# Management of the Diabetic Patient in the Diagnostic Care Pathway

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**Abstract.** Diabetes is a complex pathology both for the affected patients and for the medical specialists who follow them. Furthermore, since diabetes is a pathology with a high prevalence and incidence, it is essential to intervene effectively in therapeutic actions through the application of common guidelines. Therefore, in order to improve the management of the diabetic patient, the aim of the work is to define a Diagnostic Therapeutic Assistance Pathway (PDTA). A questionnaire-based approach is adopted for data collection from 136 patients at the Clinical Dermatology Unit of the University Hospital "Federico II". In most cases (64%) the diagnosis was made by the General Practitioner, 15% of patients obtained the diagnosis at the ASL and 12% at the Polyclinic of Naples AOU "Federico II" and the remaining part from the diabetologist specialist. The second access is generally carried out at the "Federico II" AOU (66%), followed by the ASL (17%), by a doctor specialized in diabetology (12%) while no patient has turned to the General Practitioner for the treatment of diabetes. The final visit is carried out at the "Federico II" AOU in almost cases. The data obtained follow the Italian guidelines: the patients get the diagnosis from the Family Doctor and then they are addressed either to ASL or to diabetologists specialists. For the subsequent visits, most of them prefer to turn to the "Federico II" AOU, especially when they have complications associated with the diseases as they are followed in a more careful and satisfying manner.

**Keywords:** Chronic diseases · Diabetes · Diagnostic therapeutic assistance pathway · Clinical management


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## 1 Introduction

Chronic diseases are the leading cause of death worldwide. 54% of the 56.9 million deaths in 2016 [1] are due to this vast group of pathologies, united by risk factors, health determinants and opportunities of intervention. Although it occurs even after decades, these diseases begin at a young age. Due to the long course, they need long-term care, but at the same time, they present different opportunities for prevention. According to ISTAT 2016 data, these are the most common chronic diseases or conditions: hypertension (17.4%), arthrosis/arthritis (15.9%), allergic diseases (10.7%), osteoporosis (7.6%), chronic bronchitis and bronchial asthma (5.8%), diabetes (5.3%) [2]. In particular, diabetes consists of a high concentration of glucose in the blood. There are several forms of diabetes and the main ones are: Type I (insulin-dependent) diabetes, Type II diabetes (insulin-resistant) and Gestational diabetes [3, 4].

The official sources that provide data on the prevalence of diabetes come from the annual monitoring data on the state of health of the population conducted by the ISTAT and the PASSI surveillance system [5]. The standardized values indicate an increase in the prevalence of the diabetes rate by 90% in the last 13 years [6]. As for the spread of diabetes by geographical area, according to ISTAT data, the prevalence is higher in the South (6.5%) and lower in the Center (5.7%) and in the North (4.7%). Furthermore, according another report [7], the prevalence is higher in people with no educational qualifications (14%) and with greater economic difficulties (7%). Regarding the incidence of diabetes, it is possible to estimate that every year there are 5–7 new cases of type 2 diabetes every 1000 people [8]. Regarding to type 1 diabetes, the data [9] show an incidence equal to 9.3/100000 subjects/year in the twenty-four years.

The diabetes has a high impact on the Public Health in terms of costs and it involves the need to apply an interdisciplinary therapeutic approach. Furthermore, diabetes is an extremely widespread pathology in South Italy [2]. Despite this, our Region has not yet adopted a unique form of diagnostic-therapeutic pathway. Although prevention is the main method to reduce the development of diabetes and associated diseases, it is necessary to standardize the management pathways of the diabetic patients. Unifying the guidelines available in a specific Diagnostic and Therapeutic Assistance Pathway (PDTA) can help the care path of patients and, at the same time, reduce the health costs of this long-time disease [10–15].

In this context, recently, in addition to simulation models [16–19] and algorithms [20–23] for the management [12, 24] and elaboration of biomedical data [25–31] related to pathological conditions, new approaches such as PDTA have increased the interest of the whole Health organization. The Italian Standards, developed by the Italian Society of Diabetology, are the reference document for diabetes in Italy [32].

The diagnostic-therapeutic assistance pathways (PDTA) are characterized by the organization of the assistance process for specific groups of patients, through the coordination and implementation of activities by a multidisciplinary team [33]. Unfortunately, several PDTAs in Italy have failed in the implementation step. One way to avoid this waste of resources is to make patients aware of the best use of health resources. It follows that the first objective is to guarantee a uniform path within the hospital and then expand this path also at territorial level [7, 34]. It is good to specify

that the PDTAs represent the contextualization of Guidelines, in the specific organizational reality of a healthcare company and are, therefore, local models that, in relation to the available resources, allow us to provide tools that enable the healthcare company to outline the best practicable path within its organization. This implies that for each pathology, be it a chronic condition or an acute manifestation, we will hardly find an absolute PDTA that can be applied in all contexts, but surely each of the existing models can represent a good starting point to model the territorial needs of Regions, hospitals or companies.

In this work, preliminary data were collected relating to diabetic patients belonging to the University Hospital "Federico II", in order to reconstruct one path preferential treatment of the subjects in the study, evaluating the obstacles and problems, if they were present, to which the patients meet in the various structures to which they are addressed.

## 2 Methods

A structured questionnaire was prepared submitted to 136 patients: 34 belonging to the Clinical Diabetology Unit and 102 of the Clinical Dermatology Unit University Hospital "Federico II".

Data were collected from March to November 2019 and from June to July 2019.

The questionnaire is articulated into 11 questions, as reported below:

1. Sex;
2. Age;
3. What kind of diabetes is affected?
4. Who diagnosed diabetes for the first time?
5. What is the path you took after diagnosis?
6. Did you change therapy/why did you change your doctor/company/center?
7. How many visits?
8. Have you had any complications in the last year?
9. What kind of complications?
10. Therapy for diabetes?
11. Dermatologic disorders?

## 3 Results

In the 136 diabetic patients interviewed, 71 males were detected, of which 9 were suffering from type I diabetes and 62 from type II diabetes and 65 females including 7 affected by type I and 58 type II diabetes. Moreover, of these, 57 under the age of 60 (aged between 40–60) and 79 with age over 60 (Table 1).

In most cases, specifically 87 of 136 patients, corresponding to a percentage value of 64%, the diagnosis was made at the General Practitioner following altered blood tests (glycaemia exceeding 100 mL/dl). 15,4% of patients obtained the diagnosis at the ASL, 11,7% directly at the Polyclinic, 7,4% from the diabetologist specialist

**Table 1.** Diabetic patients (DMI: Type I Diabetes, DMII: Type II Diabetes, −60: aged between 40–60, > 0: age over 60).

| | TOT | −60 | >60 | DMI | DMI-60 | DMI > 60 | DMII | DMI-60 | DMII > 60 |
|---|---|---|---|---|---|---|---|---|---|
| M | **71** | 30 | 41 | **9** | 7 | 2 | **62** | 23 | 39 |
| F | **65** | 27 | 38 | **7** | 6 | 1 | **58** | 21 | 37 |
| TOT | **136** | **57** | **79** | **16** | **13** | **3** | **120** | **44** | **76** |

(especially in cases of familiarity) and, only 1,5%, became aware of the pathology at hospitals (Table 2).

**Table 2.** Data related to the diagnosis of diabetes: numerical values and percentage (ASL: Local Health Unit, GP: General Practitioner, HOSP: hospital, POL: Federico II Hospital, SMD: Specialist Medical Doctor)

| Diagnosis | N° | % |
|---|---|---|
| ASL | 21 | 15,4 |
| GP | 87 | 64 |
| HOSP | 2 | 1,5 |
| POL | 16 | 11,7 |
| SMD | 10 | 7,4 |
| TOT | **136** | 100 |

As found from the data collected, the second access to the therapeutic/assistance pathway is generally carried out at the polyclinic (66%), followed by the ASL (17%), by a doctor specialized in diabetology or by a center that deals only with the pathology in question (15%), while no patient turned to the GP for the treatment of diabetes or related disorders (Table 3).

**Table 3.** Data related to the second visit: numerical values and percentage

| 2nd visit | N° | % |
|---|---|---|
| ASL | 22 | 17 |
| GP | 0 | 0 |
| HOSP | 3 | 2 |
| POL | 86 | 66 |
| SMD | 19 | 15 |
| TOT | **130** | 100 |

It has generally been assessed that, following data processing, patients at the third visit stop attending other centers or consulting specific professionals, as they are

already being treated at the hospital and therefore have already been assigned a precise therapy in relation to clinical considerations. In fact, after having often followed unsatisfactory therapeutic pathways, the subjects turn to the polyclinic for 73% of the total (Table 4).

**Table 4.** Data related to the third visit: numerical values and percentage

| 3rd visit | N° | % |
|---|---|---|
| ASL | 8 | 18 |
| GP | 0 | 0 |
| HOSP | 0 | 0 |
| POL | 33 | 73 |
| SMD | 4 | 9 |
| TOT | **45** | 100 |

Here they stay in treatment for years, carrying out check-ups about 3 times a year.

## 4 Discussion and Conclusion

As previously shown, the current welfare system in Italy is of a sectorial-specialist type, so each donor (GPs, specialists, hospitals, etc.) is qualified to provide assistance with different degrees of clinical-assistance complexity [34]. Following the guidelines disseminated in Italy [35, 36], most subjects (87 out of 136 patients) learn that they have diabetes with their family doctor, following the alteration of routine tests performed periodically. Of these 87, 22 will be addressed to the ASL of belonging, where only 8 of them will make the third access, to then move to the polyclinic. It should be noted that these patients report that the transition from the ASL to the polyclinic is forced by the fact that very often doctors belonging to the structure have difficulty prescribing the drug according to the patient's needs. Only rarely are patients referred by a diabetologist or a hospital (19 patients and 3 patient respectively), while most begin their own care path at the "Federico II" AOU where, moreover, they declare not only that they do not find more therapeutic or prescription drug problems, but they also claim to be "facilitated" in their care as it is easier for them to make multiple visits at the same time and this is especially true for patients who have complications associated with diabetes (83 patients out of a total of 136, Table 5).

The data obtained are in line with the standards set in Italy [36]. During this phase, the difficulties encountered were different: first, at the end of the visit, patients were not focused enough on the questions, thus giving answers not in line with the information needed; secondly, patients often have low schooling, so it was necessary to simplify the questionnaire several times, which was initially much more precise and detailed, but which was not always clear for the patient; finally, the patient at the conclusion of a medical examination is often deconcentrated and tired, so it is not always compliant.

**Table 5.** Data related to the complications associated to the diabetes.

| Complications | N° | % |
|---|---|---|
| Hypertension | 25 | 18 |
| Kidney disorders | 3 | 2 |
| Cardiac disorders | 117 | 86 |
| Ketoacidosis | 4 | 3 |
| Obesity | 56 | 41 |
| Retinopathy | 5 | 4 |
| Neuropathy | 7 | 5 |

However, this preliminary study shows the need to include the patient in a multidisciplinary path that can support him in the various aspects related to the pathology.

The participants emphasized the less of support in terms of communication and relationships. Therefore, in addition to the multidisciplinary approach identified as one of the successful assistance strategies, communication aspects must also be considered and the activation of collaborative processes between operators must be promoted. In fact, the ideal assistance has as its fundamental objective the maintenance of the state of physical, psychological and social health of the person with diabetes, which can be pursued through early diagnosis, correct therapy, prevention of complications. To achieve these goals, the Diabetological Medical Doctor, General Practitioners and all the Specialists are called to interact in order to ensure a unitary, integrated, continuous assistance that achieves high efficiency while respecting the rationalization of expenditure.

Adherence to care plans, sharing of guidelines for clinical practice and, at the same time, optimization of human and economic resources using strategies to modify the behavior of patients and medical staff, is fundamental to design and implement integrated patients' management pathways.

**Conflict of Interest Statement.** The authors have no conflict of interest to declare.

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