scientific research and promoting systematic procedures in management practice also is a parallel to medicine. However, this situation is comparable to the situation in medicine only two decades ago. Witness a comment made by Gordon Guyatt in 1990: “The problem isn’t clinical experience: the problem is that we (physicians) are so unsystematic, intuitive, and with no notion of scientific principles in our accumulation of clinical experience” (Daly, 2005). The current situation with training managers bears a great resemblance to the medical training situation in the 90’s, which could constitute an argument in favor of educating management students in the principles of Evidence-Based Practice. In that sense, Drucker’s 1985 plea for a systematic and methodical approach can be regarded as prophetic (Drucker, 1985). However, there remains one important obstacle to this, an obstacle that impedes the field’s development of Evidence-Based Management.

Sociology has developed various criteria that characterize a profession. A number of these criteria have already been highlighted above, such as formal training, certification and quality control. An important criterion not yet mentioned here is the existence of a common body of knowledge. A profession needs to be based on a clearly defined domain of well-organized and systematized
knowledge, a domain that forms the basis for the training and development of professionals (Khurana, et al., 2005). Admittedly, this body of knowledge is amply available in the field of management (Pfeffer and Sutton have even argued that there is too much evidence), but it is still insufficiently systematized and also insufficiently accessible. As such the body of relevant management knowledge does not yet act as a common frame of reference for managers. The lack of this common frame of reference also impedes the development of peer pressure supporting managerial use of this body of knowledge. To develop into a genuine profession, management needs better integration and accessibility of this body of knowledge into its practitioners’ training. The assumptions developed by Sackett and Guyatt regarding Evidence-Based Medicine are an important starting point: educating managers and students based on self-learning and problem-based instruction in small groups which provide intensive, hands-on instruction on how to find the best available evidence, how to critically appraise the evidence, and how to integrate the evidence in (management) practice.

Misconceptions about the Researchability of Management Practice

The Western world recognizes various sciences. A distinction is made between fundamental and applied sciences, and sciences are also divided into humanities, the natural sciences and social sciences. The humanities, also called the liberal arts, include disciplines such as philosophy, history, anthropology and literary theory. The humanities occupy a special place in the spectrum, as these are less suited to experimental research and therefore use techniques from logic to construct internally consistent theories. Natural sciences, also called exact
sciences, are different from other sciences in that they are based on the laws ofnature and theories that are more suited to be tested in experimental research. Examples are physics, chemistry and biology. The social sciences are a halfway house so to speak. These disciplines, also known as social studies, include sciences that are focused on man and his environment, e.g. sociology, pedagogic or educational theory, psychology, economics, business administration and law. From this perspective, management is squarely in the social sciences camp. In the natural sciences, experiments are conducted which allow the researcher to control all the conditions and factors that may influence the result. This often takes place in a controlled environment such as a laboratory. This is why the term “cause” as used in the natural sciences has the same meaning in common parlance. In the social sciences, the results of studies are often influenced by multiple variables that affect each other as well and causality is not often demonstrable. For this reason, terms such as “cause” and “effect” are avoided by social scientists, who prefer to use terms such as “correlated” or “related with” (Hunt, 1997). Because of the multi-relational nature of the social sciences, it is possible to demonstrate that certain variables under certain conditions bear on a certain result, but often it is not possible to show that that relationship exists in all or even most cases.

The practical value of management research’s results is limited because of this tangle of multi-relational connections whose potential cause-effect connections are not teased apart. As a counter example, medicine is often used, where strongly focused research questions are allegedly used that can be answered unequivocally in double blind randomized studies and where strong,
mono-causal links exist. That is why medicine is often considered to be the more scientific discipline, as well as why it is concluded that the practices of Evidence-Based Medicine do not apply to management. However, there are three comments to be made here.

*Randomized research is widely used in Medicine, but less than we think*

In as early as 1926, Ronald Fisher, the founding father of modern statistics, described the use of randomization in agricultural experiments (Fisher, 1926). The first medical randomized controlled trial (RCT) was not conducted until the end of the 1940s (BMJ, 1948); however, RCTs are now applied worldwide and regarded as the golden standard. All the same, most evidence in medicine is based on non-randomized and observational research. One reason for this is that blinding is not always possible in medicine. With surgical procedures for example, it is blindingly obvious to the patient and the researcher that an operation has taken place. The same is true for pharmacological research in which the long-term side effects of the drug to be tested are such that blinding is pointless. Moreover, randomization is not always feasible in medicine. Sometimes randomization is not possible for practical reasons, but more frequently, objections of an ethical nature come into play, for example in research into the effects of smoking on the development of lung cancer. Additionally, quite often it is not possible to conduct experimental research in medicine. This is the case in research into disorders that afflict only a very small part of the population, research into the side effects of drugs and research into the mortality rate of certain diseases or treatments. In fact, even in the natural sciences experimental
research is not always the most appropriate method for providing evidence, for instance in the field of astronomy or astrophysics. In all these cases, observational research is used, where the researcher merely observes but does not intervene, with the intention of finding correlations among the observed data. Such research too can lead to robust empirical foundations, particularly when repeated frequently and under varying conditions (Petticrew and Roberts, 2003). One form of observational research widely used in medicine is cohort research. In this type of research, large groups of people are followed over a long period to see (prospectively) whether differences occur among the groups. Another type of observational research that is frequently used is case-control research. In this type of research, one group of patients with a particular disorder is compared retrospectively with a group that does not have this disorder (Schulz and Grimes, 2002).

In management research too, randomization and experimental research is often hard to carry out for practical reasons. In spite of this, cohort research or case-control research is used relatively little. This is remarkable as case-control research could be applied in management relatively easily. These observations force the conclusion that the research practice of medicine shows extensive similarities with that of management, and that yet the extent and the methodological repertoire of management research is significantly smaller.

Causality is complicated in medicine, not just in management. A second comment must be made with respect to the assumption that there are strong, mono-causal connections in medicine. For example, it is a well-known fact that a
person’s blood pressure is influenced by a dozen variables and that the effect of a
treatment for high blood pressure is modified by a range of factors (Friedman, et al., 2001). Even with an intervention that seems unequivocal at first sight, such as
a hip replacement, its success is determined not only by variables such as the
quality of the prosthesis or the surgeon’s experience, but also by numerous less
obvious variables such as the patient’s nutritional situation, living conditions,
social support, state of mind and the ability to cope with setbacks. In medicine
too, there is a tangle of multi-relational links that are also difficult to measure or
to control. Even natural sciences like physics are not as exact, objective, and free
of experimenter bias as they are purported to be. Therefore the most important
difference between research practice in medicine and management is less the
nature of that practice and more the degree of variation in shared meaning within
each discipline. For researchers to be able to carry out a study in the discipline,
they must attach the same meaning to concepts and models and strive to eliminate
ambiguity and achieve value freedom. Every physician knows what is meant by
fever, and a standardized measurement tool has been developed even for a
subjective concept such as pain, so that it can be used globally as a hard outcome
measure for research. This is in contrast to the management practice, where much
use is made of multi-interpretable abstractions such as “dynamic capabilities,”
“change capacity,” “organizational learning” and “level five leadership.” Such
abstractions are far from unambiguous and difficult to operationalize and thus
hinder the development of a common frame of reference.
Evidence-Based Practice is about “best available” evidence. The third and most important comment involves the assumption that Evidence-Based Practice is only possible if the discipline has a research practice with a high level of evidence. This is a common fallacy. With Evidence-Based Practice, whether it involves medicine, education, justice or management, it is all about the “best available evidence.” If evidence is available on the basis of multiple systematic reviews of double blind randomized studies, that is great, but often the results of observational research, surveys or even case studies are the best available evidence. The level of evidence in itself does not say anything about the extent to which an evidence-based decision is possible, as a decision based on the opinion of experts can also be an evidence-based decision. In many cases, there is even insufficient evidence, so a professional has no option but to make a decision based on experience or intuition. Therefore, the scientific status or developmental phase of a field does not determine the applicability of the principles of Evidence-Based Practice. If research is conducted within the field, and a decision is to be made, a professional can establish whether there is sufficient evidence to underpin this decision and in doing so apply the principles of Evidence-Based Practice.

A Closer Look at the Practice -- Knowledge Gap

The management field shows a broad consensus on the existence of a deep chasm between knowledge and practice. Journals frequently feature articles on the gap between practitioners and researchers and the authoritative Academy of Management Journal even dedicated special issues to this subject. In most publications it is pointed out that researchers and practitioners live in separate
worlds and seldom communicate (Cohen, 2007; Rynes, Bartunek, and Daft, 2001; Rynes, Giluk, and Brown, 2007; Shapiro, Kirkman, and Courtney, 2007). Consequently results from scientific studies are hardly ever applied in practice. There is little consensus on the causes of this gap or on the best way to bridge it.

As for the cause, many authors look to medicine again and they are right to observe that the culture among managers is very different from that of physicians (Giluk and Rynes, 2011). Physicians regard medicine as a scientific domain, combining natural and social sciences. Consequently, much attention is given in their medical training to research and methodology and the scientific method is regarded as the basis for developing medical knowledge. In the hierarchy of the discipline, physicians who participate in research or who have done research for a doctorate have a higher status than physicians who only practice. Many medical consultants therefore have a career in both research and clinical practice, so the communities of researchers and practitioners in medicine overlap each other to a large degree. That is why physicians, unlike managers, recognize the importance of scientific research and appreciate the results of studies. This combination of scientific knowledge and practice-based experience enables physicians to assess the results of research critically and to translate these into their daily practice and into individual patient cases.

Managers on the other hand seldom see research results during their training, one reason for their minimal knowledge in this area. Only a small number of managers read academic journals, the majority gaining their knowledge from colleagues, popular management books, authoritative consultants
or success stories about well-known CEOs (Cohen, 2007). Students also tend to have strong normative beliefs and ideas as to what they need as future managers and they are primarily interested in current company practices and experiences of corporate leaders (Rousseau and McCarthy, 2007). Or put differently, managers rate face validity and readability more highly than methodological validity and evidence based on scientific research. However, a closer look at the practice knowledge gap reveals that this cultural difference does not just exist between managers and physicians but also between management researchers and their medical counterparts. In medicine, a researcher is typically a physician as well, which means that he or she has completed a medical training and has had years of experience working with real patients, so he or she knows what the daily practice of a physician is about. Management researchers on the other hand tend to be people who have never worked in management themselves and who therefore have no experience of the issues a manager has to address in practice. Moreover, management researchers often cherish an Aristotelian perspective, that is, the importance of an internally consistent theory explaining the observed phenomena. Put differently, management researchers strive to explain how things work, whereas managers (like physicians) seek to know whether things work.

Of course, there is no Evidence-Based Practice without theory about how things work. If we do not understand the world, we can neither anticipate it nor take purposive effective action. Even more, practitioners need some theoretical understanding of why something works to make evidence “stick” (Rousseau and Boudreau, 2010). However, the degree to which the question “why” is adequately
answered appears to differ between managers and researchers. As parents of small children know, the question “why” can be asked ad infinitum. In general, managers seem to settle for answering the first “why.” Researchers, on the other hand, will find this answer unsatisfactory and will repeat the question “why” a few more times in order to find out more about the underlying mechanisms. This also might be the reason why management researchers tend to publish hard-to-read articles where a disproportionate number of pages are dedicated to theory and hypothesis formation, only a few pages to research results, and none to implications for practice (Kelemen and Bansal, 2002). Even more, in some management journals it is almost impossible to publish scientific research without an underlying theory, even if the study’s outcome is relevant for practice.

The practice-knowledge gap has also existed in medicine and still exists today. Several studies reveal that late into the 1990s, the publication of either relevant research results on the basis of RCTs or systematic reviews in a widely read journal was no guarantee for practical application. As a result it sometimes took many years before relevant research results were included in guidelines or were recommended by experts (Antman, Lau, Kupelnick, Mosteller, and Chalmers, 1992). This situation has significantly improved during the last two decades, particularly thanks to the influence of Evidence-Based Medicine through which a more pragmatic attitude was adopted. As a result, research articles in medicine journals are significantly shorter, written in easy-to-read English, and the theoretical underpinning of the research outcomes is of secondary importance to the practical relevance and applicability.
Foreground and Background Questions

The gap between practice and knowledge in medicine had its origin -- to a considerable degree - in the very kind of research conducted. Until the late 1970s, the most important medical research consisted of biomedical laboratory research, the nub of which was the pathophysiology of diseases, but it had limited possibilities for application and limited relevance for clinical practice. Here too, researchers concentrated mostly on explaining how certain diseases and disorders are caused, whereas physicians mainly want to know which clinical interventions work. Also due to the influence of Evidence-Based Medicine, this situation has changed slowly but steadily and the focus in medical research has shifted to the most important task of physicians: treating patients. Evidence-Based Medicine has played an important part in that shift by emphasizing the difference between foreground and background questions (Sackett, et al., 1997). Background questions are about general knowledge of the biomedical aspects of a disease or disorder. A typical background question would be “How does congestive heart failure lead to swollen feet?” or “What causes migraines?” Background questions usually begin with an interrogative pronoun such as who, what, when, where, how and why. Background questions are usually asked because of the need for basic information about a disease or disorder. It is not normally asked because of a need to make a clinical decision about a specific patient. The outcome of a background question is sometimes referred to as Disease-Oriented Evidence (DOE) (Geyman, 1999). This kind of evidence is found in textbooks and handbooks or even medical information sites on the Internet.
Foreground questions on the other hand are about specific knowledge that can be used in a clinical decision as to the treatment of a patient. A typical foreground question is “Would adding medication X to the standard therapy for adults with heart failure reduce morbidity from thromboembolism over 3-5 years?” A well-formulated foreground question consists of four elements: the patient's condition, the population or the actual problem (P), the intervention (I), the intervention with which the comparison is made (optional) (C), and the outcome one is interested in (O). These four letters form the acronym PICO which is used the world over by medical researchers, physicians and students as a mnemonic to describe the four elements of a good clinical foreground question. The use of the PICO acronym has even become established in social sciences as well, usually with the addition of the letter C for context. The acronym is also helpful for physicians to evaluate the relevance, usefulness, and meaningfulness of the research outcome to their patient. The outcome of a foreground question is sometimes referred to as Patient-Oriented Evidence that Matters (POEM). This kind of evidence is found within the information contained in published research studies which are accessible through databases like MEDLINE. Foreground questions tend to be more difficult to answer than background questions because they require the synthesis of a wide range of knowledge.
The Evidence-Based Medicine movement stresses that physicians need both background and foreground knowledge, and that the need for foreground knowledge grows with experience with respect to a certain disorder or disease (see Figure 1). A medical student who has just begun his/her studies (point A) will benefit mostly from knowledge about the genesis of diseases and the underlying pathophysiological processes, but an experienced medical consultant (point C) will need practical knowledge about the clinical treatment of his/her patients. Note that the position of the diagonal line implies that a practitioner is never too green to learn foreground knowledge, or too experienced to outlive the need for background knowledge (Straus, Richardson, Glasziou, and Haynes, 2005). As medical researchers focused on background questions until the late 1970s, most medical research did not meet the physician’s need for foreground knowledge, resulting in the gap between practice and knowledge. For that reason, Evidence-Based Medicine is critical of the dominance of laboratory research investigating biomedical processes and a plea for research on the effect of clinical interventions aimed at real patients. In other words: bringing research back from the bench to the bedside.

The Accessibility of Evidence

To a large degree, Evidence-Based Medicine is justified by the enormous explosion of research literature. As early as 1994, it was estimated that over 40,000 medical scientific journals were published each year, containing over one million research articles (Olkin, 1995). In the field of coronary heart disease alone, over 3,600 articles are published annually, and this means that a
cardiologist would have to read more than 10 articles each day just to keep up with developments. For a general practitioner or family physician, this number is many times higher yet. The problem with Evidence-Based Medicine is not so much a lack of evidence, but rather its surplus: for any individual physician, there is too much evidence to take into consideration in daily clinical practice. Pfeffer and Sutton were justified in pointing out that this is not different for the field of management. The number of research articles on management published annually will be significantly lower, but even then too many research articles are published for a manager to keep abreast of the latest knowledge. As a consequence of this gigantic scientific output, it is not just the volume that increases but the diversity of the research results as well, so much so that it becomes impossible for researchers and practitioners to find their way in the mass of evidence. This results in a situation where researchers no longer base their research on the cumulative knowledge in the discipline, but on their subjective perception of only a fraction of this knowledge and practitioners ignore (sometimes contradictory) research results and rely instead on their personal experience and intuition. This soon led to the realization within the Evidence-Based Medicine movement that Evidence-Based Practice is only feasible if two crucial preconditions are met.

First, access to evidence must be quick and easy, via online databases. The enormous development of the Internet has been an important driver in the development and spread of Evidence-Based Practice within medicine. A great number of bibliographical databases is now available via the Internet and they often contain thousands of indexed journals and many millions of research
articles. This enables physicians to search relevant research articles using keywords, text words in the title or abstract and using the embedded filter to limit the research results to research type or level of evidence. One of the most famous databases in medicine is Medline, which allows the user to search publications from 1966 in over 4,000 journals. Thanks to Internet access to these databases, every physician can go online to find the most up-to-date studies and every consultation room has an immense virtual library containing the latest studies (Werner, 2011).

Second, aggregate evidence needs to be available in forms such as systematic reviews, synopses, summaries and evidence-based guidelines. The intention behind a systematic review is to identify as fully as possible all the scientific studies of relevance to a particular subject and to assess the validity and authority of the evidence of each study separately. As the name indicates, a systematic review takes a systematic approach to identifying studies and has the methodological quality critically appraised by multiple researchers independently of each other. The use of statistical analysis techniques in a systematic review to pool the results of the individual studies numerically in order to achieve a more accurate estimate of the effect is termed a “meta-analysis.”

Systematic reviews are crucial for the development of a well systematized and organized body of knowledge (Denyer and Tranfield, 2009). They efficiently summarize the available evidence on a certain subject (eliminating the need to read individual studies on this topic). They also call attention to gaps in our knowledge and the areas for which little or at best only
weak evidence is available, and in turn, help shape the field’s research agenda. The most important database for systematic reviews is that of the Cochrane Collaboration. Synopses are succinct descriptions of primary studies and systematic reviews and summaries are summaries of multiple systematic reviews on one medical topic. Summaries and synopses can be searched via special databases such as Trip, Sumsearch, DARE and Bandolier. Evidence-based guidelines are the highest form of aggregate evidence and they consist of systematically developed statements to assist practitioner and patient decisions about appropriate healthcare for specific clinical circumstances. Guidelines are not legally binding regulations, but insights and recommendations informed by as much evidence as possible regarding what physicians need to do to provide quality care. A well-known American database containing guidelines is the National Guideline Clearinghouse. Thanks to the availability of online databases with systematic reviews, synopses, summaries and guidelines, the massive amount of evidence in medicine is organized and well-indexed, so researchers, physicians and medical students can find the evidence they need with relative ease.

These two preconditions are not met yet in the field of management. Although research articles are quickly accessible via databases such as ABI/INFORM, Business Source Premier, Science Direct and PsycINFO, most managers cannot benefit from this wealth of information for the simple reason that the companies and organizations they work for do not have a license. On top of that, these databases are organized and indexed differently from the medical
databases, which rules out filtering on research design or level of evidence, and a search often turns up mostly irrelevant articles. More importantly, though, is the fact that aggregate evidence is almost non-existent in management: the number of well-executed systematic reviews that can stand the methodological test of criticism is severely limited and synopses, summaries and evidence-based guidelines do not yet exist. The absence of aggregate evidence can be attributed to a large part to the diverging character of management research: contrary to medicine, where research is repeated as often as possible and under different conditions, so as to obtain the highest possible level of evidence, research in management is often isolated and unrelated and does not build enough on previous studies, so aggregation of research results through systematic reviews is difficult (Denyer and Tranfield, 2009). This makes for a heavily fragmented body of knowledge with a low level of evidence. This divergent character is partly caused by the fact that research in management is strongly driven by academic interests and there is insufficient consensus on the most important questions in the field that need answering. This situation could be resolved if researchers began to focus more on the foreground questions of managers rather than the background questions of academics, and also if management research developed into a discipline driven by problems and questions that relate to the daily practice of managers.
Side Effects of Evidence-Based Practice

Evidence as a Higher Form of Truth

In “Evidence-Based Medicine and the Search for a Science of Clinical Care” by Jeanne Daly, a famous anecdote is told about how David Sackett used evidence to settle a professional dispute: “It concerns a consensus conference where it was difficult to reach agreement because authoritative clinical experts saw their own clinical view as definitive. Unable to persuade them otherwise, the McMaster people at the conference sent for Sackett. He proposed that experts be encouraged to make any recommendations they chose, but that they also rate on a scale the quality of evidence to back the recommendation. If a recommendation was based on evidence from randomized clinical trials with sufficient power, it would head the list. If the evidence was a case report, the recommendation would still be accepted, but it would be rated as a lower grade of evidence. Thus was born the hierarchy of evidence.”

In Evidence-Based Medicine, the term “evidence” is used deliberately instead of “proof.” This emphasizes that evidence is not the same as proof, that evidence can be so weak that it is hardly convincing at all or so strong that no one doubts its correctness. It is therefore important to be able to determine which evidence is the most authoritative. So-called “levels of evidence” are used for this purpose and specify a hierarchical order for various research designs based on their internal validity (Phillips, 2001). The internal validity indicates to what extent the results of the research may be biased and is thus a comment on the degree to which alternative explanations for the outcome found are possible. The
pure experiment in the form of a randomized controlled trial is regarded as the “gold standard,” followed by non-randomized controlled trials (quasi-experiment) and observational studies such as cohort and case-control studies. Surveys and case studies are regarded as research designs with the greatest chance of bias in their outcome and therefore come low down in the hierarchy. Right at the bottom are claims based solely on experts' personal opinions. Experiments in the form of RCTs are only suitable for assessing the effectiveness of interventions. To evaluate serious side effects and the long-term effects of an intervention, one needs longitudinal and observational research and for the assessment of the effect on the quality of life for example, qualitative research is sometimes more suitable.

However, as RCTs are at the top of the hierarchy of evidence, medical research largely has focused on topics that could best be researched using experimental research designs and until recently only evidence based on RCTs was treated as real evidence. This restrictive view of evidence led to medical research dominated by experimentation and aimed at hard, quantifiable outcome measures. It meant that research with a lower level of evidence, often aimed at side effects, the long-term effect or social-psychological success factors such as the patient's coping skills, the level of support from his environment and the perceived quality of life, were largely left out of the equation. Another problem that resulted from this one-sided focus on experimental research was limited generalizability. In research designs with a high level of evidence such as RCTs, there are often strict inclusion criteria that exclude patients with co-morbidities (for example, overweight or excessive alcohol consumption) or certain
demographical properties (e.g., age), so that the research outcome only applies to a specific patient population, which limits the generalizability. Observational studies and non-comparative research, on the other hand, have lower internal validity, but are sometimes more generalizable. One drawback of the levels of evidence is that they do not say anything about the research result’s external validity (generalizability) and take insufficient account of the methodological suitability of the particular research design to the research question at hand. Alvan Feinstein and Henrik Wulff accused the people at the McMaster University openly of being obsessed with RCTs and reproached them for promoting RCT as a higher form of truth when in fact it is only a means to determine the effectiveness of an intervention. In management too, the negative effects of the levels of evidence and the dominance of RCTs are frequently pointed out. For example, in his article “Evidence-Based Management: A Backlash Against Pluralism in Organizational Studies,” Mark Learmonth expresses concern that the popularity of Evidence-Based Management can lead to a one-sided view of evidence at the expense of funding observational and qualitative research (Learmonth, 2008).

In 1996, David Sackett and his colleagues responded to mounting criticism with an editorial in the British Medical Journal, called “Evidence-Based Medicine: what it is and what it isn’t” (Sackett, et al., 1996). In this article they argue that “Evidence-Based Medicine is not restricted to randomised trials and meta-analyses. It involves tracking down the best external evidence with which to answer our clinical questions. Without clinical expertise, practice risks becoming
tyrannised by evidence, for even excellent external evidence may be inapplicable to or inappropriate for an individual patient.” In our field Briner, Denyer and Rousseau pointed out that the same counts for Evidence-Based Management (Briner, Denyer, and Rousseau, 2009).

In the past few decades, the focus on RCTs in Evidence-Based Medicine has waned slowly but steadily and by now it is generally acknowledged that a clinical decision should not only be based on scientific evidence with respect to the effect of the treatment, but also on evidence regarding the long term effect, the chance of harmful side effects, the way patients experience their illness, the quality of life and other outcome measures relevant to patients. Partly because of this, the National Institute for Health and Clinical Excellence (NICE), the biggest source of evidence-based guidelines in the world, always involves two patients in the production of a guideline, which always includes a chapter on patient experience. The importance of the levels of evidence has also drastically decreased by now and they have been partly replaced by the GRADE approach (GRADE Working Group, 2008). In this approach, evidence is weighed not just on the basis of the internal validity of the research design, but the size of the effect detected is taken into account, as well is the subjective interest that a patient assigns to the outcome and the possible side-effects (Guyatt, et al., 2008). This approach has led to a revaluation of research designs with a lower level of evidence such as observational and qualitative research and initiatives like the establishment of the Cochrane Qualitative Research Methods Group and the Joanna Briggs Institute.
Trust in Numbers

Trust is essential for any discipline; it can be said to be a precondition for the social mandate that facilitates professionals to do their job. But what is the source of this trust? What is it that separates common knowledge from professional expertise? Why would lay people be prepared to abstain from their own intuitions and rely on the expert judgment of a professional? How does professional authority reduce uncertainty about any problem and pacify social unrest? In his widely acclaimed book *Trust in Numbers. The Pursuit of Objectivity in Science and in Public Life*, Theodore Porter is addressing these intriguing questions (Porter, 1995). Wondering how social trust is organized, he discusses the appeal of quantification in the nineteenth and twentieth centuries. He argues that quantification is no inherent quality of science, but rather the result of compromise, that becomes necessary when a discipline is experiencing external social pressure and distrust. It is interesting to apply this line of reasoning to Evidence-Based Practice. In his book, Porter introduces an analytical distinction between two sorts of objectivity. Whereas disciplinary objectivity relates to consensus among professional experts, mechanical objectivity is referring to formalized knowledge to satisfy the general public. This is not just an analytical distinction, but a chronological one as well. Over time, personal trust in professionals in face-to-face communities faded, to be replaced by “trust in numbers” in democratic mass societies. This development was not only derived from the understanding that expert judgment of professionals tends to be imprecise and unreliable, but was also the result of public distrust. Professionals
no longer made a difference; instead, standardized and transparent guidelines became the instruments in the hands of bureaucrats and managers. Quantification and calculation were a response to an emerging political and social culture marked by distrust of elites and experts: “Quantification grows from attempts to develop a strategy of impersonality in response to pressures from outside” (Porter, 1995).

Applied to medicine, this means that Evidence-Based Medicine did more than reduce clinical uncertainty. It also created or expanded public accountability. At the end of the 20th century, physicians faced an exploding volume of literature, the rapid introduction of technologies, a deepening concern about burgeoning medical costs, and increasing attention to the quality and outcomes of medical care. There was an urgent need to address these challenges, but medicine could not do this by itself. Greg Stoddart and George Torrance, two members of the Department of Clinical Epidemiology and Biostatistics at McMaster’s realized this, when in 1988, they founded the Centre for Health Economics and Policy Analysis. The aim of the new Center was to develop and apply methods for the economic evaluation of specific services and to design and evaluate systems of healthcare delivery. The Center sought to study decision making in healthcare: not just by health providers, but by consumers and policy makers as well. In doing so, Stoddart and Torrance took decision making to a higher level of aggregation: from the clinic to society at large. The market -- so they argued -- should be organized on the basis of analyses of technical efficiency and cost-effectiveness (Drummond, Stoddart, and Torrance, 1987).
Over the course of the 1970s and 80s, the protagonists moved from basic science to applied clinical epidemiology, and from there to health economics and health policy. Gradually, the implications of Evidence-Based Medicine became clear: it was obvious that a tool now existed that facilitated intrusion by third parties, who generally were medical lay people like civil servants and health insurers. In a sense, clinical epidemiology, Evidence-Based Medicine and health economy have been instrumental in making medical practice transparent and open to public scrutiny. Evidence-based medicine introduced new notions regarding autonomy, objectivity, medical jurisdiction and risk. By making medical decision more transparent, it changed the relationship between preventive and curative interventions, between rights and duties of citizens and between physician and patient. The boundaries between science, politics and society faded, while the stakeholders had to position themselves and articulate their goals continuously.

The creation of public accountability is a current issue in management too. Managers have to endure a great deal of criticism from various directions. Misuse of the position of power to one's own benefit, failure and mismanagement are the charges most commonly heard. In a number of Western countries such as the Netherlands this criticism is not restricted to the manager involved, but is extended to the profession as a whole: “Staff in the private and public sectors are addressed on a daily basis in a language which does not express their own specific reality but the make-believe world of managers. This make-believe world is dominated by objectives couched and repeated in a theatrical rhetoric: top quality, excellence and continuous innovation” (Pessers, 2005). As a result of this
increasing social pressure there is an external drive for transparency which fosters an upheaval for “objective opinion” and even “objective evidence.” It is therefore to be expected that the acceptance of Evidence-Based Management will not only be promoted by the need to improve the quality and professional standing of the profession, but will also in particular be used to increase managers’ public accountability.

Cost Control as a Driver

As we saw in the previous section, Evidence-Based Medicine is not just about clinical decision making, but also about cost containment, recourse allocation and distributive justice. In health economy, it is imperative to stand back from specific medical interventions and consider their place in the bigger picture. At the end of the twentieth century, governments and insurance companies were facing soaring healthcare costs. In many Western countries these costs rose faster than the growth of the economy allowed and the costs sometimes ran over 10% of the gross domestic product. In addition, many diagnostic and clinical interventions were found wanting in their effectiveness and many medical treatments were considered superfluous. Against this background, governments and insurance companies felt the need to regulate medical care, and Evidence-Based Medicine could cater to that need. Governments therefore hailed Evidence-Based Medicine as an external evaluation tool for the professional activities of healthcare professionals. Insurers now embraced evidence-based guidelines set up by the professional group itself as a criterion for compensation. Consequently, the freedom of action for physicians was drastically curtailed. In the US, this
development has given rise to a situation in which physicians first have to seek permission from insurers for many medical interventions. Applications are assessed by trained employees without medical background via simple protocols. As a result, physicians no longer run the show in clinical decisions in the US, as they have had to relinquish some power to insurers and managers. As a consequence, the discussion on Evidence-Based Medicine has not only been politicized but also strongly polarized. In this discussion, advocates of Evidence-Based Medicine see it as the tool to save healthcare: use the best available evidence to determine the best treatment and eliminate all superfluous and unnecessarily expensive medical intervention. Opponents see Evidence-Based Medicine as cookbook medicine, where the patient's need is no longer the main concern, rather the need of governments and insurers to keep costs down is determinant. In their view, cost control instead of medical necessity has become the justification for the assignment and distribution of care. In his article “What Evidence-Based Medicine: what it is and what it isn’t” Sackett warns against this depiction of Evidence-Based Medicine which he feels is an oversimplification: “Evidence-Based Medicine is not ‘cookbook’ medicine. Because it requires a bottom up approach that integrates the best external evidence with individual clinical expertise and patients' choice, it cannot result in slavish, cookbook approaches to individual patient care. Some fear that Evidence-Based Medicine will be hijacked by purchasers and managers to cut the costs of healthcare. This would not only be a misuse of evidence based medicine but suggests a fundamental misunderstanding of its financial consequences. Physicians
practising Evidence-Based Medicine will identify and apply the most efficacious interventions to maximize the quality and quantity of life for individual patients; this may raise rather than lower the cost of their care” (Sackett, et al., 1996).

Implications for Further Development of Evidence-Based Management.

Recapitulation

This chapter provided a short history of Evidence-Based Medicine’s development and that of the professional field of management. It has also extensively covered the similarities and the differences between the two professional fields and the hindrances that block Evidence-Based Management's further development. It has also demonstrated the untenability of the view that Evidence-Based Practice in our professional field is not possible because management is not a profession. The most important argument to support this statement, namely the lack of a body of knowledge that functions as a common frame of reference, says more about the developmental phase than about the nature of the professional field: medicine’s body of knowledge failed to provide a common frame of reference until the late 1980s; the introduction of Evidence-Based Practice promises to be the ultimate gamechanger.

We demonstrated why Evidence-Based Practice needs to become part of the management curriculum. The current supply-driven management educational system must make way for problem-based teaching and hands-on instruction on finding the best available evidence, critically appraising, and then integrating it into management practice. The problems managers struggle with in practice must take center stage in educating and developing managers.
With regard to scientific research, we revealed that our professional field shows a striking amount of similarities with medical science. Research results in both professional fields are determined by several variables, there are weak links and often a large number of factors that modify the effect. It is noted that the methodological repertoire of management research is significantly less broad than that of medical science. Evidence-Based Management should therefore imitate its medical colleague and promote the application of other research designs. Management researchers must stimulate the exploration of the possibility of comparative research and further randomization within the professional field. Because comparative research is only possible in homogenous categories, researchers, instructors and managers will also need to put in the effort to push back the use of multi-interpretable abstractions within the professional field. Both aspects, a limited methodological repertoire and a large meaning variance, are characteristic of our professional field’s development phase, but they do not form a hindrance to applying the principles of Evidence-Based Practice. As remarked earlier, within every professional field where research is conducted, a professional can, when making a decision, establish whether there is evidence to underpin this decision and in doing so apply the principles of evidence-based practice.

The same is true for the gap between practice and science. The observation that researchers and practitioners live in separate worlds and that because of this, the research results are not applied in practice, proves after further examination to be a better argument for Evidence-Based Practice, than against. Just as it can in medical science, evidence-based practice can act as a catalyst in our professional
field and make researchers concentrate more on managers’ foreground questions instead of academics’ background questions. This means management research can develop into a problem and demand-driven discipline that aligns closely with daily practice. As we pointed out, one important precondition here is for practice-driven and repeated research in academic centres to be held in higher regard and for authoritative management journals, like medical journals, to focus more on its relevance to practice.

**Further Development and Dissemination: Lessons to Learn from Medicine**

It has been concluded in the paragraphs above that the present situation in management shows a striking number of similarities with the situation in medicine two decades ago. It is thus reasonable to expect that the initiatives that ensured the propagation of Evidence-Based Practice in medicine will also make the difference in the management field. If we look at the historical development of Evidence-Based Medicine, we see that the key drivers are:

- The development of courses on Evidence-Based Practice and the integration of the 5-step approach of Evidence-Based Practice into the medical curriculum;
- The publication of a handbook on how to practise and teach Evidence-Based Medicine;
- The introduction of the Levels of Evidence which weigh evidence on the basis of the internal validity of the research design, and the GRADE approach which weighs evidence on the basis of the
subjective interest that a patient assigns to the outcome, and using it as a way to “flag” the vast array of available research;

- The introduction of the concept of Foreground and Background knowledge and Disease-Oriented Evidence (DOE) and Patient-Oriented Evidence that Matters (POEM), as a way to promote more research on the effect of clinical interventions aimed at real patients;

- The foundation of the Centre for Evidence-Based Medicine to promote evidence-based healthcare and to provide free support and resources to doctors, clinicians, teachers and others;

- The creation of databases with aggregated evidence to improve the accessibility of evidence.

All these initiatives can be translated directly to the management field and are potentially, therefore, an important driver in the further development and propagation of Evidence-Based Management. The first and last initiatives in particular are crucial in light of the contribution that these initiatives have made to the paradigm shift that has occurred within medicine in the past two decades. In view of the many initiatives that have already been implemented in this field, it is reasonable to suppose that it must be possible to set up courses on Evidence-Based Practice and integrate the 5-step approach of Evidence-Based Practice into the curriculum of universities and business schools in the decade ahead. The creation of databases with aggregated evidence to improve the accessibility of evidence is expected to be very difficult to achieve.
The Main Challenge: Improving the Accessibility of Evidence

In section 3.5, we considered the limited availability of online databases and the lack of aggregated evidence. Both preconditions form one absolute condition for the development and application of Evidence-Based Practice in our professional field. In this respect too, we can learn from Evidence-Based Medicine. The journal *Evidence-Based Medicine* was mentioned earlier in this chapter. It publishes the 120 best and most relevant research articles every year. The journal's editors summarize these articles and provide them with commentary in which they give a great deal of thought to the implications for their use in practice. Such a journal does not exist in our professional field, but it could be a first step to bringing well-conducted and practical, relevant studies to managers' attention in an accessible way. In addition to this journal, the Cochrane Collaboration is the paragon of excellence in the promotion, production and dissemination of aggregated evidence. The Cochrane Collaboration has in the meantime been copied within the social sciences in the form of the Campbell Collaboration. The idea for the initiative was thought up in London in 1999 during a meeting of eighty scientists. A number of these scientists were linked to the Cochrane Collaboration, where in the meantime the need had arisen for a sister organization “*that would produce systematic reviews of research evidence on the effectiveness of social interventions*” (The Campbell Collaboration, 2010). The ambition to establish a separate organization to this end was widely supported by a large number of social and behavioural scientists and led in the year 2000 to the formal establishment of the Campbell Collaboration.
There is a pronounced need within the Evidence-Based Management movement for an organization such as the Cochrane or Campbell Collaboration. To give Evidence-Based Practice a shot at success within management, management education needs to promote the availability and accessibility of aggregated evidence. According to Gordon Guyatt believes, who introduced the term 'Evidence-Based Medicine': “*When I started, I thought we were going to turn people into evidence-based practitioners, that they were really going to understand the methodology, that they were really going to critique the literature and apply the results to clinical practice. I no longer believe that. What I believe now is that there will be a minority of people who will be evidence-based practitioners, and that the other folk will be evidence users who will gain a respect for the evidence and where it comes from and a readiness to identify evidence-based sources which summarize the evidence for them.*” (Daly, 2005).
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