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# Sociological Model for Understanding Medical Practice Variations

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## ABSTRACT

Medical practice variations have been known to exist since the 1930s. The literature revealed that these variations were not random. Clear patterns of variation were found on several levels, for example, in countries, regions, hospitals, and physicians. The question, therefore, is less why physicians take different medical decisions but, more importantly, why physicians within geographical or organizational units show similarities even though differences exist between those units. In this chapter, a sociological model explaining medical practice variations is proposed. The importance of constraints and institutional mechanisms is shown, and time trends and the influence of the physician-patient interaction are elaborated upon.

## INTRODUCTION

Medical practice variation has been documented since the 1930s when Alison Glover's study revealed local differences in rates of tonsillectomy among schoolchildren in England (Glover 1938). Since then, researchers have shown that medical practice variation for different medical decisions exists throughout the world (Paul-Shaheen et al. 1987; Corallo et al. 2014). Variations have been reported in primary care with regard to diagnoses, contact frequencies, ordering of diagnostic tests, referrals, drug prescribing, and reasons for follow-up (e.g., Taroni et al. 1990; Zaat 1991; Marinus 1993; Verhaak 1993; Davis and Gribben 1995; Peterson et al. 1997; O'Donnell 2000; Guthrie 2001; Davis et al. 2002; Congdon 2006). In secondary care,

variations have been found for a variety of decisions, such as hospital admissions, surgery, diagnostic procedures, and length of stay (e.g., McMahon et al. 1989; Westert 1992; Westert et al. 1993; Weinstein et al. 2004). The literature showed that variations were not random. Clear patterns of variation were found on several levels, for example, in countries, regions, hospitals, and physicians (e.g., McPherson et al. 1981; Wennberg and Gittelsohn 1982; Read et al. 1983; Paul-Shaheen et al. 1987; Westert et al. 1992; Arndt et al. 1995; Wennberg 1999; Ashton et al. 1999; O'Connor et al. 1999; Birkmeyer et al. 2013). It seems that within certain units, such as countries, regions, and hospitals, physicians tend to make similar medical decisions. The question, therefore, is less why physicians make different medical decisions but, more importantly, why physicians within units show similarities even though differences exist between those units. Why doctors within units, such as hospitals, show differences and similarities in medical behavior will depend on *time* (knowledge changes and new knowledge is probably diffused more quickly now than in the past), *context* (at some levels of aggregation/organization they do the same, at others not), and *patients* (patients differ and professionals apply theoretical knowledge to individual patients or the newer issue that patients influence what doctors do in shared

decision-making). For understanding the existence of medical practice variation, insight into the behavioral mechanisms that underlie variation is necessary. In itself, variation in the treatment patients receive is not remarkable. Patients are not alike, and their medically relevant characteristics should be taken into account in the decision about the treatment they receive. Besides, patients can differ in their preferences with regard to options for medical treatment and that might influence medical decisions. For instance, a causal relation was found between the likelihood of caesarean section in Norway and the caesarean section rates in the mothers' country of origin, which points to the influence of preferences (Grytten et al. 2013).

The choice of medical treatment by physicians can be influenced by uncertainty about the most effective practice, the response to regulations, the remuneration system, the availability of beds and facilities, and the type of insurance coverage (Greenfield et al. 1992; Delnoij 1994; Westert 1992; Kroneman 2001). These influences show that non-medical factors are needed to explain variations in medical practice (Bachman and Freeborn 1999; Donelan et al. 1997; Eisenberg 1985; Greenfield et al. 1992; Langley et al. 1992). Factors, such as the availability of beds, show that care can be supply sensitive. According to Wennberg, supply sensitive care accounts for 60 % of Medicare spending (Wennberg 2010). Other studies emphasized the influences of the (social) work environment on medical decisions (Arndt et al. 1995; Westert et al. 1993; Westert 1992).

This chapter presents a sociological model to explain variations between and similarities within shared work environments. This chapter is partly based on De Jong (2008). Insight is necessary into the behavioral mechanisms that underlie variation. This insight is valuable in itself and will help in finding policy solutions to solve the policy problem of variation. Without knowing the causes, the consequences cannot be addressed effectively; understanding medical practice variation is crucial in developing effective policies aimed at influencing medical decision-making (Stano 1993). Since medical decisions will depend on context, time, and individual patient, the model should take these factors into account. The central question is:

*How can variations in medical practice between (groups of) physicians be explained after taking medically relevant factors into account?*

#### **EXPLANATIONS FOR MEDICAL PRACTICE VARIATION**

This section provides an explanation for the existence of variation. This explanation, however, is a first step; but it does not explain why medical practice variation is clearly patterned. The second step is the development of a theory that can explain those patterns.

#### **Professional Uncertainty, an Opportunity for Different Decisions**

Medical practice is based on theoretical knowledge. In applying that knowledge, there can be professional uncertainty in how this knowledge should be applied and in what treatment should be chosen. Variation is the result of applying theoretical knowledge to individual patients. Wennberg and Gittelsohn (1982) postulated that the amount of variation for a certain decision is determined by the level of professional uncertainty. The larger the professional uncertainty, the more possibilities exist for individual views and the more variation in styles of practice will be found. For some diagnoses, it is clear what the appropriate treatment is, thus limiting the range of appropriate decisions. For other diagnoses, there is professional uncertainty on what the appropriate treatment should be. As a result, there is an opportunity for different medical decisions that all seem appropriate, which will cause medical practice variation. When the level of professional uncertainty is high, combined with professional autonomy, an opportunity exists for the

influence of factors other than medically relevant patient characteristics. Professional uncertainty offers an explanation for the finding that there is more variation for some diagnoses than for others. In addition, patterns of variation in medical practice for the same diagnosis have been found between practices. These patterns of variation between practices imply that physicians sharing a work environment show similarities in medical decisions.

#### **Constraints, an Explanation for Patterns of Variation**

In order to explain similarities in medical decisions within work environments, Westert and Groenewegen (1999) introduced a theory of local standards, emphasizing (social) conditions or local circumstances. These conditions or local circumstances provide opportunities and constraints in terms of medical decisions, thus influencing behavior of physicians. This approach has the advantage of an explicit relationship between the work-related circumstances, physicians' medical behavior, and medical practice variation. The underlying assumption in this approach is that physicians are goal oriented. General goals of physicians are taken as given rather than their preferences concerning medical treatment. The model of local standards, applied by Westert (1992), predicts similarities among physicians who share a common work environment and consequently similar constraints. Different circumstances provide different opportunities and constraints and can lead to different medical decisions. These different circumstances bring about *patterns* of medical practice variation.

Professional uncertainty combined with the importance of circumstances can be derived from the work of Freidson (1975). He theorized that there are no strong expectations or norms on how to treat for some diagnoses. As long as there is professional autonomy and third parties do not set norms on how to treat patients based on factors other than medically relevant characteristics, physicians decide on medical treatments. Then, professional uncertainty provides an opportunity for different practice styles. Freidson described the social system in which physicians make their medical decisions and argued that, due to mutual dependencies, physicians behave in similar ways within groups. Professional uncertainty is related to differences in medical practice, while sharing a work environment is related to similarities in medical practice. Doing what others are doing can be seen as a solution by physicians to reduce the problem of professional uncertainty (Eddy 1984). Professional uncertainty does not necessarily mean that individual physicians are uncertain. One does not have to explain or legitimize behavior when acting like other physicians. It becomes a norm. In this way, patterns of variation come into being. These patterns, variation between and homogeneity within shared work environments, is empirically confirmed (Westert 1992; De Jong 2008). Nevertheless, variation within work environment has also been found. For instance, one recent study showed variation in practice style among intervention cardiologists within in a single high-volume tertiary cardiac center (Mercuri et al. 2012). It was unclear what explained this variation.

Technological, organizational, and societal changes affect the larger environment in which physicians work and influence the medical profession (Freidson 1975). Technological changes not only increase the medical possibilities but also the means of spreading medical knowledge. Changes in the organization, for example working in groups instead of working alone, affect the work environment. Societal changes have an influence on the environment as well as the profession from within. Processes of rationalization such as transparency and accountability are an example. Other important societal changes that influence the medical profession are increased individualization and trends towards consumerism, which could also influence the relationship between patients and medical professionals. An increase in variation may occur when processes of rationalization aimed at decreasing variation conflict with a change in patient choice in health care. Since medicine is subject to change and scientific insights change over time, gold standards can be difficult to create. In practice, the best treatment will depend on time, context, and the individual patient. In this chapter, a model that gives an explanation for patterns of variation taking time, context, and the individual patient into account will be proposed. Three mechanisms that are supposed to generate homogeneity will be outlined: selection, gradual adaptation towards group norms, and rapid adaptation towards circumstances. Selection of physicians to work with might be based on similarities in practice style. Gradual adaptation when physicians share a work environment might cause similarities in medical behavior. Rapid adaptation to circumstances when there are incentives for certain choices might also be a cause of similarities. These ideas will be complemented by three institutional mechanisms: the regulative, the normative, and the cultural cognitive mechanism. The regulative mechanism refers to rules and regulations, the normative to professional norms, and the cultural cognitive mechanism to the framework physicians use in their decision-making. The theoretical model is

depicted in Fig. 1 (adapted from De Jong 2008). The theory will be explained in the next section. Empirical evidence will also be provided in the next sections.

## [FIGURE 1]

### THEORETICAL CONSIDERATIONS

#### **The Importance of Circumstances**

In the debate concerning explanations for medical practice variation, the appropriate unit at which homogeneity might be expected is one of the questions raised. Since medicine has become a teamwork effort and physicians have become more dependent on hospitals (Groenewegen and Van Lindert 2001), it has become more important to examine physicians' behavior in relation to the group of physicians with whom they work. More and more physicians are working in partnerships, which implies mutual dependencies and influences, maybe unintentionally and unconsciously, on treatment decisions (Groenewegen et al. 2002). Freidson (1975) argued that physicians working in group practices have less autonomy because they are mutually dependent. This hints at the units at which homogeneity can be expected. Physicians working in solo practices rely more on patients for social approval, while physicians sharing their work environment with colleagues rely more on these role equivalents for their social approval (Freidson 1975). From this line of reasoning, it follows that variation in medical practice between physicians is related to differences in incentives and circumstances in their work environments, and from these local contexts different practice styles evolve.

There are still countries with large numbers of solo practices, especially in family medicine. However, one could also argue that these solo practitioners share a working environment formed by the local physician community that may meet informally, share locum services, and have access to the same secondary services. This would be a weaker form of shared environment.

#### **Visibility of Behavior**

Sharing a work environment implies mutual dependencies because physicians use shared resources, such as personnel and equipment. The work environment serves as a social system in which decisions take place, which might result in similar decisions between physicians. Within groups of physicians, norms will develop. In general, deviation from group norms may lead to criticism from other group members depending on the person's position in the group (e.g., Hogg and Reid 2006). Both collective and individual goals affect behavior within groups and can cause similarities between the members of a group. Within groups colleagues develop an informal system in order to protect their collective goals, to overcome freeriding, and to maintain solidarity (Lazega 2001). Whether group norms develop depends on the extent to which physicians actually form a social group and are able to develop into a normative community. Visibility of the outcomes of behavior is relevant; it is unlikely that norms will develop for behavior that is unlikely to be criticized. Behavior will

only be criticized by colleagues who are aware of the behavior and if the behavior has consequences for them.

The hypothesis was tested that the more visible the activities of physicians are to colleagues in the same practice, the less variation there is among them (De Jong et al. 2006). It was found that clustering of variation within practices depends on the clinical activity studied. Physicians sharing a work environment differed more from colleagues working in other practices than from colleagues working in the same practice. This was found for activities such as treatment and diagnostics performed in the physicians' practice. For prescriptions, referral to primary care, referral to secondary care, diagnostics performed in the laboratory, and advice, it was the other way round. For these activities, similarities between practices were found instead of similarities within practices. These clinical activities are less visible to colleagues and do not make use of shared resources. The hypothesis that there is less variation within practices when shared resources are used and when behavior is visible for colleagues was confirmed. A next step is to search more specifically for the causes of medical practice variation.

### **Selection, Gradual Adaptation and Circumstances**

Physicians sharing a work environment show similarities. This might be explained by three different mechanisms: selection, gradual adaptation, and circumstances. The selection of new colleagues might be directed towards similarities, that is, like seeking like. Selection includes both self-selection and selection by others. Gradual adaptation towards each other might result from processes of peer approval. Shared circumstances might lead to similarities in medical behavior between colleagues more or less directly.

For physicians within partnerships, careful selection of colleagues in that partnership might be important because it is not easy to get rid of a partner once he or she has entered the partnership. Therefore, a wrong choice has huge consequences. It can be expected that physicians search for new partners among physicians they already know, or who have characteristics that can be used in the selection process as proxies for characteristics that signal trustworthy colleagues. In the process of selection, implicitly or explicitly, a profile will be used that a new colleague has to meet. Selection is not necessarily based solely on similarities. New colleagues can also be selected based on differences with the physicians in a partnership. A partnership can choose to provide for omissions in treatment for their patients and search for other expertise in new colleagues.

Although similar people are attracted to each other (Fehr 1996), it is also assumed that people who interact influence each other and therefore will become more alike (Leenders 1995). Processes of socialization and normative control, which are classical sociological forces, can generate homogeneous practices through gradual adaptation. Formal education is a way of socialization; informal education

occurs when physicians start working together. When a physician starts to work with colleagues in a partnership, it is expected that sooner or later the physicians within the partnership will adapt their medical behavior to each other. If they do not adapt, they run the risk of losing social approval if their medical performance is criticized by their colleagues (Freidson 1975; Westert 1996; Westert and Groenewegen 1999). All kinds of groups impose sanctions against group members who deviate from norms

(Wilensky and Ladinsky 1967). For physicians, peer review increasingly is part of normal routine in partnerships or groups. Besides, when people in general evaluate their own personal skills or self-image, they rely on role equivalents (Burkhardt 1994). Thus, physicians will compare themselves with colleagues. As a consequence, there may be pressure towards adaptation within partnerships. The process of gradual adaptation leads to similarities in medical behavior.

Another process that causes similarities is a more rapid adaptation to the circumstances under which physicians work. The circumstances provide opportunities and constraints for behavior. Therefore, a change in behavior can be rapid when circumstances change.

The hypothesis was tested that physicians in partnerships are more similar in professional attitudes and behavior to each other than to randomly chosen physicians (De Jong et al. 2003). In this study, it was found that Dutch general practitioners (GPs) working in the same partnership showed more resemblance in attitudes and behavior than GPs not working in the same partnership. Circumstances were found to be most important as an explanation of similarities within partnerships. To a lesser extent, indications pointed towards adaptation. These findings gave a clue to an explanation of similarities in medical practice based on circumstances. The implication is that medical practice variations may not be caused by individual differences in practice style but patterned by social processes in partnerships and local circumstances. This finding was further confirmed in a study of medical behavior performed by physicians working in two different hospitals. The hypothesis that physicians working in two different hospitals act differently in those hospitals was tested (De Jong et al. 2006). This idea implies that variation within hospitals was small compared with variation between hospitals for physicians treating similar patients. A second implication would be that physicians conform to the usual practice of each hospital in which they practice (Westert 1992). This implication is essential for a constraint-centered approach and cannot be deduced from an approach that is based on practice styles that are formed, for instance, during medical education, as these individual practice styles would not change when working in another hospital. It is important to make the distinction between individual practice styles and the influence of constraints because it informs policy. The hypothesis that variation within hospitals was small compared to variation between hospitals was confirmed (De Jong et al. 2006). However, this result is still compatible with both the approach based on specific practice styles and the constraint-centered approach. Therefore, the decisions of the same physicians in different hospitals were also analyzed. Individual practice styles are likely relatively stable within the same person, but circumstances may clearly differ. Several different analyses confirmed that physicians working in two hospitals with different average lengths of stay have a patient length of stay similar to the usual practice in the hospital where the procedure was performed. The analyses showed that organizational units, such as hospitals, are important in studying medical practice variations. The study confirmed that circumstances are important in understanding medical practice variation. The model now covers for "context" as an important element in explaining medical practice variation. The element "time" also was mentioned. Therefore, the model was extended by adding institutional mechanisms, which will give more insight into how circumstances are shaped and include changes in circumstances over time.

## **Institutional Mechanisms**

Circumstances do more to shape the medical behavior of physicians than their individual practice style. These shaping processes can be considered institutional and both apply to physicians working in groups and solo practice. In this chapter, “institution” as a sociological concept refers to the written and unwritten

rules of social behaviors; it does not refer to a concrete organization. Three mechanisms of how institutions work can be distinguished: the regulative, the normative, and the cultural-cognitive mechanism (Scott 2001). These mechanisms might influence variation.

The regulative mechanism refers to regulations, such as rules set by insurers on the medical treatment given to patients. The normative mechanism refers to the expectations of peers. It matches professional control, such as guidelines developed by the profession itself. These guidelines have a normative character. The cultural-cognitive mechanism relates to a common framework of meaning.

To test the influence of the regulative mechanism, the influence of managed care on the decisions physicians make and on variation in medical practice was studied. The managed care system in the USA is an example of a restrictive circumstance in which regulative mechanisms are used to influence medical behavior. The Health Maintenance Organization (HMO) is the best known type of managed care in the USA (Bachman and Freeborn 1999). The focus was on one important set of constraints, viz., those set by the insurer of the patients. Constraints on medical treatment set by an HMO will be far more restrictive than constraints on medical care for the traditionally insured, implying that variation between physicians treating patients with HMO insurance will be less than the variation between physicians treating patients who are otherwise insured. Physicians treating HMO insured patients face similar constraints and incentives, leading to similar decisions regarding length of stay.

Based on the differences in constraints between managed and non-managed care plans, it was hypothesized that the length of stay would be shorter for managed care patients. In addition, less variation in the length of stay for managed care patients was expected. The lengths of stay for comparable patients who are insured under managed or non-managed care plans were studied (De Jong et al. 2004). In this study, no difference in the length of stay between managed and non-managed care patients were found. Furthermore, it appeared that the length of stay for managed care patients varied less. Contrary to our expectations, this difference in variation was not primarily found at the level of the physicians, nor was it found at the hospital level. No evidence was found that managed care has an effect on the length of stay. It was concluded that restrictions imposed by the insurer do not result in patterns of variation, since hardly any differences in the length of stay were found between managed care and non-managed care patients. It could be that hospitals respond to the way they are paid; payment per DRG means that it is always (cost) efficient to keep the length of stay short. Or it may be that knowing managed care is on the increase is causing hospitals to react in advance by developing strategies making sure that (managed care) patients will be treated in their hospital in the future (Zhang et al. 1999). Actually, it seems that hospitals are managing care more than the insurer.

The normative mechanism was tested in a study of the influence of professional guidelines for general practitioners in the Netherlands (De Jong et al. 2010). It was

hypothesized that variation would decrease when guidelines are followed. This hypothesis was based on the idea that following guidelines gives people status or protection when medical behavior is to be explained. When an individual follows guidelines, it is easier to explain what is done and acceptance is achieved easier. It was found that the introduction of guidelines did not reduce variation. However, it probably tempered the increase in variation. Although several studies examined the adherence to guidelines (e.g., Schers et al. 2000; Hermens et al. 2001; Grol 2001; Tiemeier et al. 2002), the impact on variation among physicians is hardly ever studied. An exception is Verstappen et al. (2003), who reported a larger decrease of variation in the experimental group after an intervention in laboratory test ordering (but gave no statistical test on the difference).

The cultural-cognitive mechanism is supposed to have an effect on variation as it is likely to lead to similar decisions when a similar framework to make decisions is used, with the pre-condition that there is not much room for individual interpretation. Using a Decision Support System (DSS) is an example of

such a framework. The influence of a DSS on variation was tested in a study of a DSS used by general practitioners in the Netherlands (De Jong et al. 2009). The DSS studied is a tool to give advice on prescription when the ICPC-coded diagnosis is given. The DSS proposes a prescription given the diagnosis of the patient, taking age, sex, and co-morbidity into account. Using a DSS is expected to decrease the variation between physicians because they make use of the same cognitive framework.

DSSs intervene in physicians' daily routine and are used to facilitate, for instance, the use of those guidelines. The study showed that physicians using a DSS are prescribing to conform to the advice given in the DSS more than physicians not using a DSS. Still, variation was not lower; variation was the same for physicians using and for physicians not using a DSS. This finding was supposed to be related to the fact that the DSS studied advised several different drugs or recommended a step-by-step treatment. The implications are that DSSs can be used to facilitate the implementation of guidelines, but it should not be expected that variation is limited as a consequence. Variation is probably only limited when DSSs limit the opportunity for variation, for instance, when only one recommendation about which medication to prescribe is given.

Based on our studies, the influence of institutional mechanisms on medical practice variation is not empirically confirmed. Results show that there is an influence on medical behavior, but variation is not necessarily decreased.

#### **TIME TRENDS**

It was stated that medical decisions will depend on context, time, and the individual patient. How does this fit into our theoretical model? Since the focus of the model was on the meso and macro level, context is well covered. Although time is not explicitly mentioned, the model can be used for deriving hypotheses concerning time trends. There is a growing body of knowledge concerning medical practice, meaning that there is evidence on the most appropriate treatment for more diagnoses now than in the past. Consequently, professional uncertainty about treatment decreases and room for individual views is limited. Subsequently, variation for these diagnoses would

decrease. At the same time, innovation takes place and evidence about the effectiveness of innovative treatments gradually builds. Based on theories about the diffusion of innovation, one would expect that variation would increase initially, since some physicians will use new evidence before others do, rather than decrease, which likely would occur eventually when most physicians use new evidence. Evidence for this pattern can be derived from a study by Ohlson et al. (2011) on the prescription of simvastatin in general practice. However, after some time, established treatments may also be succeeded by new ones. The earlier established treatments will be left first by some and then by more physicians, leading to a new increase in variation. Research on trends in medical practice variation is rare (Groenewegen and Westert 2004). It seems that at the level of the “life cycle” of separate treatments there is decrease of variation after the introduction of new guidelines; but at the system level many different treatments may be in different phases of their life cycle, blurring a clear pattern. From the theoretical model, hypotheses can be derived concerning the circumstances under which variation in medical practice would increase or decrease. If circumstances are similar, physicians’ medical behavior is expected to show less variation. Institutional change can cause circumstances to become more alike. An example of institutional change is the worldwide trend from professional control to managerial control (Schers et al. 2000). Instead of professional norms, rules become important. The implication is that when rules are set, monitored, and sanctioned, for instance at the hospital level, variation within hospitals would decrease. If rules are set at a national level, for instance the national introduction of performance targets and incentives, variation is expected to decrease at a national level for medical decisions that are subject to performance indicators.

#### **PHYSICIAN-PATIENT INTERACTION**

Current research and attempts to explain medical practice variation focus on physicians and the organizations they work in. This approach may have been adequate in a world where the authority of physicians was undisputed (if this world ever really existed). However, there seems to be an increasing influence of patients on the decisions finally made in medical encounters. Providing care with respect for patients’ values, preferences, and expressed needs is one of the quality criteria of the IOM, and there is an increasing attention to shared decision-making. How does this influence patterns of medical practice variation? This is a rather new question in the field and relevant to get a better understanding of the behavioral mechanisms. There are no clear theoretically derived hypotheses, although it has been suggested that shared decision making reduces practice variation (Greer et al. 2002). Empirical data suggesting a decrease of practice variation is lacking.

It can be argued that it is useful to take patients as (co-)decision makers into account. This moves the existing theory on medical practice variation that takes physicians as the only decision makers towards a boundary case. The boundary at the other side is the patient as the sole decision maker, e.g., in commercial cosmetic surgery when patients choose the clinics that are willing to do what they want (although some people would argue that these patients have been lured into this by clever advertising). This would bring us to a continuum of decision-making (Fig. 2).

In line with our theoretical model, the goal-oriented behavior of patients (as we did with physicians) should be modeled, and the circumstances that would determine the

position of a physician-patient interaction on this continuum should be explored. Furthermore, for the right side of the continuum (from shared decision-making onwards), rules of aggregation or transformation from the outcomes (decisions) of the interactions to medical practice variation have to be determined.

Empirical evidence shows the value of the theoretical model in explaining medical practice variations. The basic assumption was that physicians decide treatment. This was based on theories about professions, which put professionals at the center of the decision-making process. Professionals apply theoretical knowledge to complex individual problems. With increasing attention for shared decision-making, the assumption of physicians as the main actor in medical decision-making is challenged. The interaction between patients and doctors might generate practice variations when there is shared decision-making. Not only the clinical characteristics of the patients are than relevant for the medical decision, but also the preferences of these patients. Therefore, patients should be included in the model as actors. Until now the model dealt with physicians as actors. This should be modeled accordingly. Until now, the model dealt with physicians as actors. Physicians are assumed to be goal-oriented individuals. These goals are taken as given rather than their preferences for treatment. This was based on theories of people in general as goal-oriented individuals. Based on these theories, patients are expected to be goal-oriented individuals as well. In general, they strive for physical and social well-being. Health is part of physical well-being. Patients strive for recovery of their health but also for being informed about their prospects and for being listened to and reassured. Patients might also strive for a pay off associated with ill health, that is, the continued benefits of being ill (attention, not having to work, perhaps sickness benefits). Furthermore, in striving for well-being, direct and indirect costs of medical decisions are important. Patients can consider alternative use of their time and money. This will be the case particularly in elective or cosmetic surgery; time and money related to the surgery can be used otherwise.

In the patient-physician interaction, there is information asymmetry on both sides. Physicians have far more knowledge concerning medical treatment than patients, but physicians do not know the hidden pay-off agenda that may be due to patients who are ill.

Patients have several actions to choose from in the patient-physician interaction. They can delegate the authority to a physician, search for a physician based on their preferences for treatment, or search for information to make the medical decision together with a physician (shared decision-making). If they do not agree with the medical decision, the options are: they can negotiate with the physician, which is an alternative of the knowledgeable patient; they can find another physician if they are not satisfied; they can act as if they accept the decision but neglect the advice (Groenewegen 1997).

### **Delegate the Authority**

Lack of knowledge on the patient's side brings uncertainty about the relation between the medical decision and health. To cope with this uncertainty, patients delegate the authority to decide treatment to physicians. Therefore, physicians will be dominant in deciding treatment. If so, physicians are the central actors and, therefore, the described theoretical model will hold for variation in medical decisions. However, the information asymmetry between physicians and patients will not be the

same for all patients and under all circumstances. This might lead to group-specific practice variation, for example there might more practice variation for highly educated patients than for less-educated patients.

### **Select a Physician Based on Preferences for Treatment**

Moreover, under some circumstances patients will be able to select a physician based on their preference for certain treatment. This mechanism would also result in patterns of variation related to physicians, and thus will fit our existing model.

### **Shared Decision-Making**

A third option is shared decision-making. In these situations, patients decide about treatment with help from their physicians, or with shared decision-making tools, informing them about several options. This would help to bridge the knowledge gap between patients and providers and might result in different patterns of medical practice variation not related to physicians but, given the diagnosis, related to patients. Westert et al. (1991) tested whether there was a patient influence on length of stay in a hospital and concluded that modeling the patient as an actor in this decision was not useful. Still, there may be other medical decisions in which the patient should be modeled as an actor. Besides, the aforementioned study used data that are by now 25 years old.

### **Negotiate**

If patients do not agree with the medical decision proposed by a physician, they can negotiate in order to receive what they expect to have. The patient would then be dominant in deciding treatment. This is what Hirschman (1970) calls the option "voice."

### **Search for Another Physician**

Another option when a patient does not agree with the medical decision would be to search for another physician. This would be an exit option (Hirschman 1970) and would result in patterns of variation related to physicians. Therefore, it fits our existing model.

### **Neglect the Advice**

When patients are unable to negotiate a search for another physician but disagree with the medical decision, they can act as if they accept the decision but neglect the advice. This would result in variation in medical decisions related to physicians and therefore would fit our model. At the same time, it would result in variation in compliance related to patients, which is not yet included in the model.

### **Physician-Patient Interaction in the Model**

The physician-patient interaction was not yet included in the model. One issue to consider is under what circumstances the physician-patient interaction would not be dominated by the physician. Circumstances related to patients and circumstances related to the diagnosis will affect the interaction. A precondition for shared decision-making is that there is opportunity for different decisions; there should be several

options for treatment that all are considered appropriate. Another precondition is time. There should be opportunity to gain information before deciding over treatment. This means that in acute situations patients will tend to leave decisions to their physician. Medical decisions for which the benefit/harm ratios are scientifically uncertain or sensitive to patients' values on benefits versus harms give opportunity for different decisions. Examples at this time include treatments for abnormal uterine bleeding, benign prostate enlargement, chronic back pain, and early-stage breast or prostate cancers (O'Connor et al. 2004).

In making decisions, the mechanisms that influence patients might not be very different from the mechanisms influencing physicians.

As mentioned before, both physicians and patients are expected to be goal-oriented actors, striving for physical and social well-being. Like physicians, patients will have to explain when deviating from certain norms. For physicians, it was expected that norms within their working environment are important. For patients, norms within their social environment, family, and friends will be important. This is the meso level in the model (Fig. 3). These norms can be related to delegating the authority of deciding over treatment to physicians, as well as to the medical treatment one should receive. Patients can differ in their preferences and their means (for example, financial situation, knowledge, and health literacy) to reach goals.

At the macro level, physicians as well as patients are subject to influences from the structure and institutions of the health care system (Fig. 3). The mechanisms at the macro level are the regulative, the normative, and the cultural-cognitive mechanism (Scott 2001). These mechanisms influence the physician-patient interaction at the micro level by the extent to which there is room for different options and by the extent to which the physician-patient interaction is embedded in an existing relationship. Patients who are on the patient list of a specific physician have different options from patients who can shop around. Patients who are tied to a physician have the option of negotiating or the option of non-compliance. Patients who are not tied to a physician can negotiate, or go to another physician. Differences in patients' views on the authority of physicians exist between countries and according to patient characteristics, such as age or religion. Cultural cognitive definitions of health change over time; the shift from supply-oriented systems towards demand-oriented systems with the introduction of market elements changes (part of) health care in relation to product that can be bought.

[FIGURE 3]

## CONCLUSION

In this chapter, a sociological model that can be used for explaining medical practice variations was proposed. The starting point is that the nature of medical practice makes variation between physicians possible. In applying their clinical knowledge, physicians may demonstrate professional uncertainty as to optimal treatment. The interesting phenomenon is that medical practice variation tends to cluster within units and differ among units. In trying to explain these patterns of variation, the importance of constraints and institutional mechanisms was shown and time trends and the influence of the physician-patient interaction were elaborated upon.

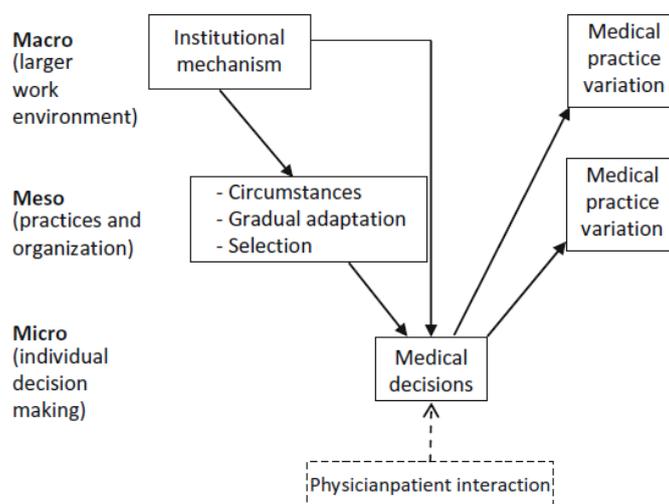
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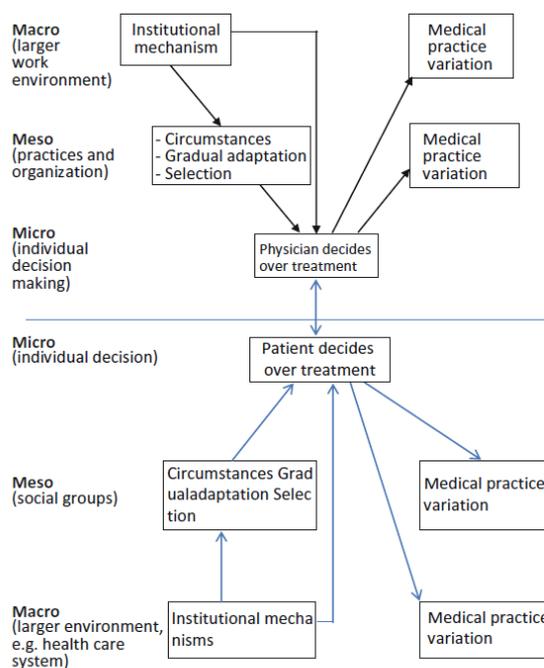
**FIGURES**



**Fig. 1** Theoretical model for the explanation of medical practice variation



**Fig. 2** A continuum of decision-making



**Fig. 3** Theoretical model for the explanation of medical practice variation, including the physician-patient interaction