Barriers that practitioners face when initiating insulin therapy in general practice settings and how they can be overcome

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Abstract

AIM
To explore primary care physicians’ perspectives on possible barriers to the use of insulin.

METHODS
This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Eight electronic databases were searched (between January 1, 1994 and August 31, 2014) for relevant studies. A search for grey literature and a review of the references in the retrieved studies were also conducted. Studies that focused on healthcare providers’ perspectives on possible barriers to insulin initiation with type 2 diabetic patients were included, as well as articles suggesting solutions for these barriers. Review articles and studies that only considered patients’ perspectives were excluded.

RESULTS
A total of 19 studies met the inclusion criteria and were therefore included in this study: 10 of these studies used qualitative methods, 8 used quantitative methods and 1 used mixed methods. Studies included a range of different health care settings. The findings are reported under four broad categories: The perceptions of primary care physicians about the barriers to initiate insulin therapy for type 2 diabetes patients, how primary care physicians assess patients prior to initiating insulin, professional roles and possible solutions to overcome these barriers. The barriers described were many and covered doctor, patient, system and technological aspects. Interventions that focused on doctor training and support, or
IT-based decision support were few, and did not result in significant improvement.

CONCLUSION
Primary care physicians’ known delay in insulin initiation is multifactorial. Published reports of attempts to find solutions for these barriers were limited in number.

Key words: Diabetes; Insulin; Initiation; Delay; Barriers; Primary care physicians

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Core tip: There are several barriers to primary care physicians in initiating insulin therapy when it is required for type 2 diabetes patients. The main purpose of this systematic review is to explore these barriers in depth. Published reports of attempts to find solutions to these barriers were limited in number. Given the increasing burden of this chronic disease, and the need to optimize and standardize management, it is expected research in this area will remain intense. The research that remains patient-centered and takes a system approach can be expected to yield best results.

INTRODUCTION
Diabetes is a major world health problem. The most recent report from the International Diabetes Federation estimates that 415 million people have diabetes worldwide (8.8% of the adult population). Of these, 193 million people have undiagnosed diabetes, which allows the disease to progress untreated causing many complications. In 2015, diabetes was responsible for 11.6% of total global adult health expenditure and yet there were 5 million deaths from this disease. In addition, the number of people with diabetes is expected to increase to more than 642 million by 2040[12].

Type 2 diabetes is characterized by defects in both insulin secretion (due to a progressive decline in beta cell function), and insulin resistance. It is aggravated by obesity and sedentary lifestyle. Untreated hyperglycemia increases the risk of mortality and morbidity, via a higher risk of macro-vascular and micro-vascular complications[13,14].

With already high numbers of patients and a relatively small number of diabetes specialists worldwide, 90% of patients receive care for their diabetes from primary care physicians (PCPs)[15,16].

Several trials[17-19] have shown that improving glycemic control, via lifestyle modifications and the use of medications, reduces micro-vascular and possibly macro-vascular complications and mortality related to diabetes. However, over time, the progressive nature of beta cell dysfunction results in the inability of oral hypoglycemic agents to control hyperglycemia and achieve HbA1c targets[20]. This gradual loss in beta cell function would indicate that insulin therapy is almost always required at some point to treat diabetic patients[20].

Although most PCPs believe that the initiation of insulin therapy is an essential component in the management of type 2 diabetes, many still consider it to be the “last option” and indicate that their patients are reluctant to accept this therapy. In the seminal Diabetes Attitudes, Wishes, and Needs (DAWN) study, Peyrot et al[21] reported that approximately 50% of healthcare professionals delay insulin initiation until it is “absolutely necessary”.

Similarly, the SOLVE™ (Study of Once Daily Levemir), a multicenter observational study that involved over 17374 patients with type 2 diabetes in 10 countries (Europe, Asia and North America), showed that insulin initiation is generally delayed until an average HbA1c level of approximately 9%[22]. Several other studies across many countries have confirmed that there is significant delay in the initiation of insulin therapy[23-25]. This reluctance to initiate insulin treatment may be related to patient, provider or system factors.

Reported patient-related barriers include a sense of personal failure, a negative impact on social life, injection phobia, myths and misconceptions about the drug, the permanence of the therapy, difficulties in fulfilling responsibilities at home and at work, limited insulin self-management training, inadequate provider explanation about the risks and benefits of the intervention - and concerns over weight gain and hypoglycemia[26-29]. Most of these negative attitudes and perceptions are described in the literature under the term “psychological insulin resistance”. Studies in Various countries have found variable rates of such resistance amongst patients - from 5.9% to nearly 50% of patients[10,25,30,31].

System barriers to the use of insulin therapy may include a lack of resources (e.g., staff and materials), a lack of continuity of care, as well as the workload and time constraints of PCPs[26].

As for the providers, part of the problem has been attributed to “therapeutic or clinical inertia; a recognition (by the PCP) of a lack of glycemic control - but a failure to act”[27-29]. These PCPs blame (perceived) patient reluctance, language barriers, their concern for patients’ comorbidities and their own lack of training[26].

A few systematic reviews have been published related to patients’ perspectives on the delay in insulin initiation or to psychological insulin resistance[28,30-32]. This study focuses on PCP’s perspectives on their barriers to initiating insulin therapy in primary care/general practice. It will also explore the literature for possible solutions.

MATERIALS AND METHODS
This literature search was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-
The screening and selection of the studies were done independently by the two authors, and the final number of the studies used for this review was reached by consensus between them. The authors assessed the methods used in the various studies: The Critical Appraisal Skills Program checklist (35) was used for the qualitative studies, the STROBE checklist (36) was used for the observational studies, the Mixed Methods Appraisal Tool (37) was used for the mixed-methods studies and the Centre for Evidence-Based Medicine tool (38) was used for the randomized control trials.

The authors had to be in agreement for an article to be included in the systematic review. Both authors also collaborated to extract the data from each article. These are summarized in table form according to authors' name, year of publication, aim of the study, sample size, the setting, instruments used, results and conclusion (Table 1).

**RESULTS**

The initial search process resulted in 9757 studies. After removing any duplicates and adding articles by searching the cross-references and grey literature, this number dropped to 6683 studies. Titles and abstracts of these studies were then screened, and the two authors narrowed the results down to 132 articles for full-text assessment (78 articles were then excluded because they looked only at patients' perspectives, and a further 32 were excluded because they were review studies).

The remaining 22 articles were critically appraised by the two authors, and three more articles were excluded because of their poor overall quality. Thus, a total of 19 articles were included in the final analysis. Figure 1 is a flow diagram of this process.

**Characteristics of the studies**

The publication dates of the final 19 studies ranged from 2005 to 2014 and included 10 qualitative studies, 7 observational studies, 1 mixed-methods study and 1 randomised controlled trial.

One study was international and multicentre; three studies were conducted in both the United States and Malaysia; two studies were conducted in the United Kingdom and Australia; and one study was conducted in each of the following countries: Japan, Pakistan, Singapore, South Africa, Israel, Belgium, Canada and Middle Eastern Arab countries. These articles are summarized in Table 1.

**The perceptions of primary care physicians**

Several researchers tried to explore PCPs' barriers to initiating insulin therapy using qualitative methods (e.g., focus group discussions or semi-structured interviews). Hayat et al (39), Patel et al (40), Lee et al (41), Tan et al (42) and Haque et al (26) conceptualized that the decision to initiate insulin therapy can be influenced by three types of barriers: Physician barriers, patient barriers and system barriers.

From these studies we can say that PCPs' barriers may include: A lack of knowledge, training and experience by the PCP; language barriers between PCP;...
### Table 1 Summary of the articles included in this study

| Ref.                          | Design         | Study aims                                                                                     | Sample and setting                                                                 | Tools and outcome measures                        | Results and conclusions                                                                 |
|-------------------------------|----------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------------------------|
| Hayat et al. (2010)           | Qualitative    | To explore barriers and myths regarding initiating insulin therapy in poorly controlled type 2 diabetic patients in primary care centres in Hyderabad District, Pakistan | 6 to 20 medical officers per each focus group and 12 medical officers for semi-structured interviews Conducted in primary care centres in the Hyderabad District, Pakistan | 6 focus group discussions 12 semi-structured individual interviews | Patients barriers: Mistaken beliefs about insulin; fear of needles and excessive belief in traditional healers Doctors’ barriers: Skill and knowledge deficiencies, language barriers and fear of hypoglycaemia and obesity risks System’s barriers: High workload, insufficient consultation time, lack of continuity of care and financial barriers Barriers for initiating insulin aren’t solely due to medical or training issues; communication and relationships among health care professionals also have a strong influence 4 themes identified from the study: Uncertain roles, unreliable competency, relationships and communication between healthcare workers and the development of trust and respect |
| Manski-Nankervis et al. (2014) | Qualitative    | To study the effect of communications and relationships between health care professionals in general practice toward the issue of insulin initiation and to clarify how multidisciplinary teams work in practice | 21 GPs, practice nurses, diabetes nurse educators and specialist physicians Conducted in Melbourne, Victoria, Australia | Semi-structured interviews face-to-face or via the telephone | The major considerations for academic generalists when starting insulin are the patient’s HbA1c level, adherence and motivation, health assessment and glucose level patterns Major barriers to beginning insulin for generalists are patient derived (patients’ fear and preferences), while the specialists didn’t specify any major barriers There are perceptions gaps regarding insulin initiation between patients and physicians, especially regarding its social impact Physicians tend to overestimate the barrier of the injections being painful and patients’ fear and to underestimate its social impact |
| Grant et al. (2007)           | Cross-sectional | To study physicians’ considerations and preference when selecting medications for patients with type 2 diabetes | 886 academic generalists and specialists Conducted in the United States | Questionnaire-based survey | The major considerations for academic generalists when starting insulin are the patient’s HbA1c level, adherence and motivation, health assessment and glucose level patterns Major barriers to beginning insulin for generalists are patient derived (patients’ fear and preferences), while the specialists didn’t specify any major barriers There are perceptions gaps regarding insulin initiation between patients and physicians, especially regarding its social impact Physicians tend to overestimate the barrier of the injections being painful and patients’ fear and to underestimate its social impact |
| Yoshioka et al. (2013)        | Cross-sectional | To identify differences in the perceptions of patients and their physicians regarding insulin initiation (using data from the DAWN Japan study) | 148 patients with type 2 diabetes and 68 physicians Conducted in Japan | Questionnaire-based survey | The major considerations for academic generalists when starting insulin are the patient’s HbA1c level, adherence and motivation, health assessment and glucose level patterns Major barriers to beginning insulin for generalists are patient derived (patients’ fear and preferences), while the specialists didn’t specify any major barriers There are perceptions gaps regarding insulin initiation between patients and physicians, especially regarding its social impact Physicians tend to overestimate the barrier of the injections being painful and patients’ fear and to underestimate its social impact |
| Peyrot et al. (2005)          | Cross-sectional | To study patients’ and healthcare professionals’ (physicians and nurses) attitudes toward insulin therapy and its correlation with delaying insulin therapy initiation | 2061 type 2 diabetic patients and 1109 providers (physicians and nurses) Conducted in 13 countries in Asia, Australia, Europe and North America | Structured interviews conducted face-to-face or over the telephone | Most healthcare professionals (50%-55%) delay insulin initiation until it is absolutely required Delay in insulin initiation is significantly less likely when providers consider that their patients are adherent to appointments and medication regimens Delay of starting oral hypoglycaemic drugs is the strongest correlation with insulin therapy initiation |
| Authors                  | Year     | Study Type | Research Question                                                                 | Participants                                                                                             | Methods                                                                 | Findings/Conclusion                                                                                                                                 |
|-------------------------|----------|------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Lee et al (2014)         |          | Qualitative| To determine how healthcare professionals assess their patients when initiating insulin therapy for type 2 diabetic patients | 41 health care professionals (physicians, nurses, diabetic educators and pharmacists)                    | 4 focus group discussions and 10 individual interviews                  | Healthcare professionals' assessment of diabetic patients when considering insulin initiation are based on their perceptions rather than objective evaluation of patients' backgrounds, knowledge and abilities |
| Ratanawongsa et al (2012) |          | Cross-sectional| To explore primary care physicians' perceptions about barriers of initiating insulin for patients with type 2 diabetes | 83 primary care physicians                                                                                                       | Structured interviews that contained open-ended questions               | Participants reported that at least 10% of their patients would reject to start insulin; 64% of the clinicians believed that their patients' reluctance was the cause of delaying insulin initiation; 43% believed it was due to their patients' poor self-management skills |
| Patel et al (2012)       |          | Qualitative| To identify healthcare professionals' perspectives on delaying insulin initiation for type 2 diabetic patients in a multi-ethnic setting | 14 healthcare professionals (general practitioners, specialists and nurses)                                                                 | Semi-structured, face-to-face, interviews                               | Barriers for initiating insulin therapy for South Asian diabetic patients could be over-accentuated by the presence of language barrier and the lack of patients' understanding about the disease and its therapy. South Asian patients seem to be more likely to be negatively influenced by observations and experiences about insulin treatment within their community |
| Lee et al (2012)         |          | Qualitative| To explore healthcare professionals' opinions on barriers of initiating insulin therapy in Malaysian multi-ethnic patients with type 2 diabetes | 38 healthcare professionals (general practitioners, family medicine specialists, medical officers, policy makers, diabetes educators and endocrinologists) | Focus group discussions and semi-structured interviews                 | Patients' barriers: Patients' fear and misconceptions about insulin, lack of knowledge and self-efficacy. Healthcare professionals' barriers: Negative attitude toward insulin; lack of training, motivation and confidence. System barriers: Lack of continuity of care, shortage of resources and language barriers. |
| Lee et al (2012)         |          | Qualitative| To explore the strategies suggested by healthcare professionals to improve insulin initiation in the Malaysian dual-sector (public-private) healthcare system | 38 healthcare professionals (general practitioners, family medicine specialists, medical officers, policy makers, diabetes educators and endocrinologists) | Focus group discussions and semi-structured interviews                 | Developing an integrated system for patients' referral from the private sector to the public health sector for insulin initiation services. Involving nongovernmental organisations, the media and pharmaceutical industry in supporting insulin initiation. Establishing multidisciplinary teams. |
| Lakkis et al (2013)      |          | Cross-sectional| To investigate family physicians' attitudes towards insulin therapy in type 2 diabetic patients in Middle Eastern Arab countries | 122 family physicians                                                                                                              | Online questionnaire-based survey                                       | 73.6% of family physicians chosen to delay insulin initiation until it is absolutely necessary. 64% of family physicians reported hesitancy to start insulin mostly due to apparent patient reluctance. |
| Study | Design | Objective | Methodology | Key Findings |
|-------|--------|-----------|-------------|--------------|
| Nakar et al. (2007) | Case-control study | To study the barriers that delay a shift to insulin from the perspectives of type 2 diabetic patients and family physicians | Study group: 92 patients who needed insulin<br>Control group: 101 patients who had begun insulin<br>157 family physicians<br>Conducted in Israel | Referral to endocrinologists for initiating insulin therapy was correlated with a lack of experience and concerns about risks, mainly with elderly patients. A clear perception gap regarding the insulin initiation barriers between patients and physicians. Physicians exaggerate the importance of patients' physical fear of pain associated with injections and blood tests, while patient barriers seem to be related more to their concept of the illness. |
| Furler et al. (2011) | Qualitative | To describe barriers and facilitators to insulin initiation in general practice | 14 healthcare professionals (general practitioners and diabetes nurse educators) and 12 type 2 diabetic patients<br>Conducted in Australia | Insulin initiation could be influenced by the way patients and healthcare professionals interact. There was a disagreement and uncertainty about the healthcare workers' role in initiating insulin. |
| Hayes et al. (2008) | Cross-sectional | To explore primary care physicians' attitudes toward insulin initiation for type 2 diabetic patients and to determine the areas where there is a clear lack of consensus between them | 505 primary care physicians<br>Conducted in the United States | Highest consensus was in attitudes related to risk and benefits of insulin therapy, positive experiences of diabetic patients on insulin and patient worries about insulin initiation. Clear lack of consensus was seen in attitudes related to the metabolic effects of insulin, the necessity for insulin therapy, the duration needed for training and the fear of hypoglycaemia risk especially in elderly patients. |
| Tan et al. (2011) | Qualitative | To explore the barriers to insulin initiation for diabetic patients managed in primary care polyclinics in Singapore | 18 healthcare professionals (physicians and nurses) and 11 type 2 diabetic patients<br>Conducted in Singapore | Patient barriers to insulin initiation were denial of the need for insulin therapy, perception of social stigma, inconvenience, worries of needles pain, fear from side effects and complications. Physician attitude and experience with insulin therapy were also a possible barrier. |
| Haque et al. (2005) | Qualitative | To explore the barriers to initiating insulin therapy for type 2 diabetic patients in public-sector primary health care centres in Cape Town, South Africa | 46 medical officers working at community health centres<br>Conducted in Cape Town, South Africa | Physician barriers: Lack of knowledge and experience, language barriers and exaggerated fear of hypoglycaemia. Patient barriers: False beliefs about insulin, poor compliance, lack of understanding of the disease, belief in traditional herbs, fear of injections and poor socioeconomic status. System barriers: Time limitations, lack of continuity of care and financial restraints. |
Bin rsheed A et al. Barriers for insulin initiation in general practice

| Study | Study Design | Methodology | Sample Size | Intervention | Outcome Measures |
|-------|--------------|-------------|-------------|--------------|------------------|
| Sunaert et al. (2014) | Qualitative | Related to a program supporting the initiation of insulin therapy in primary care in Belgium, this study determined factors influencing the general practitioners to be involved in insulin therapy initiation and explored factors relevant for future program development | 9 general practitioners for focus group discussions, 20 general practitioners for individual interviews, 10 type 2 diabetic patients for individual interview | Conducted in Belgium | Focus group discussions, Individual semi-structured interviews |
| Burden et al. (2007) | Mixed | To evaluate the 'Insulin For Life' training course for general practitioners and practice nurses in the Heart of Birmingham Teaching Primary Care Trust by exploring the attitudes of the patients, nurses and GPs toward initiating insulin therapy | 39 type 2 diabetic patients using a questionnaire 3 to 6 mo after starting insulin, 17 general practitioners and practice nurse surveyed using a questionnaire after course completion, 37 GPs and practice nurses attended focus group discussions | Conducted in Birmingham, United Kingdom | Questionnaire-based survey, Focus group discussion |
| Harris et al. (2013) | Randomised control trial | To determine the effectiveness of an insulin initiation strategy utilising a diabetes specialist and community retail pharmacy support to increase family physician insulin-prescribing rates | 73 family physicians in the intervention group were provided with diabetes specialists/educators consultation support for 12 mo and community retail pharmacist support, 78 family physicians in the control group had usual care | Conducted at 15 sites across Canada | Primary outcome was insulin-prescribing rate (IPR) per physician defined as the number of insulin starts of insulin-eligible patients during the 12-mo period |

DAWN: Diabetes Attitudes, Wishes, and Needs

and patient; accentuated concern by the PCP about the risk of hypoglycemia and weight gain; and PCP concerns about patient noncompliance.

In one of the DAWN studies, Peyrot et al reported that a delay in beginning insulin therapy is significantly less frequent among specialists in comparison to PCPs and that healthcare providers (PCPs, specialists and nurses) usually underestimate a patient's feelings of self-blame and personal failure when insulin is needed.

In another study, Ratanawongsa et al. reported that 64% of PCPs cited patients' resistance as the major cause for delaying insulin initiation, and 97% of these physicians believed that this resistance was due to a fear of injections.

In Arab countries, 73% of PCPs prefer to delay insulin therapy until it is "absolutely essential"; this percentage is higher than the data from the DAWN report (i.e., 50% to 55%).

In an earlier study in the United States, Hayes et al. explored the attitudes of 505 PCPs in the United States regarding initiation of insulin. Most reported that initiation of insulin is the most difficult part of managing type 2 diabetes, due to the need for injections.

How PCPs assess patients prior to initiating insulin

The way in which PCPs assess their diabetic patients could highly impact their decision to start insulin. Grant et al. surveyed 886 academic PCPs and specialists in the United States. They reported that when initiating insulin, PCPs usually consider their patients' HbA1c levels, adherence, motivation to improve, overall health assessments and blood glucose level patterns. Patients’ age, weight and hospital protocol or guidelines had less impact on their decisions. They appeared to consider factors to consider include: Job boundaries between the diabetes nurse educators and general practitioners, job boundaries between general practitioners and specialists and protocol adherence.

Post-course completion:

Type 2 diabetic patients reported that starting insulin in general practice is acceptable and were confident and self-management.

Most general practitioners and practice nurses were confident about initiating insulin.

Factors to consider include: Job boundaries between the diabetes nurse educators and general practitioners, job boundaries between general practitioners and specialists and protocol adherence.

Factors to consider include: Job boundaries between the diabetes nurse educators and general practitioners, job boundaries between general practitioners and specialists and protocol adherence.

No significant differences were found between the two groups: Mean IPR of 2.28 compared to 2.29 for Intervention group physicians and the control group physicians, respectively. And an estimated adjusted RR (95%CI) of 0.99 (0.80 to 1.24); P = 0.96.

An insulin initiation support program utilising support from diabetes specialists, diabetic educators and community retail pharmacists to improve insulin prescribing in family practice was unsuccessful.
patient concerns in their assessments of barriers, whereas few specialists pointed to any major barriers in insulin initiation at all[46].

In a similar approach a qualitative study conducted in Malaysia of over PCPs explored what assessment they made of patients requiring insulin. They concluded that the decision to start insulin therapy was influenced by assessments of their patients’ characteristics, not just their HbA1C or pattern of random glucose readings[47].

Two studies discussed the existence of a perception gap between physicians and patients when initiating insulin. Physicians tend to underestimate the social issues related to insulin usage, they also tend to underestimate patients’ understanding of the illness, including concerns that the disease will worsen, self-blame and feelings of personal failure in controlling disease progression. Rather, physicians seemed to overestimate patients’ fear and concerns that the injections will be painful[46,49].

**Professional roles**

The initiation of insulin could be influenced by the way that patients and healthcare providers interact. The impact of roles, communication and the relationships between healthcare professionals and their patients was explored in two qualitative studies conducted in Australia.

Furler et al[50] interviewed 14 general practice healthcare providers and 12 patients with type 2 diabetes and concluded that there was uncertainty regarding whose role it was to initiate insulin, e.g., the patients were unclear if the diabetes nurse or diabetes educators were allowed to initiate insulin therapy or whether they only had support roles. The study concluded that there were differing perceptions of what is to be done, who does it, how it is done, and how it is supported. To quote: "...initiating insulin for the treatment of diabetes in the setting of general practice is a complex social intervention".

Manski-Nankervis et al[51] interviewed 21 PCPs, practice nurses, diabetes nurse educators and specialists. Both specialists and PCPs agreed that insulin initiation can be undertaken by general practitioners supported by diabetes educators, with specialists backing them up for the complicated cases. They found (again) concerns regarding the ambiguous roles and involvement of nurses (especially practice nurses vs diabetes nurse educators) in insulin initiation. However, there was a general feeling that nurses could play a vital role by providing specific training and education[51].

**Possible solutions**

Our review found four studies that explored solutions to the barriers to insulin initiation. In one study, healthcare professionals and health policy makers in Malaysia were interviewed and participated in focus group discussions. The participants concluded that there is a need to establish multidisciplinary teams and to develop an integrated system for collaboration between the private and public sectors, particularly regarding insulin initiation programs, to decrease the workload (especially of the public sector).

The participants also emphasized the importance of the involvement of nongovernmental organizations, the media and the pharmaceutical industry in insulin initiation programs through the provision of training, education and financial support[52].

In another qualitative study conducted in Belgium, PCPs were invited to attend a support program addressing barriers to insulin initiation; this program involved education and specialist coaching. Comparing PCPs who participated with those who did not, the authors analyzed their findings in terms of the theory of planned behavior. This social cognition model includes consideration of attitude, subjective norm and perceived behavioral control when exploring determinants of professional behavior. Compared to PCPs who did not participate in the program, PCPs who participated noticed the following changes in their behaviors: They were more satisfied with their jobs, more interested in becoming involved in insulin initiation, felt strengthened by the appreciation of their patients and had higher self-esteem levels due to their roles in diabetes care being acknowledged by health policy makers[53].

Similarly, a 2007 study conducted in the United Kingdom to partially evaluate a training course for insulin initiation found that most of the healthcare providers thought that the course was useful and made them more confident in dealing with diabetic patients[54].

Finally, Harris et al[55] in 2013 reported a randomized controlled trial of over 151 PCPs in 15 locations across Canada to determine the effectiveness of a 12-mo insulin initiation strategy within primary care. This strategy included diabetes specialists and community retail pharmacists supporting PCPs in their initiation of insulin therapy. The primary outcome they measured was insulin prescribing rates. Surprisingly, their results showed no significant difference when using this strategy; the mean insulin prescribing rates for the intervention group PCPs and the control group PCPs were 2.28 and 2.29 respectively. The authors suggested these results might be influenced by some factors: It may be underpowered by having a smaller than estimated sample size, or the possibility of contamination (although it was limited) or the delay of recruitment and participation of the pharmacists. In addition, they considered the “Hawthorne” effect could be operating (where physicians tend to improve their behavior in response to their knowledge of being observed); and that this could explain some of the lack of difference between the two groups.

**DISCUSSION**

To the best of our knowledge, the present study is the first systematic review of published work that has explored primary care physicians’ points of view regarding the noticeable delay in insulin therapy initiation in primary care settings.

This clinical inertia affects approximately one-third of patients with type 2 diabetes, and this failure of
PCPs to act, coupled with patients’ prolonged exposure to hyperglycemia, leads to a higher risk of chronic complications and mortality\cite{28}. Our review finds that PCPs report many barriers to the initiation of insulin and these range across doctor, patient and system issues. Others have also pointed to this complexity\cite{26,39,41,51}. Table 2 listed the main barriers reported by PCPs to initiate insulin as found in this review.

Clearly, the knowledge, training and experience of the PCP is an important factor, and must affect patient management in more domains than just insulin initiation\cite{11}. This factor may also overlap with an over-concern (by the PCP) about their patient’s ability to cope with injections or about possible patient side-effects such as weight-gain and hypoglycemia\cite{26,39,42-44}.

Less obviously connected to training and experience is the finding that PCPs under-estimate their patient’s feelings of guilt and personal failure when faced with insulin initiation. About 40% of diabetic patients report poor psychological well-being; guilt and self-blame may well be included in this\cite{56}.

And PCPs may assess their insulin-requiring diabetic patients in ways different to their specialist colleagues - considering patient adherence and motivation (as well as general health status, HbA1C and blood glucose levels)\cite{46,47}, thus delaying insulin initiation. Yet a concern for this wider assessment seems to miss relevant patient concerns such as the impacts (of insulin use) on their social, marital, occupational or financial situations, as well as causing inconvenience and social stigma. Patients also report lack of understanding of the illness and the role of insulin\cite{48,49}. Perhaps PCPs hear this patient reluctance and assume it is mainly about the use of injections.

Counter to this is the reassuring findings of two studies that suggest patients’ negative attitudes toward insulin are mostly temporary and improve after they begin using insulin\cite{57,58}. Perhaps patients need education and reassurance earlier in their diabetic journey; that insulin will most probably be needed at some stage, despite their best efforts, and that this is part of the natural history of the disease - not a sign of their poor management and certainly not a reason for self-blame.

Limitations

This systematic review concentrated only on studies of Primary Care Physicians.

It integrates the findings from a variety of research designs; thus a meta-analysis couldn’t be used. Sampling varied greatly amongst the studies: Some included patients as well as healthcare providers (even health policy experts), and some didn’t report how the subjects were recruited. Moreover, the research was restricted by the use of articles written in English, which could miss some studies related to this review subject.

In conclusion, PCPs’ known delay in insulin initiation...
is multifactorial, but our understanding of these is getting better, e.g., perceptions of PCPs about patient reluctance may be missing important details such as patient guilt and self-blame. Upskilling of PCPs remains an attractive approach, while the particular elements of teamwork, clinic processes, clinic resources and decision support will need further study and refinement.

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COMMENTS

Background
The reluctance of many general practitioners to initiate insulin treatment could be related to patient, provider and/or system factors. The purpose of this study is to explore general practitioners’ perspectives on possible barriers to the use of insulin therapy and to look for solutions to this dilemma in the current literature.

Research frontiers
A few systematic reviews have been published previously related to patients’ perspective on the delay in insulin initiation or to psychological insulin resistance. What is unique in this study is the focus on primary healthcare providers’ perspectives on barriers to the initiation of insulin therapy in primary care/general practice, and the investigation of possible solutions.

Innovations and breakthroughs
There are several barriers to primary care physicians initiating insulin therapy when it is required. Of these, patients’ perceived reluctance seems to be a prominent factor, though it is only one of many aspects of this complex issue.

Applications
Published reports of attempts to find solutions to these barriers were limited in number. Given the increasing burden of this chronic disease, and the need to optimize and standardize management, it is expected research in this area will remain intense. The research that remains patient-centered and takes a systems approach can be expected to yield best results.

Terminology
Clinical inertia could be defined as the failure of healthcare provider to initiate or intensify therapy when it is clinically required.

Peer-review
In this systematic review, the authors tried to explore primary care physicians’ perspectives on possible barriers to the use of insulin therapy and to look for solutions to this dilemma in the current literature. The authors concluded that primary care physicians’ known delay in insulin initiation is multifactorial. Published reports of attempts to find solutions for these barriers were limited in number. This is an interesting systematic review.

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