Background Paper

Health care of diabetes patients in times of the COVID-19 pandemic

Key messages

This paper examines the overall health care situation – i.e., the provision of care, the utilisation of care, care processes and health outcomes – in diabetes patients in times of the COVID-19 pandemic. It firsts presents study results from abroad, then from Germany. In summary, the following is established:

- The empirical data situation from surveys among patients and care providers, as well as the evidence from secondary data on the utilisation of health services and reasons for this and on health outcomes remains exceedingly scarce.
- International studies suggest a decrease in the utilisation of health care and a decline in health with regard to metabolic control and an increased risk of complications associated with diabetes.
- In Germany, healthcare facilities for patients with a diabetic foot syndrome reported that health care was significantly limited for a brief period, but that the vast majority of surveyed participants believed that critically ill patients were still able to receive the care they needed.
- Concerning the utilisation of disease management programs (DMP) of people with diabetes, a very moderate decline was observed in the first six months of 2020. Seen over the year, however, the patient numbers for the DMP for type 2 diabetes were nearly identical. For the DMP for type 1 diabetes, there was an increase in patients compared with 2019. There is evidence that patients who were generally less adherent to their DMP failed to appear for their routine check-ups.
- Compared to the year before, significantly fewer hospital stays were reported for diabetes patients in the first six months of 2020.
- Among children and adolescents with type 1 diabetes, the number of cases of severe metabolic crises at presentation of the disease was reported to have doubled.

The review of the (currently scarce) studies on the situation of people with diabetes during the

COVID-19 pandemic does not paint a clear picture. On the one hand, despite the restrictions imposed in the spring, patients appear to have had sufficient access to health care. On the other hand, there is evidence of problematic health care situations and resulting health consequences which were potentially caused or further exacerbated by the measures taken to contain the pandemic.

Further studies are urgently required in order to verify, take a closer look at and quantify potentially detrimental effects on health care.

This paper is aimed at political decision-makers at the communal, state and federal level, healthcare institutions, the scientific community, affected patients and interested citizens.

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Background

A recently published background paper (1) examined, by way of example, the health care of diabetes patients and of patients in need of care and the various areas of responsibility of the publicly funded health care. As announced in the background paper, the current article focuses on the situation of diabetes patients who did not fall ill with COVID-19. With a prevalence of around 8 % in Germany, diabetes is a commonly diagnosed chronic disease (2). It requires a high level of self-management on behalf of the patients. In addition, affected patients are dependent on receiving regular care by different healthcare facilities. There is a separate disease management program for the two main types of diabetes, type 1 and type 2 (3,4).

According to a rapid assessment by the WHO in May of 2020, three quarters (75%) of the 163 participating countries reported a considerable degree of disruption to health services for patients with non-communicable diseases (5). In Germany, the documentation requirement for disease management programs (DMP) and patients' obligation to attend recommended training was suspended by the Federal Joint Committee as part of the derogations related to the pandemic (6). Elective treatments in hospitals were restricted. In addition, it is possible that individuals who did not contract COVID-19 limited their utilisation of health services for fear of becoming infected and, for example, decided to forego preventive measures such as check-ups and elective treatments (7).

The question is whether such a reduction in health services leads to health consequences in the medium and long term, especially for chronically ill patients. To be able to recognise and counteract a potentially increased morbidity and mortality during and after the pandemic in a timely manner, it is important to describe and simultaneously monitor the changes in health care.

Aim

This article aims to provide a continuing review of the care situation of people with diabetes beyond COVID-19 during the pandemic. The care situation may be characterised by different aspects, such as a change in the availability of care providers, possible consequences of the reorganisation of health care, decisions taken by affected persons regarding the utilisation of health care, or also lifestyle changes made due to the pandemic affecting the health situation and utilisation of health care (8). In this context, it can be assumed that the conditions evolved in the course of the pandemic and also exhibited regional variations.

Our aim is to summarise knowledge on the provision of care, the utilisation of health care, care processes and any potentially resulting health consequences for people with diabetes. It is designed to provide information for a continuing debate and, in the long run, a better foundation for health policy decisions.

Methods

A non-systematic search was carried out in PubMed and Google Scholar for scientific publications relating to the utilisation of care, the provision of care, care processes and care outcomes in diabetes patients in the context of the COVID-19 pandemic until October 2020. The following key words were used in combination with “diabetes”: “health care utilization”, “health care”, “service disruption”, “health care provision” and “Covid-19” or “SARS-CoV-2”. For Germany, the Central Research Institute of Ambulatory Health Care in Germany, Department of Evaluation and Quality Assurance was also asked to provide available DMP data. In addition, we initiated an evaluation of data from the AOK Rheinland-Hamburg on hospital stays of people with diabetes and conducted a survey among health care facilities specialised in treating diabetic foot syndrome.

Results

International studies

Previous international studies on the consequences of the COVID-19 pandemic in people with diabetes originate, among others, from Great Britain, Italy and India. The details are outlined below. However,

in view of major differences in the course of the pandemic, the measures taken to control the pandemic and the healthcare systems, the transferability of these data to Germany should be critically questioned.

Lipscomb et al. examined the documentation of newly diagnosed diabetic foot ulcers in the data of 19,145 patients in the region around Brighton, England. In April 2020 they found a decrease exceeding two standard deviations compared to the mean of the preceding two years of 48 new ulcers per months, as well as a 52 % decrease compared with April 2019 (9). To date, there are no follow-on investigations on whether fewer foot ulcers did, in fact, occur, possibly due to the reduced physical activity of people with diabetes, or whether patients with foot ulcers avoided visiting their doctor, thus resulting in a delay in increased numbers of severe foot ulceration with an increased risk of amputation due to a delay in treatment.

Caruso et al. reported the results from a specialist diabetes centre in Naples, Italy (10). They compared patients admitted from March to May 2020 (N=25) with those admitted from January to May 2019 (N=38). The patient populations were comparable in terms of sociodemographic and clinical parameters. Compared to 2019, significantly fewer patients were referred from outpatient clinics in 2020 (16 % vs. 45 %), whereas the proportion of patients with emergency admission was significantly higher (76 % vs. 26 %). A significantly higher proportion of patients visited the clinic with a severe foot ulcer (64 % vs. 29 %) and had to undergo amputation (60 % vs. 18 %, adjusted relative risk 2.5).

Ghosal et al. performed a model-based study to estimate the effects of the pandemic lockdown on metabolic control in diabetes patients in India and the resulting risks for co-morbidities associated with diabetes (11). Data from 100 interviewed household members of patients with type 2 diabetes registered in a tertiary care centre for diabetes served as a basis for the model. The prediction showed a significant decline in metabolic control and a significant increase in consequential risks, including heart attack (0.9 % increase), stroke (0.5 % increase) and amputations (10.4 % increase).

A population-related cohort study (12) of 3,138,410 people diagnosed with diabetes from England showed that mortality in people with type 1 and type 2 diabetes increased sharply during the first wave of the COVID-19 pandemic (February 16, 2020 to May 11, 2020) compared with the same period in the previous three years. In around 66 % of the additional deaths, COVID-19 is believed to be the cause of death, meaning that roughly 34 % of the additional deaths are not directly attributable to COVID-19, but are considered an indirect consequence of the pandemic.

International studies have reported contradictory results regarding the presentation of type 1 diabetes in paediatric patients during the initial COVID wave (February to May 2020): An Australian study

reported an unchanged number of new cases (13), while another study from Italy (14) showed a decrease in newly diagnosed type 1 diabetes in children. It must be noted, though, that the Australian study evaluated only data of one hospital with a low incidence of type 1 diabetes (13). Having said this, both studies unanimously reported an increase in diabetic ketoacidosis (13) and severe diabetic ketoacidosis (13,14) in children and adolescents presenting with new-onset type 1 diabetes compared with the pre-pandemic period. A delay in visiting the doctor, resulting in a delay in diagnosis, was put forward as a possible reason (13,14). This hypothesis was confirmed in a web-based survey of healthcare professionals from 215 diabetes centres in 75 countries (64 % of which paediatric endocrinologists): 22 % reported a delay in the diagnosis of type 1 diabetes and 15 % reported a higher incidence of diabetic ketoacidosis (15).

Data from Germany

Scoping review on the care situation between March and June 2020

Within the framework of a scoping review, publications released between March and June (01.03. to 19.06.2020) on the provision of health care to chronically ill patients for four disease groups – cancer, cardiovascular diseases, diabetes mellitus and mental illnesses – during the first months of the COVID-19 pandemic in Germany were pooled (16). For diabetes patients, the publications that were recorded during the research period were limited to recommendations and assessments of medical societies and of care providers. The publications reported a decrease in treatments in both the outpatient and the inpatient sector, presumably owing to a decrease in health services offered, but also by patients who may have avoided treatments for fear of getting infected. Emergency care was considered unobstructed during this period. However, the review revealed a strong demand for adjustments to the provision of care including, for example, the expansion of telemedicine services. Overall, this scoping review came to the conclusion that a continuous and systematic analysis of the care situation during the further course of the pandemic is urgently required, and that particularly empirical studies on the health consequences of modified care conditions for patients are lacking.

Survey of facilities specialised in treating diabetic foot syndrome

Between the end of August and the end of October 2020, the Centre for Integrated Diabetes Care (CID, Cologne), in collaboration with the Institute for Health Services Research and Health Economics, Düsseldorf University, performed quantitative and qualitative surveys among inpatient and outpatient treatment facilities for diabetic foot syndrome (DFS) using a web-based questionnaire on the scope and type of contacts as well as on changes observed during the COVID-19 pandemic. The results have

not been published yet.

123 facilities completed the questionnaire: 69 outpatient diabetological facilities, two outpatient surgical facilities, one outpatient dermatological facility, one outpatient clinic of a vascular surgical department, as well as 16 inpatient diabetological departments and five inpatient surgical departments, nine orthopaedic shoemakers and 19 podiatry practices.

The facilities were very heterogeneous and provided care to between 1 and 400 patients per week in the second quarter of 2019, both for the prevention and treatment of an active DFS. A median of 20 patients per week was seen. A complete shutdown was not reported. In the period that was described as a “considerable restriction”, a median of five patients was seen for prevention and ten for acute treatment. This period was defined very differently and generally lasted one to two months. In the period that was described as a “mild restriction”, ten patients were seen for prevention and 16 patients for acute treatment every week.

79 of the 123 facilities provided qualitative statements on patient care. Four facilities described a substantial deterioration, for example, in the possibility to admit patients for vascular procedures. Two facilities described multiple cases of improved wound healing after a long period of stagnation due to the patients being less mobile. The remaining facilities reported alternative care options that were provided while observing a safe distance, and saw no or minor consequences for the health of their patients’ feet.

In summary, the healthcare facilities for patients with diabetic foot syndrome reported that health care was significantly limited for a short period of time; nevertheless, the vast majority of those who completed the questionnaire believed that critically ill patients had still been able to receive the care they needed. Only four of the participating facilities believed that the health care situation had deteriorated significantly. Two explicitly mentioned cases of improved healing and attributed this to the decreased mobility of the patients.

First evaluation of DMP data in the North-Rhine region

Early preliminary, not yet published evaluations of the data of the disease management program (DMP) for type 2 diabetes in the North-Rhine region for the year 2020 by the Evaluation and Quality Assurance Unit of the Central Research Institute of Ambulatory Health Care in Germany show nearly identical patient counts of 574,673 (2019) and 574,475 (2020) for the period from January to December 2020 compared with the previous year in the DMP for type 2 diabetes (DMP D2). The DMP for type 1 diabetes (DMP D1) shows an increase of +2.7 % in patient numbers from 31,479 to 32,342 in the year-to-year comparison. The most significant declines in patient numbers were recorded in

both DMPs in the months of April (DMP D2: -8.2 %, DMP D1: -15.7 %) and July (DMP D2: -15.2 %, DMP D1: -19.9 %) and, with -12.3 %, additionally in October in DMP D2. However, in June (DMP D2: +4.1 %, DMP D1: +9.9 %) and August (DMP D2: +7.9 %, DMP D1: +15.5 %) there was a catch-up effect in both programs.

In terms of the number of examinations performed, a decline of -3.0 % in follow-up examinations was reported for the DMP D2 in 2020 in comparison with 2019; with -4.5 %, the decline was strongest in the fourth quarter of 2020. There were considerably fewer initial examinations and repeated re-registrations in the DMP D2; here, the decline was -13.8 % in comparison with the year before, and -17.5 % in the fourth quarter of 2020. For the DMP D1 there was no decline in follow-up examinations compared to the year before, and even a slight increase of +1.0 % in the fourth quarter of 2020. By contrast, initial examinations also went down by -17.0 % in this DMP D1 in 2020 compared to the year before, and by -22.2 % in the fourth quarter of 2020.

Preliminary analyses of the quality target achievement suggest that, in this context, there were nearly no differences between 2019 and 2020. The observations suggest that a positively selected, particularly DMP-adherent sub-group of experienced DMP patients, at least in part, attended their regular check-ups during the ongoing COVID-19 pandemic. This could mean that particularly patients with low adherence to structured health care may have fallen through the health care net and therefore received a significantly inadequate level of care.

Inpatient care of people with diabetes

According to data of the Institute for the Hospital Payment System (InEK), the number of diabetes patients who received in-hospital care between 1 January 2020 and 31 May 2020 went down by 19 % in comparison with the previous years 2018-2019 (18). More detailed results were not reported.

An as yet unpublished evaluation of data of the AOK Rheinland/Hamburg by the Institute for Health Services Research and Health Economics, Düsseldorf University, and the German Diabetes Center, showed a significant reduction in patients with at least one inpatient stay due to coronary artery disease, acute myocardial infarction, diabetic foot syndrome and with at least one hospital stay for any reason for diabetes patients in the second quarter of 2020 in comparison with the same period in the previous years. In contrast to this, no significant changes in all-cause mortality and in the incidence of inpatient stays due to stroke or amputation were found. This may be a short-term effect resulting from the uncertainty and hesitation in the population, especially in the early stages of the pandemic. Further observations spanning a longer period of time are warranted to allow for an estimation of whether recuperation effects or a repeated decline in inpatient treatments of diabetes patients coincided with

the measures taken during the further course of the pandemic. It is also important to continue to observe how the number of inpatient treatments will develop in the aftermath of the pandemic.

Children and adolescents with type 1 diabetes

An analysis of the German Diabetes Prospective Follow-up Registry (DPV) for children and adolescents with type 1 diabetes, published after the scoping review presented above, found no change – based on data provided by 216 diabetological centres – in the trend regarding the incidence of type 1 diabetes within the scope of the COVID-19 pandemic from 13 March through 13 May 2020 (19). However, based on data of the 532 children and adolescents presenting with new-onset type 1 diabetes in the same period it was shown that diabetic ketoacidosis was diagnosed in nearly twice as many children during the pandemic compared with the same months in the previous two years: in the same period in 2020, 44.7 % of the children exhibited ketoacidosis when newly diagnosed with diabetes, compared with 24.5 % in 2019 and 24.1 % in 2018. Children below the age of 6 years were at a particularly increased risk. Potential reasons included a decrease in health services offered, a reduced utilisation of health services for fear of becoming infected, or complex psychosocial factors within the families (17).

Conclusion and recommendations

Even at this point in time, the review of the (currently scarce) studies on the situation of diabetes patients in times of the COVID-19 pandemic does not provide a clear picture. Some empirical studies which have meanwhile been published indicate that patients in Germany continued to receive adequate care despite the restrictions. Others, on the other hand, indicate difficult care situations and resulting health consequences which may have potentially been caused or amplified by the measures taken to contain the pandemic.

There is a pressing need for further investigations in order to promptly identify potentially deleterious effects of changes in the care conditions on the health of people with diabetes and other chronic diseases, while simultaneously taking the patients' perspective into account. For this reason, analyses of secondary data should be complemented by (ideally quantitative and qualitative) primary data collections. It should be noted that publications, especially those based on secondary data, are lagging behind.

Owing to the dynamics of the prevailing circumstances during the course of the COVID-19 pandemic, a continuous and systematic collection of evidence is warranted. Key questions regarding the health care of people with diabetes include:

- Has there been, or will there be, either during or in the aftermath of the COVID-19 pandemic, an increase in complications and co-morbidities associated with diabetes (for example, diabetes-related mortality, diabetic foot, amputations due to diabetes, heart attack)?
- Which sub-groups of people with diabetes (based on personal or also regional/socio-spatial criteria) may be particularly affected?
- Is there evidence of any effects of changed care conditions from the patients' perspective (for example, with respect to self-management, an evaluation of access to health care and the quality of care, diabetes-related burdens, quality of life, utilisation of health services)?
- Are there indications of whether and, if so, which sub-groups of patients require special support? Where gaps in health care need to be addressed?
- How are patients managing with digital health services and telemedicine?
- Where have slumps / barriers in health services and care processes been identified (for example, DMP participation and achievement of DMP target criteria, general practitioner and specialist care)?

To provide a continuing structured and systematic review of the care situation of people with diabetes, the working group "Requirements for the German Healthcare System" of the Competence Network Public Health COVID-19 plans to carry out periodic database and internet searches on the basis of agreed search algorithms in the sense of a "living review". In addition, we aim to periodically contact relevant organisations, healthcare facilities and research networks of the German healthcare system with regard to ongoing studies and available data (for example, Destatis, DMP, medical societies, German Center for Diabetes Research [DZD], Robert Koch Institute [RKI], COVID-GAMS, among others). Combined with a continuing review on altered framework conditions and measures which potentially impact the care situation, this may contribute significantly to improving the provision of care to people with diabetes, also in times of crisis.

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