

Paper for the 2th International Conference on Path Dependence in Berlin

-Impossible to prevent the worst?-

Path dependent professional medical routines and their
contribution to relative inefficient diabetic care in Germany

"The routineer's road is a ditch out of which he cannot get, whose sides enclose him, directing his course so thoroughly that he no longer thinks of his path or his destination. "
(Dewey 1922, p.121)

Abstract

This paper focuses on practices of physicians, whose are involved into the ambulant diabetic care in Germany. For a high quality of diabetic care is a sensitizing monitoring and successful secondary prevention important. This quality can be negatively influenced by less individualizing treatment routines and can be measured by the occurrence of long-term-consequences-diagnoses (e.g. eye-diseases, kidney failure, neurological problems etc.). Involvement of Disease Management Programs (DMP's) into the daily medical practice can improve the quality.

First, this paper develops a conceptual framework with respect to the work of John Dewey and Donald Schön in order to analyze how professional habits can become routine habits, under certain conditions. This process can be described by the theory of path dependence.

Second, an empirical analyze is done with a retrospective longitudinal data set including patient consultation data from 2002 up to 2009. The usage of DMP's is regulated by law not until 2002 in Germany.

Conditions of self-reinforcing and therefore inflexible routines are determined through the frequency of DMP-Patients within a practice and if the physician is further educated in terms of diabetology. The results show that in general practices it is possible to diagnose the "worst" earlier, but not really to prevent.

Content

Abstract.....	2
1. Introduction	3
2. Theoretical Framework.....	5
2.1 Routine	5
2.2 Medical profession	8
2.3 The concept of the reflective practitioner.....	9
2.4 Professional medical routines and their path dependence	13
2.5 Hypotheses.....	19
3. Empirical Data, Methods and Results.....	21
3.1 Data.....	21
3.2 Methods.....	22
3.3 Results.....	23
4. Conclusion	31
5. Reference.....	34

1. Introduction

A 'routinely working doctor' is a phenomenon considered desirable by most people. This concept promises security and hope for the rapid improvement of existing diseases. On closer inspection, however, the term 'professional medical routine' may appear to be a paradox. Actually, the professional doctor distinguishes himself from members of other occupations, because his decisions take place in insecure, unstable, unique and normative contexts (Schön 1983, Kinsella 2009), and his daily work has little to do with behavior patterns with recurring character. Medical action should therefore be characterized by extremely deep reflection and adaptation to environmental changes and not by routines, which have a tendency towards persistence.

For diabetic care it is very important to receive a high quality of secondary prevention. That means the prevention or the postponement of long-term-consequences (e.g. kidney damage, eye disease, neuropathy etc.) after a patient's first diagnose of Diabetes Type 2 (T2D). There is some evidence to assume a relative inefficiency regarding this quality, because of low outcomes within the actually modern German health system (Euro Consumer Diabetics Index 2008).

This study focuses on *routines of physicians*, whose are involved into the ambulant diabetic care in Germany. Treatment of T2D-patients starts usually in a practice of a General Practitioner (GP). In addition there exist approx. 1100-1200 practices specia-

lized in diabetology [“Schwerpunktpraxis”] (Häussler et al. 2010, S. 24, Siegel 2009, S.24). Practices of GP’s and T2D-experts work under different financial and institutional conditions. These differences imply some important aspects for an individualizing medical treatment of T2D-patients. This kind of treatment is observable by Disease Management Programs (DMP’s). These are management instruments for a more systematical treatment including e.g. standards for regularly inquiries or memory systems.

First, this paper develops a conceptual framework with respect to the work of John Dewey and Donald Schön in order to clarify the terms and *definitions of ‘routines’*. In addition, the path dependence theory adds the process-related perspective in order to analyze how professional habits can become routine habits under certain conditions. The *process of path dependency* is driven by certain self-reinforcing mechanisms. For the question of interest here, in terms of processes that lead to medical professional routines are the *learning effects* particularly relevant.

Second, the empirical approach for this research is a *multi-method-mix* including a large retrospective data set from practices and their interactions with patients and qualitative interviews with physicians. Using this consultation data from the “IMS Disease Analyzer”¹ from a period of 7 years (1/2002-10/2009)² it will be analyzed the context- influence on diagnosis event of long-term consequences (LC) from T2D.

Applying a Kaplan Meier Curve we tested for direct effects of DMP’s. Moreover, by pooling patients by the practice, we tested for indirect effects of DMP’s on patient outcomes due to physician learning using a logistic regression. In doing so practices were grouped depending on the diabetological education of the physicians. This paper is focused mainly on the quantitative results, although inspiration for interpreting the results emerges from first interviews with physicians.

¹ IMS Health is a Company, that collects and works with data from medical practices in Germany. The product is the for german conditions representative data set “Disease Analyzer” (Becher et al. 2009)

² In 2002 the possibility for using DMP’s was implemented by law

2. Theoretical Framework

Situations in professional practice are characterized by uncertainty, instability, uniqueness and value conflict (Kinsella, 2009, p.6). This fact is the reason for the dominant position of professionals in working life: special knowledge is necessary to handle such ambiguous situations.

Therefore, the term 'professional routine' appears paradoxical because of versatile and incomparable situations. This should actually not create routines or regularly recurring patterns of behavior. Medical professionals certainly should not practice routines, which lead to an inability to change, with resulting dysfunctions.

In order to essay a theoretical framing for this paradox, therefore, central terms will be defined in this section.

2.1 Routine

The phenomenon of 'routine' is a concept often described and debated in organization research. Routines are regular and recurring patterns of activities, actions, behaviors or interactions from recurrence (Becker, 2004, p.644). Routines are structured as patterns of behavior or cognitive mapping rules. The latter are handled in a rather theoretical way in the literature because they are difficult to observe. Empirical studies are therefore more likely to define routines as a pattern of behavior (Becker, 2004, p.664).

While the literature is largely in consensus about routine features such as pattern, repetition and collectivity, little agreement exists on the question of reflection when someone carries out routines (Becker 2004, p. 648). Some emphasize the "mindlessness" of organizational routines (especially in the classical version of March and Simon 1958, but also Nelson 1995, Dosi et al. 2000); others highlight the fact that reflecting players have a choice in their actions (Feldman 2000, 2003, Orlikowski 2002). It is of central importance for the way forward here whether actors' mindfulness and perception of their behavior patterns can be attributed to routine or not. Only then can we decide how routines emerge, sometimes to be maintained and at other times to change.

Cohen proposes answering the question of 'mindfulness' routines using the work of philosopher John Dewey and his conceptualization of behaviour as influenced primarily by habits. Dewey distinguishes between his concept of routines, habit and 'routine habit', also referred to as 'dead habit'.

"He uses 'habit' for the dispositions and skills of individuals and for their resulting actions." (Cohen 2007, p. 779).

A 'habit' is the precondition to certain acts. In the case of an acting doctor, for example, professional socialization during training and the first years of work is the crucial time to develop habits. These habits are the result of profound reflection and reflective exercise in which both cognitive and emotional elements of importance are:

"As we endlessly repeat this cycle of emotionally engaged perception and activity, periodically interrupted by breakdowns and cognitively intense repair work, it generates a vast repertoire of reasonably effective - and mutually coherent - habits." (Cohen 2007, p. 777).

Habits are crucial to the capacity to act. Without them, decisions would be very expensive because the scope of possibilities would be too large. They are a framework that still includes much scope:

"They [the habits, AR] are blinders that confine the eye of mind to the road ahead" (Dewey 1922, p.121).

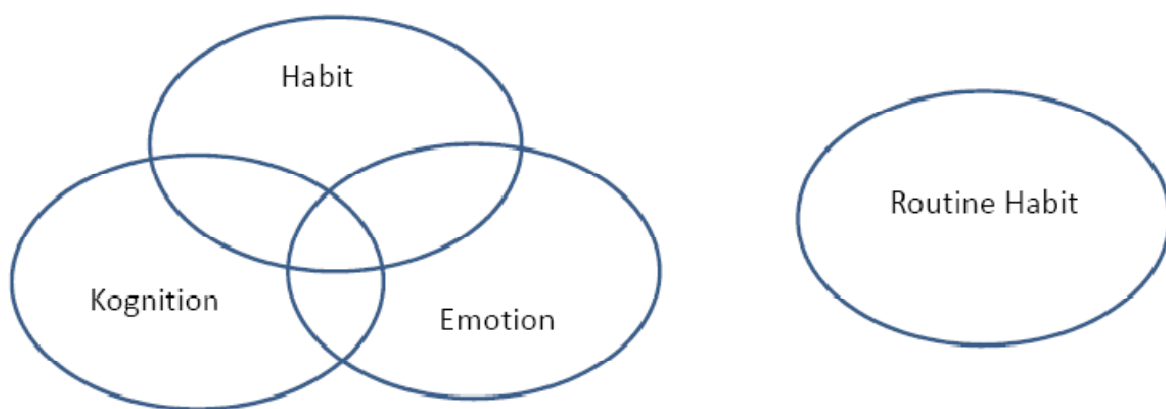
The actors are aware of the limitations of this framework of habits.

They are regularly adjusted by cognitive decisions and can therefore be considered to be very dynamic. Thus, for instance, a doctor may give two patients with the same disease different recommendations or regulations. In the case of diabetes, this could be a matter of wavering pharmacological intervention, because patients vary in their capacity for self-management. That is, while in one case a patient is very sensitive to professional empowerment and this patient does not need medication at an early stage, in another case supplementary early treatment by medication is the method of choice. It is not possible to learn formally to grasp this distinction. Cognition and emotion play a decisive role in the interaction with the patient.

It is only when the actor no longer reflects on this framing and habits are not regularly adapted to current environmental conditions that habits become routines.

According to Dewey, routines or 'routine habits' are not reflected, and thus very resistant to change (see Figure 1).

"Dewey uses 'routine habit' or 'routine' for the (often pathological) case in which thought and feeling are missing from action." (Cohen 2007,p.779).



Deweys View (Cohen 2007, S. 776)

Figure 1: Dewey's view: Habits and routine habits (Cohen, 2007, p.776, modified A.R.)

These routines or 'dead habits' lose momentum and adaptability to new, changing conditions. This is not necessarily synonymous with a dysfunctional outcome. Some activities are not subject to permanent environmental change. Dewey is comparing the activity of a violinist with that of an engraver. Habits are attributed to both, to the violinist an intelligent, to the engraver a 'routine habit' (see Dewey 1922, p.51).

The medical profession has a specific expertise, which cannot be applied directly to patients. As an example: knowledge of symptoms associated with diabetes mellitus generally is without reference to a specific patient. If an expert applies his knowledge practically, he must close a gap, "... that can only be closed by a clientele-based act of interpretation." (Vogd 2004, p.26, and after Oevermann Stichweh).

For the medical profession in interaction with the patient, the art lies in regularly adapting the habits of treatment (expert knowledge as tacit knowledge learned) to individual patients through reflection.

2.2 Medical profession

Doctors belong to a special occupational category - a profession.

The possibility of a basic autonomy of decisions is important for medical treatment processes. Freidson has described this with his definition of 'professionalism' as follows: "..., professionalism is a set of institutions which permit the members of an occupation to make a living while controlling their own work" (Freidson 2001, p. 17).

To provide and maintain control of their decisions it is necessary to form a demarcation line and a formal structure of their own. The traditional form of professional organization is the professional community as a community, similar to the guilds (Adler et al. 2008, p.361). The medical profession thus builds its own social structure, which possesses some characteristics of an organization. In the *organization of the professional community of medicine* there are an identifiable number of members, and there is a boundary between internal and external relations and general standards of behaviour.

The professional medical community as an organization provides the foundation for the development of habits by its individual members in Dewey's sense. The foundation for habits of professional practice is laid by medical education, which is regulated by the profession itself in Germany – based on a legal foundation. The framework to professional habits is determined for organization members through formal instruments of control and standard setting. Thus, on the collective level, recurrent patterns of action are found. Dewey defines habits on the collective level as 'a custom' (see Cohen 2007, p. 779). For this reason *professional habits are organizational practices* such as "... historic, collective, perceived and lived patterns of action, the formal and informal elements, and explicit and implicit components and cover ..." (Geiger / Koch, 2008, p.701). These practices are distinguishable from other actions (such as nursing activities). They are produced and maintained within the established community of practice of the professional organization.

2.3 The concept of the reflective practitioner

The reflecting, experienced doctor has gained his ability to cope with his daily practice by completing most varied situations with a certain number of medical- biologically similar cases. In this way he learns a "... repertoire of expectations, images, and techniques." (Schön 1983, p.60). He learns what he must ask or look for and how he must respond.

Schön called the knowledge base of his daily practical operations '*knowing in action*'. This is a kind of practical operation, which may be characterized as "... intelligent practice as an *application* of knowledge to instrumental decisions ..." (Schön 1983, p. 50). 'Instrumental' here is meant as an operationalization of knowledge in a decision to act. Knowing-in-action is - as a practical heuristic - "... aside the model of technical rationality ..." (ibid.) and is therefore not the same as instrumental problem-solving. 'Knowing-in-action' means that thought is no longer required during the action. It is spontaneous and simply accomplished without a mindful description of the motivation or a justification. It is similar to "tacit knowing", described by Polanyi (1967).

The ability for self-directed learning requires a realistic 'self-assessment', the ability of a professional actor to estimate his own strengths and weaknesses (Kevin/Regehr, 2005, p. S46). Self-assessment is defined as "... the involvement of learners in judging whether or not learner-identified standards has been met." (Ibid.).

The realistic assessment of one's *weaknesses* through self-assessment enables the professional to realise the scope of his own limited competence, thus enabling the setting of appropriate learning goals and deciding what is outside of his own competence, so it must be delegated.

The realistic assessment of one's own *strengths* creates adequate self-confidence, so that the professional can act without hesitation sometimes in spite of negative feedback. This can also set learning goals, which go beyond what is already known.

To sum up, realistic self-assessment creates a balance in daily practice between trust and care, persistence and flexibility, experimentation and safety, and independence and cooperation (Kevin / Regehr 2005 p.S47). A balance which is very important to

medical practice, given the variety of ambiguous situations and uncertain decisions to be taken daily.

This balance is the *art of making a reflective practitioner*. Schön defines reflected practice "... as a critical assessment of one's own behavior as a means towards developing one's own abilities in the workplace, and as a dialectical process in which thought and action are integrally linked." (Kinsella, 2009, p .7).

In this definition, the strong focus on Dewey's notion of 'habit' is clear. Reflective practice can be imagined as dynamic, versatile and adaptable.

Reflective practice may occur in two variations: first, as reflection-in-action and second, as reflection-on-action. They are distinguishable from another in relation to their temporal appearance. While reflection-in-action happens during the action, reflection-on-action is executed after the action.

'Reflection-in-action' is distinct from the mode of 'knowing-in-action' due to a conscious reflection on the necessary action decision in the sense of "... think[ing] about doing something while doing it."(Schön 1983, p. 54). For example, improvisation is possible through reflection-in-action.

'Reflection-on-action' (ibid, p.278) draws conclusions for future action decisions after the completed actions have been made. This is similar to the approach of Hannah Arendt, of "... stop-and-think ..." (1981).

Professional practice consists of actions in different situations. Nevertheless, action has a professional "... element of repetition ..." (Schön 1983, p.60).

These repetitions are to be expected, especially if the professional practitioners have experience of a high number of years within the profession. But this is a danger in terms of self-related assessment:

"Much reflection-in-action hinges on the experience of surprise. When intuitive, spontaneous performance yields nothing more than the results expected for it, *we tend not to think about* it. But when intuitive performance leads to surprises, pleasing and promising or unwanted, we may respond by reflecting-in-action." (Ibid, p. 56, emphasis AR).

Up to a certain point, increased security through 'knowing-in-action' provides advantages for the client (ibid, p.60), but a highly automated action can result in a dangerous specialization, because opportunities can be missed:

Further, as a practice becomes more repetitive and routine, and as knowing-in-practice becomes increasingly tacitly spontaneous, the practitioner may miss important opportunities to think about what he is doing. [...] When this happens, the *practitioner has 'overlearned' what he knows.*" (Ibid, p. 61, emphasis A.R.).

The state of 'overlearning' can arise from 'knowing-in-action'. Relying on Dewey's concept of 'habit' (the dynamic, reflective state) vs. 'routine habit' (the stable, unreflective state), the term routine is only used in the following in Dewey's sense. More specifically: professional medical routines describe such action decisions that are influenced by 'overlearning'. Decisions in the context of 'knowing-in-action' are more dynamic habits, variable through reflective practice.

The corrective for the state of 'overlearning' is a self-assessment concerning realistic balances of strengths and weaknesses of the professional actor. This self-assessment is reflective practice through reflecting-in-action and reflecting-on-action. But it is hindered if the automatic process of knowing-in-action only includes minor surprises or the professional has not perceived these changing circumstances at all.

A professional actor's ability for self-assessment can be determined by limited conditions.

First of all, reflective practice is expected to be limited, if the process of knowing-in-action proceeds without undisturbed, unexpected results.

Further, Schön argues with a limitation of reflection by unilateral control. That means an *interaction with a strategic partner, who stays uninvolved*. Under certain conditions, the professional actor does not reflect "... on the role frame, problem setting, or theory of action which lead him to try to create one impression, rather than another." (Schön 1983, p. 228).

Schön refers to Chris Argyris and his (1978) developed model of the single-loop learning (model I), in which the same strategies are applied repeatedly without fun-

damental change in the main program of the organization. In this way, desirable but not permanent results are achieved, and there is only short-term gratification. The professional actor in his single-loop produces a "... behavioural world in which each withheld negative information, tested assumption privately, and sought to maintain unilateral control over the other. [...], and it would also have called for a degree of trust is unlikely within a *behavioral model I world*." (ibid, p. 230, emphasis AR).

The professional's low expectations of the outcomes and his tendency to unilateral control represent restrictions of reflective practice. These limitations are complementary. If the interaction partner, the 'patient', is reflected only slightly in any decisions, the behaviour of the patient will offer only few surprises for the professional. Or to put it another way: If the patient's behaviour is not the subject of the professional's knowing-in-action, it is not covered by his reflective practice.

How can this limitation of reflected practice emerge?

The learning process of a professional actor in his daily medical process goes through various stages. While the basis is laid through the community of practice at the beginning of the process, and all new cases occur for the first time for him, after several working years the perception of the repetition of similar cases increases.

The doctor is a specialist in the cases that repeat most often because his knowing-in-practice has been practised here in particular:

"His knowing-in-practice tends to become tacit increasingly, spontaneous, and automatic, thereby conferring upon him and his clients the benefits of specialization" (Schön 1983, p. 60).

This specialisation contains possibilities, but also risks. Through repetition over a long period, capability reduces flexibility (or self-assessment), because the professional actor experiences fewer surprises. This is because new things to be learned are always based on things we have learned already (Ackermann 2001, p. 146).

The process-oriented concept of path dependence describes the conditions, under which learning effects and adaptive expectations can restrict the reflectivity of professional actors.

Referring to the theory of path dependence in the next section, I will shed light on the theoretical conditions under which professional medical routines occur and are maintained.

2.4 Professional medical routines and their path dependence

According to Dewey's perspective, *habits* have a very *dynamic character*. Habits of thought and emotion are generated from the interaction of new patterns of action decisions.

Professional medical practices are based on theoretical knowledge of medical education and the individual physician in the performance of medical tasks, as well as work experience to describe his increasing experience. In the course of this growing experience, the framework of the prescribed social practice of the professional community will be adapted to the individual social context of the individual physician and changed along with it. This adjustment is only possible if the doctor reflects on the existing framework - that is, so that he may also think beyond set limits.

The medical profession, like no other occupation, is marked by its *self-regulatory nature*, which indeed determines every profession. In medicine, this has a special meaning (Kevin / Regehr, p. S52). At the level of the individual physician, the self-regulating nature can be observed through his typical self-directed learning. Despite the existing commitment of individual actors to the medical community-of-practice, medical procedure decisions (to a higher degree than is usual in other professions) are made decoupled from each other: "... the notion that one could advance far beyond one's current level of ability without feedback from others who themselves maintain expertise is somewhat foreign in other domains." (Kevin / Regehr, 2005, p. S50).

After these preliminary remarks, the *medical professional routine* can now be defined as the possible occurrence of professional habits, which are produced and reproduced within the community-of-practice as a social practice. The social practice of professional practice is located on the collective level as "... habitual patterns of behaviour [that] did embody useful knowledge" (Langlois / Savage 2001, p.152).

The professional medical routine shows up when changing conditions – such as heterogeneous patients or over time, in a changing disease spectrum – do not lead to reflection on the currently used practices or social practices by the individual professional actors, but are decided in the sense of "... instrumental problem solvers ..." (Schön 1983, p. 21).

'Instrumental problem-solving' is routine action by which decisions will be taken from the pool of existing scientific theory and techniques (ibid.). It is a hierarchy of the professional knowledge base, within which the "... general principles 'occupy the highest level and, concrete problem solving' the lowest." (Ibid p.24).

The general principles of medical science are historically focused on disease types, whereby biological processes (such as infections) play a dominant role in treatment decisions. The behaviour of the patients in case of pharmacological treatment is significant only if the patient refuses medication or does not take it reliably. As a direct and only therapeutic measure, within medical science guiding the behaviour of the patients is not situated on the top level of professional medical action, but tends to be on the lowest hierarchical level of concrete problem solving.

The medical professional routine as instrumental problem solving can be developed in the individual social context of professional actors. On the one hand, this social context includes a specific doctor's office, but also the whole community-of-practice and its institutions (e.g. the physicians' association, health insurance, the family physicians' association, etc.). That's why routine building and sustaining factors must not only be sought at the organizational level of the doctor's office, but also on the collective level of the professional community.

There are two possible states of professional medical practice:

- Professional habits with dynamic features and reflected
- Professional routines with adjustment resistant characteristics and unreflective

The process-oriented path dependence theory (see, David 1995, Arthur, 1989, Pierson 2004, Sydow et al. 2009) seems an appropriate framework within which to analyze the transition-process from the state of habit into the state of routine habit among medical professionals.

To sum up, processes that lead to path dependence can be defined "... as processes of a diminishing scope of action that unintentionally develop their own pull and are driven by positive feedback." (Sydow et al. 2009, p. 698). At the beginning of the path dependent process, it is not yet clear whether and when the properties' ability to change will decrease: "The dynamic eventually flips over into rigidity." (Ibid.).

Two important features of path-dependent processes can be defined as follows:

1. Several outcomes are possible
2. The result is produced by the temporal evolution of the process (Ackermann 2001, p. 11)

The transition from professional habits to professional routines is a process that depends on random aspects of the social context in the course of an individual professional's temporal development in dealing with his clients.

As a key concept in Path Dependence Research, self-reinforcing processes are viewed as drivers into rigidity. Their effectiveness is subject to different logics.

Within organizations, the following types of mechanism may be experienced: coordination effects, complementarities, learning effects and adaptive expectations (Sydow, 2009, p.700). These mechanisms all have one characteristic in common: they are received and reinforced by positive feedback. For the question of interest here, processes that lead to medical professional routines are particularly relevant - *learning effects and adaptive expectations*.

Learning effects may arise when acts are performed more frequently and more repetitions increase the capability of the actor. The positive feedback occurs when "... the more often an operation is performed, the more efficiency will be gained with subsequent iterations." The drive to search for new alternatives can be suppressed by well-established practices. If such practices are legitimized and rewarded through the organization, organizational paths can lead to similar practices (ibid.)

Adaptive expectations as self-reinforcing mechanisms will "... relate [s] to the interactive building of preferences." (Ibid). These mechanisms play a significant role in the phenomenon of self-fulfilling prophecy. This is based on the fact that, in the selection of their choices, players include the expectations of interaction partners.

Professional medical routines can be characterized as instrumental problem solving. These routines are relevant to general scientific principles and based less on specific problems with individual patients. They are results from knowing-in action- processes, which are free from surprises and lead to more frequent perception of repetition of similar cases, the state of 'overlearning' (Schön 1983, p. 61). Thus, they are the result of a self-reinforcing process and include a potential dysfunctionality, because the adaptation and reflectivity of the professional actors is reduced.

The basis for medical action decisions is established at the level of community-of-practice as a 'habit', first in the individual social context through reflection-in-action and reflection-on-action to the special requirements of the heterogeneous cases. The more often similarly perceived cases occur, the less surprising is the everyday activity as experienced by the physician and the more this 'knowing-in-action' remains increasingly unreflective.

The theory of path dependence describes this reinforcing mechanism as a *learning effect* (see 2.4) and Donald Schön describes it as 'overlearning' (see 2.3).

At the start of the doctor's professional socialization in training and during his first years of professional experience, a '*mental model*' is developed, which arises from the fact that new knowledge (for example, different patients) can only be interpreted in the context of existing knowledge (experiences with patient behaviour so far).

Mental models play a central and unique role in the representation of objects, in the status of relationships, event sequences, the classification of the environment, and the social and psychological actions of daily life (cf. Johnson-Laird 1983, p. 397).

The presence of *mental models* involves the risk of potential inefficiency because new rules can always be generated only within the capacity of existing rules: "It is vastly easier, to extend a familiar system than to introduce a structurally novel one." (Holland 1986, S .346). Actors sometimes stick firmly to false mental models, despite contrary evidence. As this happens, new rules of exception are created and constantly added to save the existing model. The reason for this retention is due to the often diffuse and difficult to interpret feedback in social contexts (see Ackermann 2001, p. 147).

The individual medical mental model is determined by the temporal evolution of the process, that is, the specific history of the patient consultations that occur. Depending on the ability of individual patients to implement the doctor's instructions, different results are possible in terms of the mental model. Either the professional actor develops and maintains a differentiated picture of the diabetic as such and therefore applies heterogeneous treatment strategies, or, with increasing experience, he perceives the behaviour of diabetic patients as similar.

In the first case, this can be defined as 'individualized treatment decisions' and in the second case as 'less-individualized treatment routines'.

Potentially insufficient paths, like mental models, can be activated by *triggers* (Sydow et Al. 2009, p.693). But triggers are not intentional acts. Such a trigger could be an *economic incentive* to the above-described mental model of the diabetic perceived as homogeneous.

If early prescription of medication comprises more benefit than a lengthy discussion about the patient's goals and preferences, crucial opportunities to empower the patient's self-management may be missed. Such a disincentive is conceivable because of the specific reimbursement structure in Germany, because the more patients are treated, the higher the income per physician in the quarter³.

Adaptive expectations in the course of interactions between physicians and patients can consider as a trigger as well. The historical grown dominant role of the medical profession characterise these expectations in terms of a tendency to a passive role of patients within the treatments (Schmöller 2008).

The main feature of the professional medical care routines in diabetics is a lack of reflection on heterogeneous patient behaviour (e.g. regarding ability and willingness to change their diet), that is, the use of *routines that are less individualizing*.

Summary: Less-individualizing treatment routines or the practice of instrumental problem solving may result from mental models developed by doctors, which are triggered by economic incentives.

³ The performance and contractual relationship in outpatient care is based upon an individual service billed (see Rosenbrock/Gerlinger 2006, p.143-144)

The less-individualized, little varying routines include inefficient strategies, that are an orientation towards a medical therapy instead secondary prevention. This leads to a rising proportion of diabetics who experience a long-term consequence very early.

This results in a treatment of other T2D patients with a focus on pharmaceutical rather than behavioural processes triggered by the physician behaviour corresponding to their adaptive expectations. This leads to a unilateral control of the treatment process by the physicians accompanied by a patient-willingness to their own passivity. Increasing experience in daily practice leads to decreasing surprises for the professional actor. This leads to a physician’s mental model of diabetics’ homogeneous behaviour in terms of their lack of capability for self-management.

This gives rise to further less-individualizing treatment routines. Increasing experience with many diabetic patients may lead to a “specialization” of doctors and thus to an ‘overlearning’ (Schön, 1983). The term “specialization” here should not suggest a degree of education of the physician, but the increasing experience with same kind of cases. (See Figure 2)

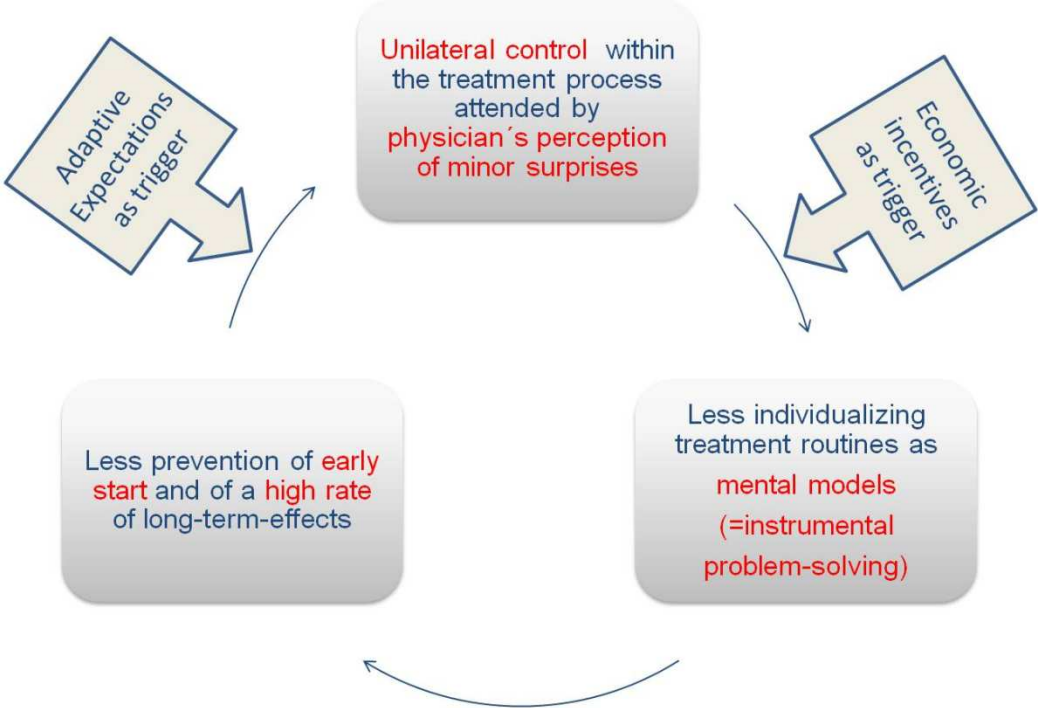


Figure 2 Conservation of less-individualized treatment routines by self-reinforcing processes

2.5 Hypotheses

Following a very simple definition are DMP's "...Programs that used a systematic approach to care and included more than 1 intervention component..." (Knight, S. 243). The German introduction of DMP's in 2002 intent to improve the quality and efficiency of health care (Amelung et al. 2008, S.259) especially with regard to typical widespread chronic diseases, e.g. Diabetes mellitus Type 2. With the usage of DMP's it is possible to encourage individualizing medical treatments, for example with standards for regularly inquiries or memory systems. Therefore it can be expected an improvement of secondary prevention after the first diagnosis of T2D. This should result in a postponement and/or reducing of LC's.

The translation of DMP's into practice depends on the one hand on the willingness of the T2D-patient, who is invited by his health insurance to participate. On the other hand the physician must agree to let the DMP happen.

These aspects are important here to observe:

- the occurrence of a LC-diagnosis
- the duration between the first T2D-diagnosis and a possible LC-diagnosis (= "episode")
- the usage of a DMP as operationalization of an individualizing treatment

These consideration leads to following hypotheses:

H1a: The more a DMP is used within the treatment of T2D-patients fewer cases of long-term-consequences emerge.

H1b: The more a DMP is used within the treatment of T2D-patients the longer the duration of episodes.

According to Schön a medical professional is vulnerable for the state of "overlearning" if his self-assessment through knowing-in-action is not continuous accompanied by unexpected results, such as a diabetic, who is engaged in his lifestyle-change. With a further education as a diabetologist maybe the physician is able to act with a double-loop learning that is a searching for interaction with the patient instead of unilateral control. Following hypotheses describes this:

H2a: The more the physicians are further educated fewer cases of long-term-consequences emerge.

H2b: The more the physicians are further educated the longer the duration of episodes.

Beside the mentioned aspects, physician learning depends also on the frequency of DMP-usage within a practice. With a high share of DMP-patients within a practice double-loop learning becomes stable and permanent. This should result in a negative probability for the occurrence of LC-diagnose. With Hypothesis 3 this assumption will be proofed.

H3: The higher the share of DMP-patients in a practice the less is the probability of long-term-consequences.

3. Empirical Data, Methods and Results

3.1 Data

A retrospective longitudinal study has been conducted using the representative IMS Disease Analyzer database. Practices were selected by a continuous observability of at least 8 years (Fig. 3). Patients diagnosed with T2D between 01/2002 and 10/2009 in Germany and whose data were continuously available for at least 12 months before and during a period of 7 years after first diagnosis were included (Fig. 3 & 4).

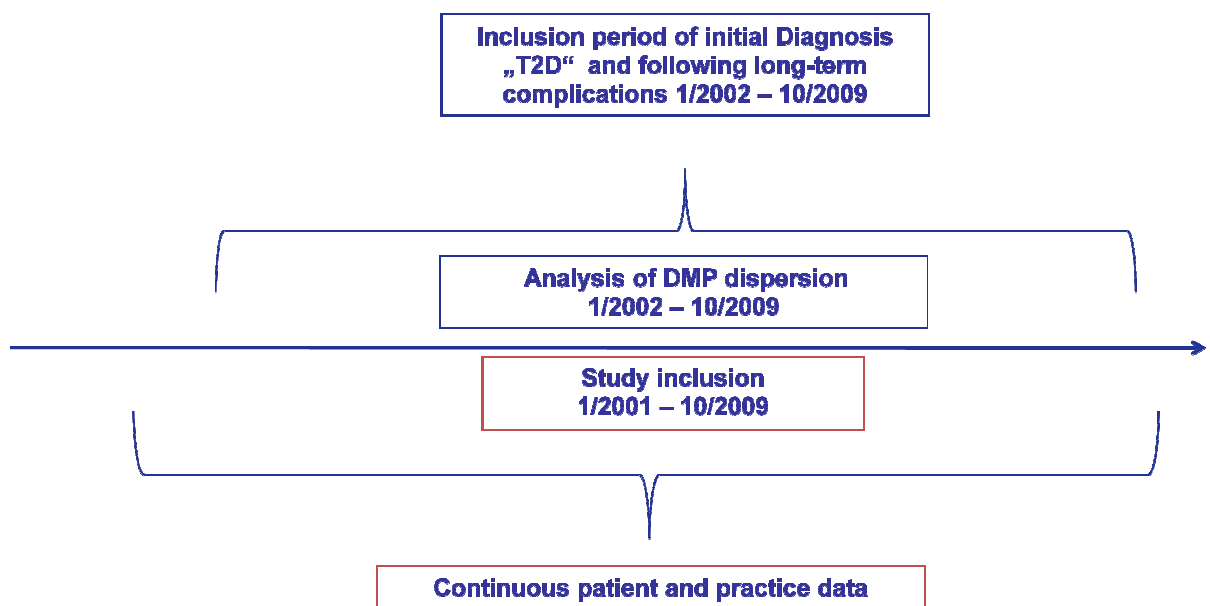


Figure 3: Study Design

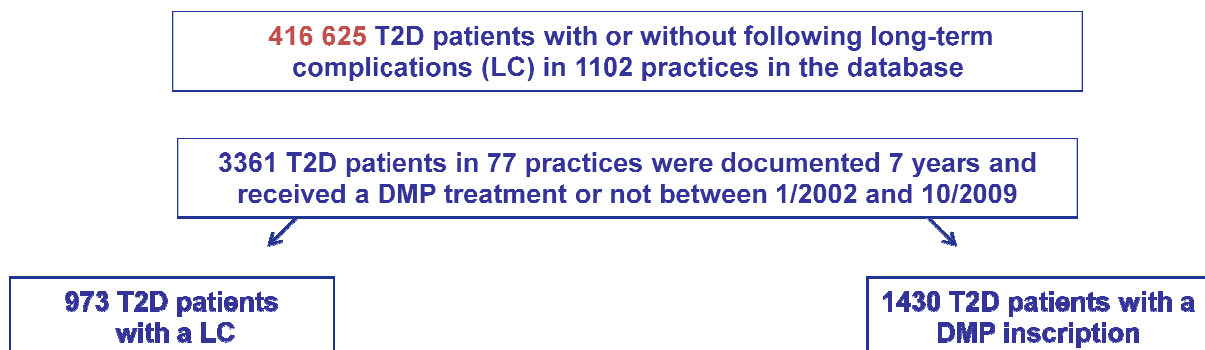


Figure 4: Patient selection

Demographic- and diabetes-related variables, clinical and laboratory parameters were determined. Patients were assigned to two groups regarding whether (DMP) or not (No-DMP) they inscribed into a Disease Management Programme. Practices were grouped depending on the diabetological education.

3.2 Methods

For answering to Hypotheses H1a it is necessary to look at the different dispersion of LC-diagnosis within the groups of T2d-patients with and without DMP-inscription. Similarly, for H2a the sample is divided into practice-groups according the further education of the physicians.

The dependent variable in Hypotheses H1b and H2b is a Variable of duration. That implies to use a Kaplan-Meier-Curve. A Kaplan-Meier-Estimator, also known as “Product Limit Estimator” estimates the survival function from life-time data (Allison 2007). That’s why it is often used in medical research, but increasingly in social science. Here it is labeled as “Event history modeling” (see e.g. Box-Steffensmeier/Jones 2007). An important advantage of the Kaplan–Meier curve is that the method can take into account some types of censored data, particularly right-censoring, which occurs if an observed patient not undergo the event. This way it is possible to integrate all T2D-patients and their “survival time” in the analysis. The “failure” or the event that occurs is the first diagnosis of a long-term-consequence (LC). The observation starts with the first diagnosis of the T2D. The dependent parameter is the time that is needed between start of the observation and the “failure”.

In a next step I will build a model including control variables from a patient and a practice perspective in order to analyze the probability of the occurrence of a LC-Diagnose (H3). A Logistic Regression is used, because it is “...an optimal method for the regression analysis of dichotomous (binary) dependent variables” (Allison 1999, S.5).

The data analysis was realized with the statistical program SAS 9.2.

3.3 Results

PATIENT LEVEL

Patients who inscribed into a DMP do not differ significantly from patients not inscribed in terms of sex and age. Patients with diagnosed with LC have a slightly higher HbA1C⁴ level than patient without complications, but do not differ regarding age and sex. Patients without LC have shorter duration of diabetes treatment hinting at a right censoring (Table 1a)

Table 1a: Baseline characteristics for T2D patients			
Variable	T2D	T2D/LC	T2D/DMP
Number of patients	3361 (100%)	973 (29%)	1430 (43%)
Male	1441 (49%)	491 (50%)	681 (48%)
Age in Years (Mean±SD) [Timepoint: Year of first Diagnosis]	63,9±12,9	64,6±11,03	64,2±10,6
HbA1C-Mean in % (Mean±SD)*	6,9±1,0	7,2±1,0 (vs.6,8±1,0 No-LC)	6,9±0,9
Diabetes duration in years (Mean±SD)	5,6±2,3	6,7±1,5 (vs.5,2±2,4 No-LC)	5,9±2,2
Duration till first LC in years (Mean±SD)		2,7±1,9	2,8±1,9
*HbA1C available for 2699 patients			

H1a: *The more a DMP is used within the treatment of T2D-patients fewer cases of long-term-consequences emerge.*

Within the whole sample of T2D-patients there are 29% of diabetics, whose have a LC within the observation-time of 7 years. In opposite to this number is the share of LC-patients within the DMP-sample considerable higher (43%). Because of this find-

⁴ "HbA1C" is a laboratory parameter and is an predictor for a successful treatment and has direct influence to the probability for a long-term consequence

ing H1a must be rejected. This finding is caused by a selection bias hinting the correlation between DMP-Inscriptions and specialized practices that are implemented for the treatment of diabetics with any complications.

H1b: *The more a DMP is used within the treatment of T2D-patients the longer the duration of episodes.*

Descriptive data shows a slightly longer duration of 0, 1 year between first diagnosis and first LC-diagnosis. H1b will not be rejected, but the Kaplan-Meier-Estimation will afford more clarification about the significance of this difference including the whole patient-sample.

PRACTICE LEVEL

Characteristics of doctors (Sex, age, work experience in a Hospital) are consistent for all patients independent of the patient status regarding DMP or LC. Although three-quarter of all T2D-Patients lives in small towns, these are only two-third, whose are involved in DMPs. This is caused by the country-town difference in terms of infrastructure.

Table 1b: Practice baseline characteristics			
Variable	T2D	T2D/LC	T2D/DMP
Patients, treated by male Doctors	2525 (75%)	665 (68%)	1009 (70,6%)
Doctors Age in years (Mean±SD)	55,4±7,3	55,2±7,2	55,3±7,9
Hospital Years (Mean±SD)	6,7±4,7	6,8±5,6	6,8±4,9
Patients, treated within Town size < 100 000 Inhabitants	2496 (74%)	632 (65%)	612 (63%)
Patients, treated by Doctors with no Further Education as a Diabetologist	2566 (76%)	632 (65%)	1074 (74%)
Share of DMP-Patients within practices in percent (Mean±SD)	43 % ± 29%	47% ± 27%	62% ±20%
Share of Patients within practices with LC in percent (Mean±SD)	29% ± 19%	41% ± 21%	32% ±19%

H2a: *The more the physicians are further educated fewer cases of long-term-consequences emerge.*

The number of patients, who are treated by doctors with further education, is generally low, but T2D patients with LC are treated in more specialized practices referring again to a selection bias (Table 1b).

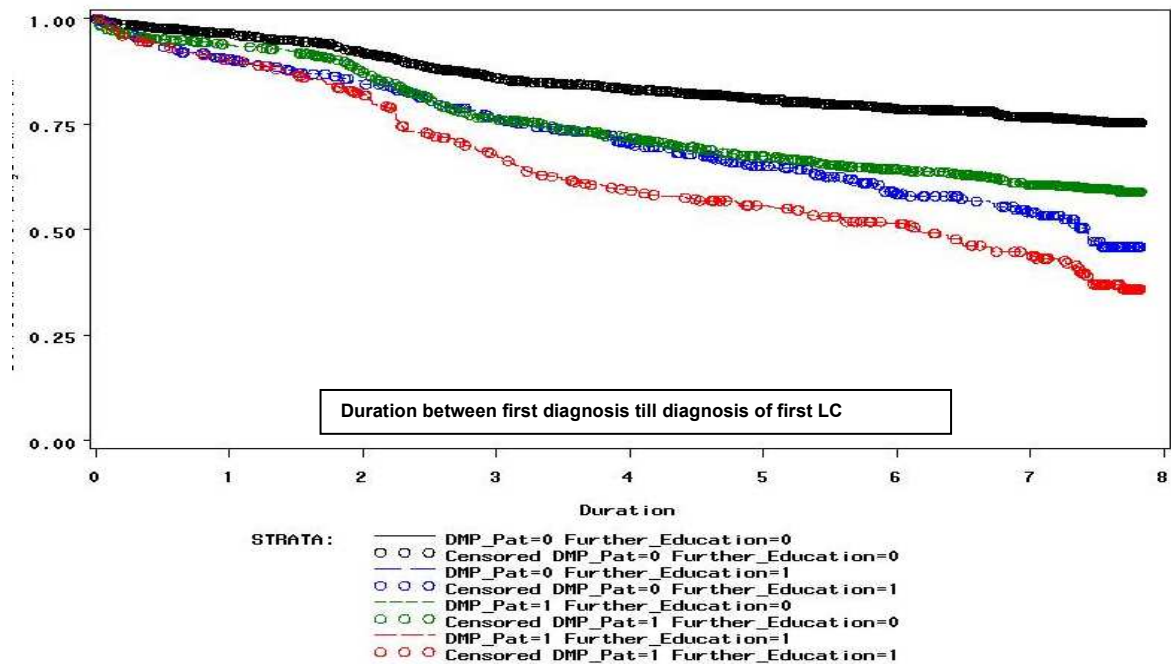


Figure 5: Kaplan Meier Curve with Strata (DMP-inscriptions/Further diabetological education)

H1b: *The more a DMP is used within the treatment of T2D-patients the longer the duration of episodes.*

H2b: *The more the physicians are further educated the longer the duration of episodes.*

Kaplan-Meier curves indicated that the DMP patients are diagnosed *earlier* with a LC than non-DMP patients, also further diabetological training of the physician leads to an earlier diagnosis of a LC (Fig. 5). These differences are significant and additive.

There is significance for a changed perspective based on previous findings:

→ Assuming that DMPs and diabetological education affect physician behavior by *improving the screening for LC* from T2D, it will be analyzed other effects influencing the diagnosis of a LC using a logistic regression with time dummies in order to answer to H3. However, H3 is changed now according the previous findings. Now,

the influence of DMP's on quality of diabetic care is assumed as a sensitizing concept for an improvement of the monitoring for long-term consequences.

H3: The higher the share of DMP-patients in a practice the higher is the probability of long-term-consequences-diagnosis.

Table 2: Variables of the Logistic Regression	Model I Coefficient (Odds Ratio)	Model II Coefficient (Odds Ratio)	Model III Coefficient (Odds Ratio)
Intercept	-5,86***	-5,96***	-5,54***
Patient_sex	-0,07 (0,93)	-0,09 (0,92)	-0,1 (0,91)
Age_DM	0,01 (1,01)**	0,01 (1,01)**	0,01 (1,01)**
Mean_HbA1C	0,30 (1,35)***	0,31 (1,37)***	0,31 (1,41)***
Doctor_Sex	0,39 (1,48)***	0,38 (1,46)***	0,38 (1,47)***
Doctor_Age	0,01 (1,01)	0,01 (1,01)	0,00 (1,01)
Hospital_years	0,00 (1,00)	0,00 (1,00)	0,01 (1,01)
Town_size	0,83 (2,30)***	0,77 (2,17)***	0,51 (1,67)***
Time_2003	-0,72 (0,49)***	-0,69 (0,50)***	-0,71 (0,49)***
Time_2004	-0,63 (0,53)***	-0,61 (0,54)***	-0,63 (0,53)***
Time_2005	-0,99 (0,37)***	-0,97 (0,38)***	-0,99 (0,37)***
Time_2006	-1,35 (0,26)***	-1,34 (0,26)***	-1,40 (0,25)***
Time_2007	-1,70 (0,18)***	-1,68 (0,19)***	-1,77 (0,17)***
Time_2008	-2,32 (0,09)***	-2,29 (0,10)***	-2,35 (0,09)***
Time_2009	-3,09 (0,05)***	-3,05 (0,05)***	-2,99 (0,05)***
DMP_Pat		0,40 (1,50)***	0,63 (1,50)***
Further Education			0,82 (2,27)***
Low_Share_DMP (=<10%)			0,36 (1,88) **
Med_Share_DMP (10%-43%)			0,29 (1,44)*
High_Share_DMP (43%-75%)			-0,14 (0,87)
DF	14	15	19

significance levels: *10% **5% ***1%

Nagelkerkes r^2	0,21	0,22	0,25
Likelihood-Ratio-Test	X=438,83***	X=458,57***	X=432,23***

Logistic regression analysis reveals that DMP inscription positively influences the occurrence of a LC diagnosis. All time dummies are significant with a stronger negative effect toward the end of the observation period, controlling for censoring effects. Patient characteristics such as age and HbA1C have a positive effect on the diagnosis event. Patient in larger cities are more likely to be diagnosed with a LC (Tab. 2, Model II).

Treatments by doctors with a further education as a diabetologist interact with a higher probability for a LC diagnosis (Tab. 2, Model III). Also, the share of DMP inscriptions within a practice positively influences the diagnosis screening for LC from T2D, which can be attributed to *physicians learning from DMPs*.

Learning from DMP procedures and the resulting improvement of LC screening seems to follow a 'non-linear' process as the first DMP inscriptions of patients in a practice have stronger effects on the improvement of complication screening in a practice than within practices with inscriptions beyond the average (Frenzel/Reuter 2010).

These findings imply an important difference between treatments within general and specialized practices. This inspires the development of new hypotheses asking for grouped influences:

H3a: The higher the share of DMP-patients in a practice without further educated physicians the higher is the probability of a long-term-consequences-diagnosis.

We have seen that a learning effect works within practices with a low and a medium share of DMP-patients. Patients, whose are treated by general physicians are expected to benefit from increasing DMP-Share because of a higher individualizing character of the treatment. That higher individualization leads to a sensitive monitoring and therefore an increasing of the probability for LC-diagnosis. Although the phy-

sicians are not specialized with regard to diabetology the patients benefit from increasing physician learning.

H3b: The higher the share of DMP-patients in a practice with further educated physicians the higher is the probability of a long-term-consequence-diagnosis. That influence is expected to be higher than in general practices.

Patients, whose interact with further educated physicians are expected to have LC's to a greater extend because of the mentioned selection bias. The Kaplan-Meier-curves shows an additive influence of the further education of the physician and the DMP-inscription of the patient on the occurrence of the event "LC-Diagnosis". These findings imply an increasing positive influence on LC's within specialized practices even on higher level than in a general practice.

Table 3: Variables of the Logistic Regression (Subgroups)	Model I GENERAL PRACTITIONER Coefficient (Odds Ratio)	Model II FURTHER EDUCATED PRACTITIONER Coefficient (Odds Ratio)
Cases of T2D-patients	2566 (used 2039)	795 (used 660)
Cases with LC	556 (27 %)	318 (48 %)
Intercept	-5,44 ***	-5,72***
Patient_sex	-0,15 (0,86)	0,22 (1,25)
Age_DM	0,02 (1,02)***	0,01 (1,01)
Mean_HbA1C	0,33 (1,39)***	0,60 (1,83)***
Doctor_Sex	-0,12 (0,89)	3,11 (22,4)***
Doctor_Age	0,00 (1,00)	0,05 (1,05)**
Hospital_years	0,04 (1,04)***	-0,03 (0,97)
Town_size	0,62 (1,86)***	-1,40 (0,25)***
Time_2003	-0,78 (0,46)***	-0,69 (0,5)**
Time_2004	-0,54 (0,58)***	-1,22 (0,30)***
Time_2005	-0,90 (0,41)***	-1,58 (0,20)***
Time_2006	-1,43 (0,24)***	-1,93 (0,15)***
Time_2007	-1,70 (0,18)***	-2,25 (0,11)***
Time_2008	-2,06 (0,13)***	-3,52 (0,03)***
Time_2009	-3,14 (0,04)***	-3,45 (0,03)***

Significance levels: *10% **5% ***1%

DMP_Pat	0,53 (1,70) ^{***}	0,70 (2,01) ^{***}
Low_Share_DMP (= <10%)	-0,06 (0,94)	-1,67 (0,19) ^{***}
Med_Share_DMP (10%-43%)	-0,31 (0,73)	-1,89 (0,15) ^{***}
High_Share_DMP (43%-75%)	-0,21 (0,81)	-2,82 (0,06) ^{***}
DF	18	18
Nagelkerkes r²	0,20	0,47
Likelihood-Ratio-Test	X ² = 308,57 ^{***}	X ² = 285,22 ^{***}

Grouped logistic regression shows on the patient level an analogical positive influence of the DMP-inscription to the occurrence of “LC-diagnosis”-event.

But, in specialized practices it is a slightly stronger impact than in general practices. Firstly, the learning effects in terms of increase of DMP-share within the general practices disappear; the influence is now not-significant. As a second surprising result, in second group (practices with further educated practitioner) the share of DMP-patients within a practice has a strong negative impact while the DMP-inscription on the individual level increases the probability of a LC-diagnosis.

Summary:

- The descriptive analyze (H1a, H1b, H2a, H2b) and the stratified Kaplan-Meier-Curve reveals results that call the quality criteria for medical treatment of T2D-patients into question. We must recognize that DMP-inscription of the patient and the further diabetological education of the physician account for a high level of LC-diagnosis and a short duration of an episode in opposite to the hypotheses (see Frenzel/Reuter 2010).
- In a next step the two-level-analyze (Patient-/Practice-level) with a logistic regression reveals a picture of learning physicians with an increasing DMP-patient contingent up to a certain degree.
- Dividing the practices into organisations with general and further educated practitioner the impact on LC-diagnosis must be separately evaluated:
 - in general practices the individual DMP-inscription is the own increasing influence on the occurrence of an LC-diagnosis

- in practices with further educated practitioner's the impact of DMP-inscription is also positive, but the LC-diagnosis are affected negatively by the DMP-Share on the organisational level (see table 4).

Table 4: Overview Hypotheses		
Hypothesis	Individual Level (Patient-View)	Organisational Level (Practice/Physician-View)
H 1a (DMP-Inscr. → fewer cases of LC)	rejected	---
H1b (DMP-Inscr. → longer duration of episode)	rejected	---
H2a (further education → fewer cases of LC)	---	rejected
H2b (further education → longer duration of episode)	---	rejected
H3 (changed) Share of DMP high → increasing prob. of a LC-diagnosis	accepted	partly accepted
H3a (new) Share of DMP <u>without</u> further education high → increasing prob. of a LC-diagnosis	accepted	rejected (n.s.)
H3b (new) Share of DMP <u>with</u> further education high → increasing prob. of a LC-diagnosis	accepted	rejected (negative influence)

4. Conclusion

This paper proposes a conceptual framework for professional practices that can develop, via the conditions of dynamic, versatile habits, into persistent and potentially relative inefficient routines in the course of a professional actor's individual development. The routinely working professional is no longer sufficiently able to reflect on the different requirements of the environment (e.g. the different distinctive competencies of patient self-management). His actions are set to a particular

patient type, which he experienced frequently within the early phase of his professional life.

Professional routines are the result of certain mental models such as instrumental problem-solving within a self-reinforcing process. The creation of professional routines is not clearly determined or predictable.

The reflecting professional actor can prevent this process with realistic self-assessment, that is, with the realistic assessment of his strengths and weaknesses. Because of his self-directed learning, however, this self-assessment can lead to a distorted perception of his abilities.

Moreover, the emergence of professional routines depends on the randomly occurring client types, their behaviour and signalled expectations. If a certain type dominates here, the number of surprises decreases in the professional's daily practice, and therefore his practice becomes less reflective. In terms of diabetic care self-directed learning is enhanced with physician's further education and a high share of DMP-patients.

This study shows the effect of T2D DMPs as instruments of managed care on care quality resulting in earlier diagnoses and treatments of long-term complications. Diabetic care is improved with regard to a sensitizing monitoring and therefore early detection of long-term complications.

Physicians in the whole analyzed sample learn to improve their screening for T2D complications by further education as well as by learning from treating their patient according to DMP guidelines.

Analyzing separated groups of practitioners (general vs. further educated) within general practices the learning effect disappears although the individual effect of DMP-inscriptions remains. By contrast: within diabetological specialized practices besides the mentioned individual effect the increasing experience with DMP-patients affects decreasing probability of long-term-consequence-diagnosis. This can be interpreted as an improved secondary prevention, because of added effects of individual DMP-inscriptions AND physicians further education.

The processes described are driven by triggers such as economic disincentives⁵ and existing institutionalized role expectations (role as physician and patient).

The perspective adopted here is a suggestion for path dependency research into the question of the conditions of emerging routines in daily practice. Further research must be focused on general practices, because of the missing learning effect in terms of increasing DMP-share. Furthermore, in most instances diabetics are treated in general practices than in diabetological.

Dewey's distinction between habits and routine habits ("dead habits") offers a concept whereby players reflect on their framework very strongly at first and then very little. The contribution of the concept of path dependence offers a detailed examination of the transition from one stage to another.

Furthermore, the approach proposed here can be used for medical treatment research on professional practice with diabetics, because few practical mechanisms have been analyzed here as yet. In this context, the examination of professional routines may explain the dysfunctional care situation in the case of this particular disease and could therefore help to discover and utilise previously wasted resources.

⁵ DMP-inscriptions leads to additional income for physicians

5. Reference

- Ackermann, R. (2001).** *Pfadabhängigkeit, Institutionen und Regelreform* (Vol. 120). Tübingen: Mohr Siebeck.
- Adler, P. S., Kwon, S.-W., & Heckscher, C. (2008).** Professional Work: The Emergence of Collaborative Community. *Organisation Science*, 19(2), 359–376.
- Allison, Paul D. (2007):** Survival analysis using SAS®. A practical guide. 10. print. Cary, NC: SAS Press.
- Allison, Paul David (2005):** Logistic regression using SAS®. Theory and application. 5. print. Cary, NC: SAS Inst.
- Amelung, Volker Eric; Bakarinow-Busse, Katja (Hg.) (2008):** Integrierte Versorgung und Medizinische Versorgungszentren. Von der Idee zur Umsetzung ; [mit Checklisten auf CD-ROM]/ Amelung ... Unter Mitw. von K. Bakarinow-Busse ... 2., aktualisierte und erw. Aufl. Berlin: Med.-Wiss. Verl.-Ges.
- Arendt, H. (1981).** *The Life of the Mind: thinking; Vols 1&2:* Harvest Books.
- Argyris, C., & Schon, D. A. (1978).** *Organizational Learning: A Theory of Action Perspective:* Addison Wesley Longman (Higher Education Division, Pear.
- Arthur, W. Brian (1989).** Competing technologies, increasing returns, and lock-in by historical events. *The Economic Journal*, 99(394), 116–131.
- Balint, E. (1993).** *The Doctor, the patient, and the group: Balint revisited.* London, New York: Routledge.
- Becker, M. C. (2004).** Organizational routines: a review of literature. *Industrial and Corporate Change*, 13(4), 643–677.
- Bloor, G., & Dawson, P. (1994).** Understanding Professional Culture in Organizational Context. *Organization Studies*, 15(2), 275–295.
- Cartwright, A. (1967).** *Patients and their doctors: A study of general practice.* London: Routledge K. Paul.
- Cebolla, B., & Björnberg, A. (2008).** *Euro Consumer Diabetes Index 2008 Report.* Retrieved January 05, 2010, from Health Consumer Powerhouse: <http://www.healthpowerhouse.com/files/edi-2008/2008-euro-diabetes-index-report.pdf>.
- Cohen, M. D. (2007).** Reading Dewey: Reflections on the Study of Routine. *Organization Studies*, 28, 773–786.
- David, P. A. (1985).** Clio and the economics of QWERTY. *American Economic Review*, 75(2), 332–337.
- Detournay, B., Cros, S., Charbonnel, B., Grimaldi, A., Liard, F., & Cogneau, J., et al. (2000).** Managing Type 2 Diabetes in France. *Diabetes & Metabolism*, 26, 363–369. Retrieved September 03, 2009, from <http://www.em-consulte.com/showarticlefile/79901/index.pdf>.
- Dewey, J. (1922).** *Human Nature and Conduct: An Introduction to Social Psychology.* New York: Holt.
- Dosi, G., Nelson, R. R., & Winter, S. G. (2000).** Introduction: the nature and dynamics of organisational capabilities. In G. Dosi (Ed.), *The nature and dynamics of organizational capabilities* (pp. 1–22). Oxford: Oxford Univ. Press.
- Kinsella, Elizabeth Anne (2010).** Professional knowledge and the epistemology of reflective practice. *Nursing Philosophy*, 11(1), 3–14, from <http://dx.doi.org/10.1111/j.1466-769X.2009.00428.x>.
- Feldman, M. S. (2000).** Organizational Routines as a Source of Continuous Change. *Organization Science*, 11(6), 611–629.
- Feldman, M. S. (2003).** A performative perspective on stability and change in organizational routines. *Ind Corp Change*, 12(4), 727–752.
- Freidson, E. (1980, 1961).** *Patients' views of medical practice: A study of subscribers to a prepaid medical plan in the Bronx.* Chicago: University of Chicago Press.
- Frenzel, Alexander; Reuter, Annette (7.11.2010):** Learning from Disease Management Programmes: How medical treatments and quality of diabetic care (type II) in Germany are directly and indirectly improved by DMPs. Poster Presentation at ISPOR

(International Society of Pharmacoeconomics and Outcome Research. Prague, 7.11.2010.

Goffman, E. (1961). *Encounters : two studies in the sociology of interaction* (8th ed.). Indianapolis [u.a.]: Bobbs-Merrill.

Hauner, H. (1997). Versorgungsqualität des Diabetes mellitus — Stand 1996. *Medizinische Klinik*, 92(1), 9–12. Retrieved September 03, 2009, from <http://www.springerlink.com/content/35324141tv804174/>.

Hauner, H., Ferber, L. von, & Köster, I. (1994). Ambulante Versorgung von Diabetikern: Eine Analyse von Krankenkassendaten der AOK Dortmund. *Deutsche Medizinische Wochenschrift*, 119(5), 129–134.

Hauner, H., Köster, I., & Ferber, L. von (2003). Ambulante Versorgung von Patienten mit Diabetes Mellitus im Jahr 2001. *Deutsche Medizinische Wochenschrift*, 128, 2638–2643.

Häussler, B., & Berger, U. (2004). *Bedingungen für effektive Disease-Management-Programme: Analyse, Bewertung und Lösungsansätze für Qualität und Finanzierung* (1. Aufl., Vol. 7). Baden-Baden: Nomos-Verl.-Ges.

Holland, J. H. (1986). *Induction: Processes of Inference, Learning and Discovery*: MIT Press Ltd.

Hüsing, B., Hartig, J., Bühlren, B., Reiß, T., & Gaisser, S. (Juni 2008). *Individualisierte Medizin und Gesundheitssystem*. Büro für Technikfolgen-Abschätzung Beim Deutschen Bundestag (Arbeitsbericht Nr. 126).

Johnson-Laird, P. (1983). *Mental models. towards a cognitive science of language, inference, and consciousness*. Cambridge: Cambridge University Press.

Jönsson, B. (2002). Revealing the cost of Type II diabetes in Europe. *Diabetologia*, 45, 5–12. Retrieved January 29, 2009.

Kevin W. Eva, & Regehr, G. (2005). Self-Assessment in the Health Professions: A Reformulation and Research Agenda. *Academic Medicine*, 80(10), S46- S54.

Klein, R., & Howlett, A. (1973). *Complaints against doctors: A study in professional accountability*. London: C. Knight.

Kevin Knight, M. MPhD; Enkhe Badamgarav, M. MPhD; James M. Henning, M. S.; Vic Hasselblad, PhD; Anacleto D. Gano, Jr MPH; Joshua J. Ofman, M. MSHSD; and Scott R. Weingarten, M. MPhD (2005): A Systematic Review of Diabetes Disease Management Programs. In: *The American Journal of Managed Care*, Jg. 11, H. 4, S. 242–250.

Köster, I., Hauner, H., & Ferber, L. von (2006). Heterogenität der Kosten bei Patienten mit Diabetes mellitus: Die KoDiM-Studie. *Deutsche medizinische Wochenschrift*, 131, 804–810. Retrieved July 01, 2009, from <http://www.thieme-connect.de/ejournals/pdf/dmw/doi/10.1055/s-2006-939850.pdf>.

Langlois, R. N., & Savage, D. A. (2001). Standards, Modularity, and Innovation: The Case of Medical Practice. In R. Garud & P. Karnøe (Eds.), *LEA's organization and management series: . Path dependence and creation* (pp. 149–168). Mahwah, N.J.: Erlbaum.

March, J. Gardner, Simon, H. Alexander, & Guetzkow, H. Steere (1958). *Organizations*. New York: Wiley [u.a.].

Mayntz, R., & Scharpf, F. (1995). Steuerung und Selbstorganisation in staatsnahen Sektoren. In R. Mayntz & F. Scharpf (Eds.), *Gesellschaftliche Selbstregulierung und politische Steuerung* (pp. 9–33). Frankfurt/Main: Campus-Verl.

Nelson, R. R. (Mar., 1995). Recent Evolutionary Theorizing About Economic Change. *Journal of Economic Literature*, 33(1), 48–90.

Orlikowski, W. J. (2002). Knowing in Practice: Enacting a Collective Capability in Distributed Organizing. *Organization Science*, 13(3), 249–273.

Pierson, P. (2004). Increasing Returns, Path Dependence, and the Study of Politics. *American Political Science Review*. *Political Science Review*, 94(2), 251–267.

- Pittrow, D., Stalla, G., Zeiher, A., Silber, S., März, W., & Pieper, L., et al. (2006).** Prävalenz, medikamentöse Behandlung und Einstellung des Diabetes mellitus in der Hausarztpraxis*. *Medizinische Klinik*, 101(8), 635–644.
- Polanyi, M. (1967).** *The tacit dimension* (Vol. 540). Garden City, NY: Doubleday.
- Rosenbrock, R., & Gerlinger, T. (2006).** *Gesundheitspolitik: Eine systematische Einführung* (2., vollst. überarb. und erw. Aufl.). Bern: Huber.
- Sachverständigenrat für die Konzertierte Aktion im Gesundheitswesen (SVR) (2002).** *Grundlagen, Übersichten, Versorgung chronisch Kranker* (1. Aufl., 2000/2001). Baden-Baden: Nomos Verl.-Ges.
- Schön, D. A. (1983).** *The reflective practitioner: How professionals think in action*. New York: Basic Books.
- Schmöller, Michael (2008):** Neue Patienten- neue Ärzte? Selbst- und Rollenverständnis niedergelassener Ärzte in Deutschland. In: Gellner, Winand (Hg.): *Neue Patienten - neue Ärzte? Ärztliches Selbstverständnis und Arzt-Patienten-Beziehung im Wandel*. 1. Aufl. Baden Baden: Nomos, S. 15–60.
- Stimson, G., & Webb, B. (1975).** *Going to see the doctor: The consultation process in general practice*. London: Routledge & Kegan Paul.
- Stimson, G., & Webb, B. (1998).** A View of the patient: Chapter 11. In L. Mackay; K. Soothill, & K. M. Melia (Eds.), *Classic texts in health care*. Oxford England Boston: Butterworth-Heinemann.
- Sydow, J., Schreyögg, G., & Koch, J. (2009).** Organizational Path Dependence: Opening the Black Box. *Academy of Management Review*, 34(4), 689–709.
- Vogd, W. (2004).** Ärztliche Entscheidungsfindung im Krankenhaus: Komplexe Fallproblematiken im Spannungsfeld von Patienteninteressen und administrativorganisatorischen Bedingungen. *Zeitschrift für Soziologie*, 33(1), 26–47.