Impact and effects of the patient-centered approach in diabetic patients: A neuro-educational approach adapted to the concepts of empowerment and reflexivity

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Abstract: This study aims to assess the impact and effects of PCA on diabetic patients within a neuro-educational framework that aligns with the concepts of empowerment and reflexivity, demonstrating its influence on patient satisfaction and the development of cognitive and behavioral skills. Conceptually, the patient-centered approach (PCA) offers the possibility of implementing a neuro-educational approach for diabetic patients (WHO). However, the key question is its practical application in general practice. A neuro-educational approach to PCA was tested on a sample of 50 diabetic patients selected by 5 general practitioners. The aim was to adopt a comprehensive biopsychosocial approach, use global listening to understand patients' points of view, offer personalized advice, establish common ground on objectives, and identify the needs and obstacles affecting their management. We conducted a cross-sectional analysis to examine the processes involved in changing behavior and acquiring skills. The study revealed a significant positive response, as well as the acquisition of reflexivity and autonomy skills in the majority of diabetes patients. Some patients showed a significant improvement in their sense of self-efficacy. However, a minority expressed resistance to this new support strategy. Ultimately, the educational approach within the PCA enabled diabetic patients to adapt and modify their behaviour, thus contributing to the acquisition of valuable skills. At the end of this study, PCA, enriched by other psychotherapeutic approaches, emerged as a systemic therapeutic support process that could be accessible to all general practitioners, teachable, and the subject of further research.

Keywords: Autonomy, Diabetes, Empowerment, Neuro-educational approach, Patient-centered approach, Reflexivity, Self-efficacy, Self-esteem, Support, The therapeutic alliance.

1. Introduction

Diabetes is a significant public health challenge, representing one of the four priority non-communicable diseases addressed by global health systems. Its prevalence has reached alarming proportions due to globalization, urbanization, and the aging of the population. Currently, nearly half a billion people worldwide are living with diabetes [1].

The rapid evolution of diabetes, deemed one of the 21st century's global health emergencies, along with the substantial direct and indirect medical costs it incurs—placing a burden on households and global health systems—necessitates the implementation of a comprehensive management strategy. This strategy should be both effective in terms of outcomes and efficient in terms of resource utilization [1, 2]. Patient self-satisfaction is a central focus in contemporary approaches to service quality [3,

4]emphasizing collaboration, multiprofessionalism, and multidisciplinary coordination [5].

These new patient-centered approaches necessitate the active participation of the patient in behavioral changes and the acquisition of specific skills, transforming the patient into a central actor in their own care. In addition to their traditional role as a drug prescriber, the doctor should also provide psycho-socio-pedagogical accompaniment.

Diabetes treatment includes not only drug therapy but also dietary management and physical activity promotion. Consequently, the challenges are considerable, and the rationale often involves a paradox: the doctor seeks to adapt the patient to their disease, while the patient endeavors to align the pathology and, particularly, its treatment with their lifestyle [6].

We champion the authenticity and originality of PCA to enhance self-care in diabetic patients. This cognitive and behavioral support approach is central to the general practitioner's practice. The general practitioner serves as the primary point of contact in the course of care for any chronic disease, overseeing the support process, overall patient care, and the continuity, management, and coordination of care.

This intervention strategy is grounded in personalized support for the patient, neurotherapeutic education, and the management of warning signs indicating decompensation of diabetes. Its ultimate goal is to harness the patient's self-management and self-direction skills, which have demonstrated their effectiveness in enhancing the diabetic patients' functional abilities and quality of life.

The study aims to:

- Investigate the effectiveness of the PCA tool in diabetes management and its impact on glycemic control.
- Demonstrate its influence on the development of cognitive-behavioral skills.
- Identify the types of adaptation processes and behavioral changes that emerge during the Patient-Centered Approach.

Our primary focus is to assess the impact and effects of this patient-centered process implemented during neuro-educational interventions of PCA with diabetic patients and to validate the clinical approach of PCA as the cornerstone of adaptation and change (human change management).

The research sub-questions center around the impact of PCA on:

- Behavioral change.
- Empowerment and responsible care.
- Reflexivity.

The study aims to assess the interest and feasibility of an approach centered on the diabetic patient in primary care medicine.

2. Theoretical and Conceptual Framework

2.1. Patient-Centered Approach

PCA is a concept that aims to rethinkneuro-therapeutic education for diabetic patients, sits at the intersection of several concepts, including empowerment, self-esteem, a sense of self-efficacy, responsibility, and reflexivity.

Balint [7] was the first to highlight that physicians, who were traditionally trained to concentrate on the disease in order to establish a medical diagnosis (traditional diagnosis), needed to shift their focus to the sick person to establish a more comprehensive diagnosis (overall diagnosis). Subsequently, Rogers [8] introduced the concepts of empathy and comprehensive listening, enabling an understanding of the patient's experience. Since then, numerous authors have contemplated the question of the doctor-patient relationship.

The patient-centered approach as a clinical approach was developed by Stewart [9] and Stewart [10]. The aims of this method include a better understanding of health issues, an in-depth understanding of the patient's experience, and its integration into the care process [11].

Little and his collaborators have shown that most patients have a strong expectation of this patient-

centered approach from a practitioner. Notably, there are at least three important areas from the perspective of patients: communication, partnership, and health promotion [12, 13].

The patient-centered approach (PCA) has been positioned at the core of the "competence daisy" of the National College of General Practitioners (NCGP) as the central cross-cutting generic competence of the general practitioner (Figure 1).
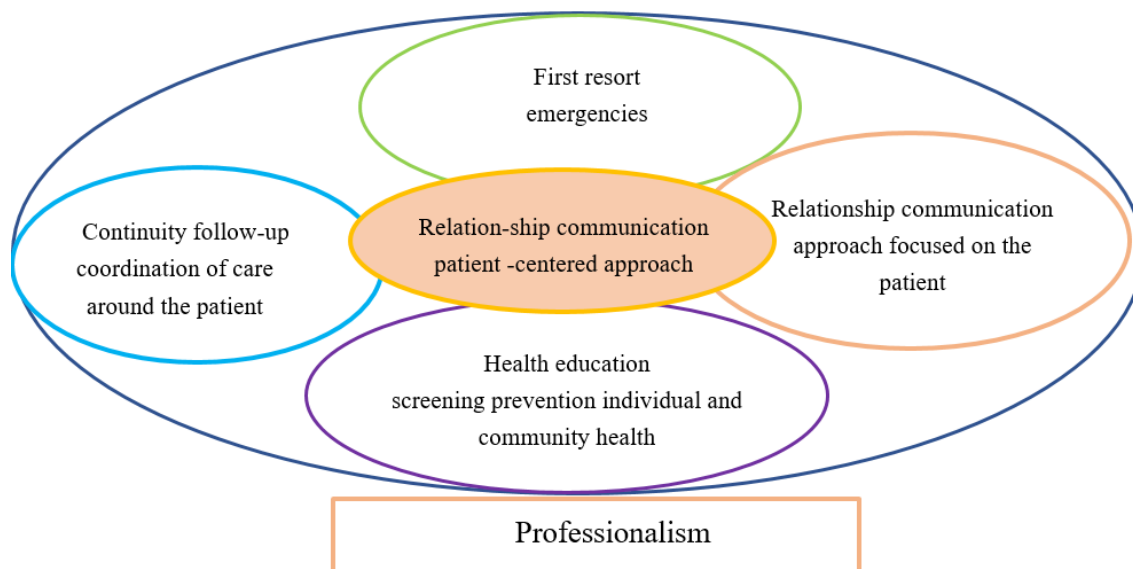

Figure 1.
Exhibits the "daisy chain" of general practitioners skills.

This concept comprises six components with six objectives to be achieved by the health professional [14-16]:

- Explore the patient's experience of illness and their perspective as a person, including their representations, expectations, and preferences.
- Understand the person in their bio-psychosocial entirety, taking into account their historical dimension and context.
- Establish an agreement with the patient, fostering a common understanding of the problem, potential solutions, and shared decision-making (common ground).
- Emphasize the relationship and therapeutic alliance capable of promoting the patient's recovery through contributive therapeutic attitudes.
- Promote prevention and health through a longitudinal neuro-therapeutic education program.
- Demonstrate realism and reflexivity concerning the management of time and priorities, taking into account associated pathologies and risk factors. The support program is personalized based on psycho-sociological and cultural characteristics.

These 6 components are in dynamic and systemic interaction to allow changes favorable to care.

Therapeutic education (TPE) can be considered a potential application of this clinical approach well-suited for care [17].

The PCA model thus aims to impart significance to the clinical approach and to the therapeutic aspect of the nursing function, emphasizing the centrality of the patient and their life project (or personal care project) in the care relationship.

2.2. Empowerment and Reflexivity

2.2.1. Autonomy

Diabetes empowerment and self-management include three components [18-21]:

- "SC maintenance (SC self-care)," i.e., behaviors aimed at maintaining a certain physiological balance (medication adherence, "monitoring" of symptoms)
- "SC management," i.e., reactivity in the face of symptoms (recognition of symptoms and adaptation of the course of action to be taken)
- "SC confidence," i.e., the patient's perception of his self-care abilities. According to this self-care theory, patients play a primary role in medical decision-making and should possess the tools to manage their health problems. While theoretical knowledge is necessary for practicing self-care, it is not sufficient to improve behavior. The optimization of care requires real cooperation and participation from the patient, who must be trained in decision-making, considering the interaction between the individual, the problem, and the environment.

PCA reinforces the feeling of self-efficacy (SE) through realistic and adapted experiences. The SE is a "belief of the person in their ability to act so as to achieve a performance and produce desired results" [22].

The SE necessitates an assessment of oneself (self-evaluation) and one's personal capacities in relation to the performance to be accomplished. This self-assessment must be relevant and realistic.

2.2.2. Reflexivity

PCA stimulates the reflective and self-assessment capacities of the patient. Indeed, in a patient-centered approach, the patient is recognized as the best expert in themselves, expressed through their perspective (their lived experience, their representations, their expectations, their preferences, etc.) in their relationship with the doctor. They can acquire expertise in themselves, making them a partner for the professional who accompanies them.

Reflective work also represents a means of mastering and constructing action. It consists of linking past, present, and future, identifying the factors influencing one's illness, increasing one's ability to assess a posteriori, and assessing the effectiveness of one's judgment, for example, on how to adapt treatment and lifestyle to manage their diabetes.

The reflective work of the diabetic patient covers a very wide range of activities related to the management of their disease, characterized by a whole arsenal of constraints. It is not only a question of managing the disease in its material dimension but also the cognitive or mental load associated with the pathology and its daily management.

Patients develop explicit knowledge and skills of vigilance, or body attention, to manage the symptoms of their disease. The programmed activities improve their mechanisms of self-management and self-direction in various social fields of activity. They also allow them to think about their treatment or even the evolution of the disease in the long term and its potential effects. This notion allows us to link illness experience to the question of self-knowledge construction and study this last dimension.

Therefore, we conceive of reflexivity as the ability of individuals to develop self-knowledge from past experiences to act and anticipate future situations and actions that are more or less temporally close [23, 24].

This reflective capacity can contribute to reducing the anxiety-provoking effects linked to the uncertainty inherent in future situations [25]. This reflective work encompasses the two registers of reflexivity: the first is that of reflexivity a posteriori, linked to taking a step back with regard to past experiences and events; the second refers to the mobilization in situ of the lessons drawn from the experience of previous situations, which make it possible to restructure the action in its very course [26].

To adapt and implement reflective strategies, psycho-socio-therapeutic support must make sense for the patient. Collaborative work facilitates learning through social interactions between doctor-patient and family. Two models provide a more precise and validated understanding of the processes of

adaptation and change:

    A. Transactional model (TM) (developed by Lazarus and Folkman [27] and updated by Bruchon-Schweitzer [28]: describes a transactional mediating process of adaptation between a person and a contextual situation. This phenomenological self-assessment is a cognitive process that gives meaning to the stressful situation. It is both an encounter and a reaction that allow the person to adapt, adjust to the situation, and cope ("coping").

    B. Transtheoretical model (TTM) (developed by Prochaska): describes the 5 stages of change (pre-contemplation, contemplation, preparation, action, and maintenance), most often followed by relapses that re-engage these different stages in a cyclical process [29].

    According to Prochaska, this overall process of change is associated with six cognitive-emotional processes related to the person's experience and characteristics, and four behavioral processes.

3. Methodological Approach

    This descriptive and exploratory research study of mixed types (qualitative and quantitative) took place in 3 health centers in the province of El Jadida.

- Moghress Rural Health Center Level 1 (RHC): 10 patients.
- DerbGhallef Urban Health Center Level 2 (UHC): 10 patients.
- Diabetology Urban Health Center (UHC): 30 patients.

    5 doctors were asked to accompany the diabetic patients, with 10 patients for each doctor, and the only inclusion criterion was volunteers capable of understanding and testing a Patient-Centered Approach. The objective was to constitute a convenient and diversified sample. This request was responded to by one general practitioner, one general practitioner diabetologist, and three diabetologists.

    The diabetic patient-centered approach was modeled in the form of personalized support and maintenance in 3 stages:

    A. Maintenance for diabetic patients takes place in "3 phases":

    • The first phase involves the 2 PCA components of active listening, understanding of the patient's perspective (I), their lived experience, their representations, expectations, and preferences, as well as taking into account their biopsychosocial context in a global approach (II).

    • The second phase consists of explanations and advice from the accompanying doctors, based on the patient's knowledge and after a medium-term longitudinal survey (of empowerment, self-esteem, feeling of self-efficacy, responsibility, and reflexivity).

    • The third phase involves summary-synthesis and setting accompanying objectives to find common ground for a shared decision (Component III of PCA).

    B. Interview included the evaluation of the intervention after 3-6-9 months by the 5 accompanying doctors.

    C. Interview with accompanying doctors *(Limits and contextual constraints)*.

    We conducted a content, descriptive, and thematic analysis to observe the connections between the PCA clinical approach and the patient changes.

The communication and relational objectives included the following (PCA Components IV, V, VI):

- Adopting an empathetic attitude.
- Using active listening techniques with an appropriate non-verbal attitude.
- Utilizing open questions, especially in the comprehensive listening and common understanding part, and closed questions to clarify, for example, during the food survey.
- Reformulating, reflecting, summarizing, and clarifying what has been said (feedback).

4. Results and Discussion

4.1. Response Rate

    Our results were organized, taking into account the order of importance of the responses from the

target diabetic patients surveyed, the personalization, and confidentiality of the responses, their social origin, their economic and cultural level, their modalities of care, their treatment strategies targeted by the carers, and finally, their effectiveness.

a. Evaluation of the response of diabetic patients according to the mode of neuro-therapeutic.

Table 1 Shows the response rate of diabetic patients to the neuro-therapeutic education methods used by doctors in each health facility participating in the study.

Table 1.
The response rate to the neurotherapeutic education methods implemented by the doctors in each participating health structure in the study.

Structure	Nursing staff	Services provided	Number of patients	Mode of education neuro-therapeutic	Number of responses	%
Moghress RHC	Diabetologist general practitioner	Various curative and preventive activities chronic disease management	10	Individual	2	20
				Collective	5	50
				Individual and collective	3	30
DerbGhallef UHC	General practitioner	Various curative and preventive activities follow-up and management of Chronic diseases	10	Individual	1	10
				Collective	7	70
				Individual and collective	2	20
DiabetolyUHC	Diabetologist	Monitoring and care of diabetic patients	30	Individual	24	80
				Collective	4	13.33
				Individual and collective	2	6.66

Comment:

Patients at the Moghress (RHC) and the DerbGhallef (UHC) exhibit a higher response rate to the collective mode of neuro-education, with Moghress RHC having a higher response rate than DerbGhallef UHC. This is explained by the workload (many programs are provided at the level of these two structures), time constraints, and staff shortages.

On the other hand, the individual mode of neuro-education dominates at the level of the diabetology center since the three diabetologist doctors exclusively ensure the follow-up and care of diabetic patients.

b. Evaluation of the degree of satisfaction of diabetic patients with the PCA in %:

Table 2 shows the evaluation of the response of diabetic patients to the PCA process.

Table 2.
Evaluation of the response of diabetic patients to the PCA process.

Structure of care	Degree of satisfaction of diabetic patients with PCA after 9 months																			
	Motivation				Selfesteem				Self-directed learning				Reflexivity				Accountability			
	VS	S	M	I	VS	S	M	I	VS	S	M	I	VS	S	M	I	VS	S	M	I
MoghressRHC 10patients	82	14	3	1	62	32	4	2	76	25	6	3	59	25	10	6	67	22	8	4
DerbGhallef USC 10patients	79	12	7	2	58	28	10	4	71	20	4	5	53	24	16	7	67	22	8	4
DiabetologyUHC 30patients	87	12	–	1	69	30	1	–	81	18	–	1	76	21	3	–	73	21	4	1

Note: NB: Modeling of responses at four level: Very sufficient: VS; Sufficient: S; Moderate M; Insufficient: I.

Comment:

Our study reveals that PCA has generated significant motivation among diabetic patients through the development of cognitive-behavioral skills and the acquisition of knowledge. This motivation enables them to comprehend their disease, take effective actions, modify their behaviors, enhance their experience of the disease and their quality of life, promote physical activity and dietary habits, and ensure adherence to treatment and therapeutic observance. Additionally, it has demonstrated a noteworthy improvement in patients' capacity for reflexivity, self-management, and self-assessment, along with the development of self-esteem, patient empowerment, and accountability in their self-care.

According to reports, patient motivation and the growth of self-esteem, self-directed learning, reflexivity, and accountability:

- More significant in the three groups of patients at the Diabetology UHC than in the patients at the Moghress RHC and the DerbGhallef UHC. The constraints, workload, and staff shortage at the latter two care structures justify this.

- This factor is somewhat more significant in patients at Moghress RHC compared to those at DerbGhallef UHC. This can be explained by the fact that the doctor at Moghress RHC is a diabetologist and has been involved in this PCA approach since 2012. Additionally, the patient sample from Moghress RHC is part of a total of 502 diabetic patients followed at this care structure, proving its effectiveness with patients in this rural commune with very low socio-economic and cultural levels (high poverty rate and very low literacy rate).

C. Clinico-biological impact of the PCA intervention:
- Moghress (RHC):

Table 3 exhibits the clinico-biological evolution (BMI in kg/m2, HbA1C in %) at the Moghress RHC group during the PCA intervention.

Table 3.
Clinico-biological evolution (BMI in kg/m 2, HbA1C Moghress during the PCA intervention.

Patient	Sex	Environment	Physiological age	Age of diabetes in years	Type of diabetes	Pathological associated	Initial BMI	BMI after 3 months	BMI after 6 months	BMI after 9 months	Initial HbA.C	HbA.C after 3 months	HbA.C after 6 months	HbA.C after 9 months
A	M	R	48	4	D1	–	22.7	24.2	24.8	24.8	11	9.2	8.5	7.9
B	F	R	69	2	D2	–	31	30	29.5	28	8.6	7.4	6.8	6.5
C	M	R	50	22	D1	–	29.2	27.4	27.4	26	11	9.6	7.6	6.7
D	F	R	72	2	D2	High blood pressure	32.6	30.5	30.5	28.7	10	9	8.4	7
E	F	R	68	2	D2	–	31	30.5	28	27.4	8.1	7.8	6.9	6.8
F	F	R	80	9	D2	High blood pressure. Heart failure	24.6	24.6	24.6	24.4	8.8	8.5	7.9	7.8
G	F	R	52	8	D2	High blood pressure	24.8	24.8	24.8	24.8	8.1	7.8	7.12	6.62
H	F	R	72	12	D2	High blood pressure. depression	21.5	23	24.6	24.6	9	7.4	7.3	7
I	H	R	52	5	D2	–	30.3	26	24.8	24.8	10	9.2	7.9	7
J	H	R	70	32	D2	Heart attack. High blood pressure. Heart failure	26.2	26	26.5	26.3	8.9	7.3	6.6	7.2

Figure 2 Presents evolution of the BMI in diabetic patients at the Moghress RHC during the PCA intervention.
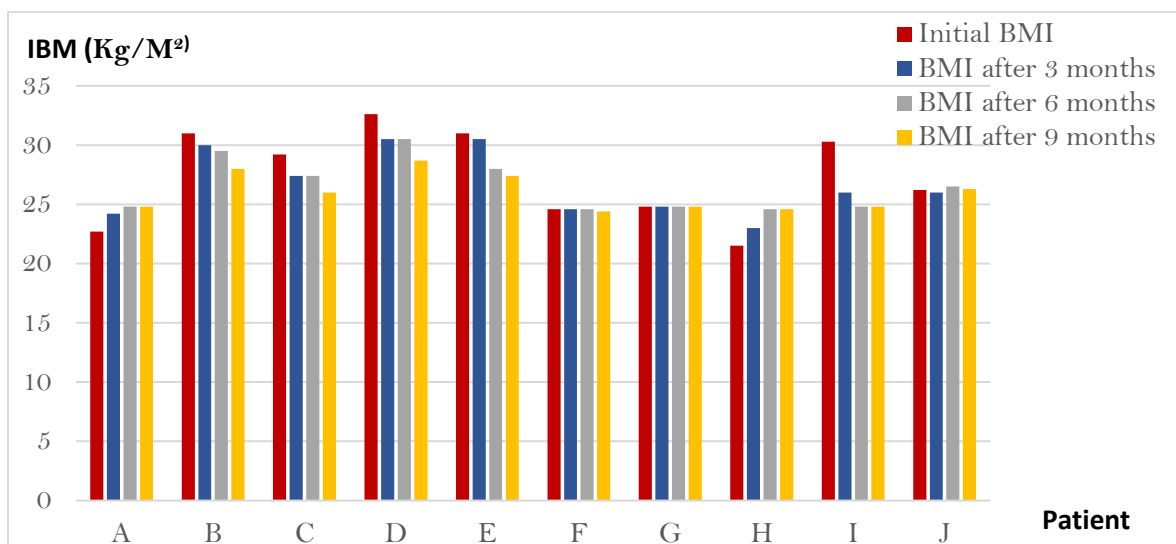

Figure 2.
Evolution of the BMI per patient during the PCA intervention.

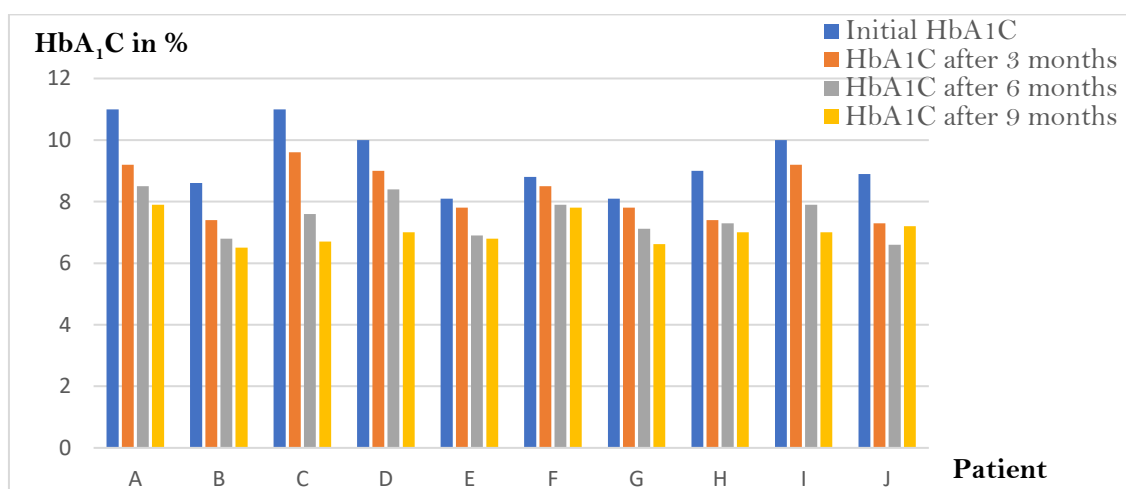Figure 3 Shows evolution of HbA1C per patient at the RHC Moghress group during the PCA intervention.

Figure 3.
Evolution of HbA1C per patient during the PCA intervention.

Comment:

Our study demonstrated improvement in Body Mass Index (BMI) and GlycatedHemoglobin (HbA$_1$c) in participants:

- BMI < 29.9 kg/m² in the 10 patients.
- Achievement of the HbA$_1$C objective ≤ 7% in 7 participants and a personalized objective between 7 and 8% for patients F and J (personalized objective according to physiological age, age of diabetes, associated pathologies).
- Improvement of HbA$_1$C without being able to reach the objective ≤ 7% in patient A (HbA1C: 7.8% after 9 months of the PCA intervention).

-   DerbGhallef(UHC):

Table 4 exhibits evolution of clinico-biological parameters (BMI, HbA1c) during the intervention of PCA in diabetic patients of DerbGhallef UHC.

Table 4.
Evolution of clinico-biological parameters (BMI, HbA$_1$c) during the intervention of PCA in diabetic patients of CSU Derb Ghallef.

Patient	Physiologicalage	Age of diabete in years	Type of diabete	Pathological associated	BMI (kg/m^2)				HbA$_1$C in %			
					Initial	After 3 months	After 6 months	After 9 months	Initial	After 3 months	After 6 months	After 9 months
A	87	2	D2	-	26,2	26,2	26	26	8,9	7,5	7	6,8
B	61	16	D2	-	24,9	24,7	24,5	24,6	9,5	8,3	6,9	6,6
C	58	4	D1	-	32	32	30	29,8	10	8,5	6,8	6,7
D	62	12	D2	-	26,6	26,6	25,2	24,9	8,9	7,8	7	7
E	70	6	D2	-	25,7	25,5	25,5	25,5	9,9	8,9	6,9	6,8
F	48	3	D2	-	34,1	32	30	28,7	7	6,6	6,4	6,4
G	36	2	D1	-	19,8	22,4	23,2	24,5	11	8,6	7,5	6,5
H	40	3	D1	-	24	24,4	24,6	24,6	10	9,3	7,2	6,6
I	51	9	D2	-	26	25,2	24,8	24,8	7,9	7,6	7,6	6,5
J	26	4	D1	-	22,2	24,6	24,6	24,8	12	10	9,3	8,4

Figure 4 Shows evolution of BMI per patient at the DerbGhallef UHC group during the PCA intervention.
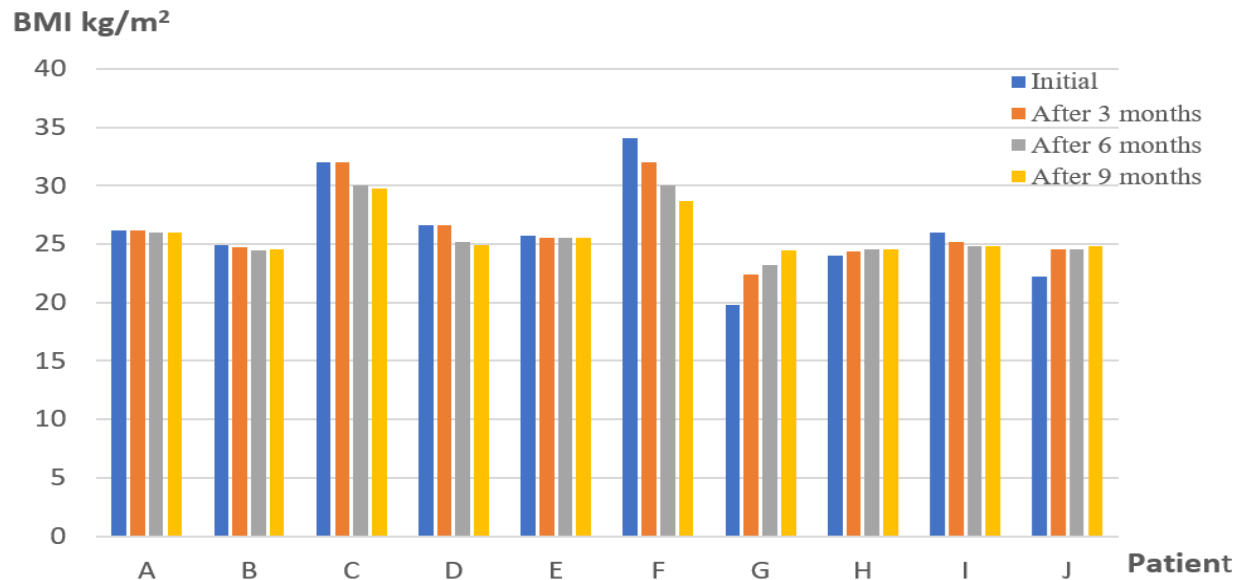

Figure 4.
Evolution of BMI per patient _ SC Derb Ghallef group during the PCA intervention.

Figure 5 Shows evolution of HbA1C per patient at the DerbGhallef UHC group during the PCA intervention.
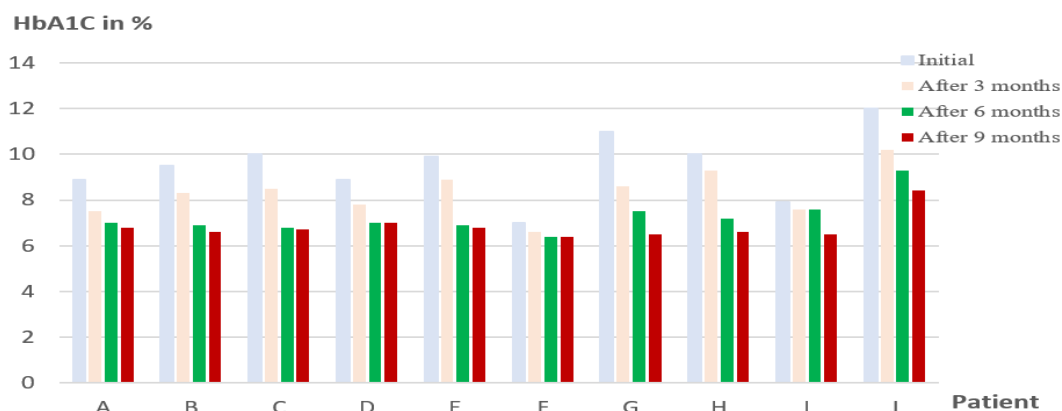

Figure 5.
Evolution of HbA₁C per patient _ SC Derb Ghallef group during the PCA intervention.

Comment:

The neuro-therapeutic support program has led to clinical and biological improvement. Indeed, there is a marked improvement in BMI and HbA₁C in participants:

- BMI < 29.9 kg/m² in the 10 patients.
- Achievement of the HbA₁C objective ≤ 7% in 9 participants and improvement in HbA₁C without being able to achieve the objective ≤ 7% in patient J (HbA₁C: 8.4% after 9 months of the PCA intervention, explained by non-compliance with treatment).

- **Diabetology (UHC):**

Table 5 shows evolution of clinico-biological parameters (BMI, HbA1C) during the intervention of PCA in diabetic patients of diabetology UHC.

Table 5.
Evolution of clinico-biological parameters (BMI, HbA1c) during the intervention of PCA in diabetic patients of the CSU of diabetology.

Gp	Patient	Sex	Environment	Physiological age	Diabetic of age in years	Type of diabetes	Path. associated	Initial BMI	BMI after 3 months	BMI after 6 months	BMI after 9 months	Initial HbA1c	HbA1c after 3 months	HbA1c after 6 months	HbA1c after 9 months
Gp 1	A1	F	R	72	18	D1	High blood pressure. Dyslipidemia	31	30	30	29	9.30%	8.70%	8%	6.80%
	B1	F	U	57	5	D2	High blood pressure. Cronical Hepathopathie	30	29.6	29.4	28.4	9.50%	9%	8.40%	7.02%
	C1	H	R	50	4	D1	Pulmonary tuberculosis	30	27	25.3	25.3	9%	7.80%	6.80%	6.60%

	D1	F	R	50	6	D1	-	33	30	28	27.8	11.10%	8.60%	6.90%	6.40%
	E1	H	R	36	15	D1	-	20	23	24.5	24.5	7.10%	6.90%	6.70%	6.60%
	F1	F	U	70	20	D2	Heart failure. Kidny failure	29	26.7	25.2	24.8	10.04%	9.28%	8.30%	8.04%
	G1	H	U	62	5	D2	High blood pressure	28	28.3	25	24.6	8%	7.80%	7.40%	6.80%
	H1	H	U	57	22	D2	-	25	24.8	24.8	24.8	7.60%	6.60%	6%	6.50%
	I1	F	U	72	18	D2	Hypothyroidisme	27	25.5	24.6	24.6	8.24%	7.30%	7.02%	7%
	J1	H	U	65	12	D2	-	32	30.2	27	26	9.90%	9.70%	7.90%	6.80%
Gp 2	A2	F	U	62	4	D2	High blood pressure. Heart failure	25	24.7	24.5	24.7	8.30%	7.50%	6.90%	6.70%
	B2	F	U	51	2	D2	High blood pressure. Heart failure	28	28.2	28.2	27.5	12.60%	10.60%	8.80%	8%
	C2	H	R	89	1	D2	-	24	23.9	23.5	23.5	7.80%	7.02%	6.40%	7%
	D2	F	U	69	18	D1	-	26	24.8	24.8	24.8	8.20%	6.80%	6.80%	7%
	E2	F	U	61	1	D2	-	33	30	29	27	13.10%	8.20%	7.50%	7.02%
	F2	F	R	40	3	D2	-	31	30.1	29	29	7.90%	6.80%	6.80%	6.50%
	G2	H	R	73	13	D2	-	25	24.8	24.8	24.6	8.50%	8.10%	7.20%	6.90%
	H2	F	R	48	1	D1	-	23	23.6	24.5	24.5	12%	9.30%	6.90%	6.60%
	I2	H	U	80	16	D1	Heart failure	29	28	28	26	9.50%	8.60%	8.20%	7.80%
	J2	H	R	76	10	D1	High blood pressure. Heart failure	24	24.6	24	24	10%	9.20%	8.30%	7.60%
Gp 3	A3	H	U	61	1	D2	-	33	31	31	29.8	13.10%	10.60%	9.70%	8,90%
	B3	H	U	67	10	D1	-	26	26	26	25.6	10.00%	8.90%	7.60%	7,10%
	C3	H	R	40	3	D1	-	25	24.9	25	24.6	8.50%	7.80%	7.60%	6,60%
	D3	H	R	41	1	D1	-	23	24.6	25	25.1	10.00%	8.10%	6.80%	6,50%
	E3	F	R	56	8	D2	Dyslipidemia	25	24.8	25	24.8	7.80%	7.20%	6.30%	6,50%
	F3	F	U	65	11	D1	-	30	30.4	30	29.5	9.40%	7;6%	7.20%	7,01%
	G3	H	R	49	5	D2	Dyslipidemia	36	33.4	31	28.4	10.80%	9%	7.80%	6,60%
	H3	H	R	87	2	D2	-	33	32	31	28.8	11.50%	9.20%	8.40%	7,60%
	I3	H	R	75	8	D2	-	35	33	31	29	9.20%	6.80%	6.70%	6,70%
	J3	F	R	59	18	D2	High blood pressure. Gout	29,3	28.6	28	27.5	7.60%	6.80%	6.70%	6,70%

Figure 6 Shows evolution of the BMI per patient Gp1 of diabetology UHC during the PCA intervention.
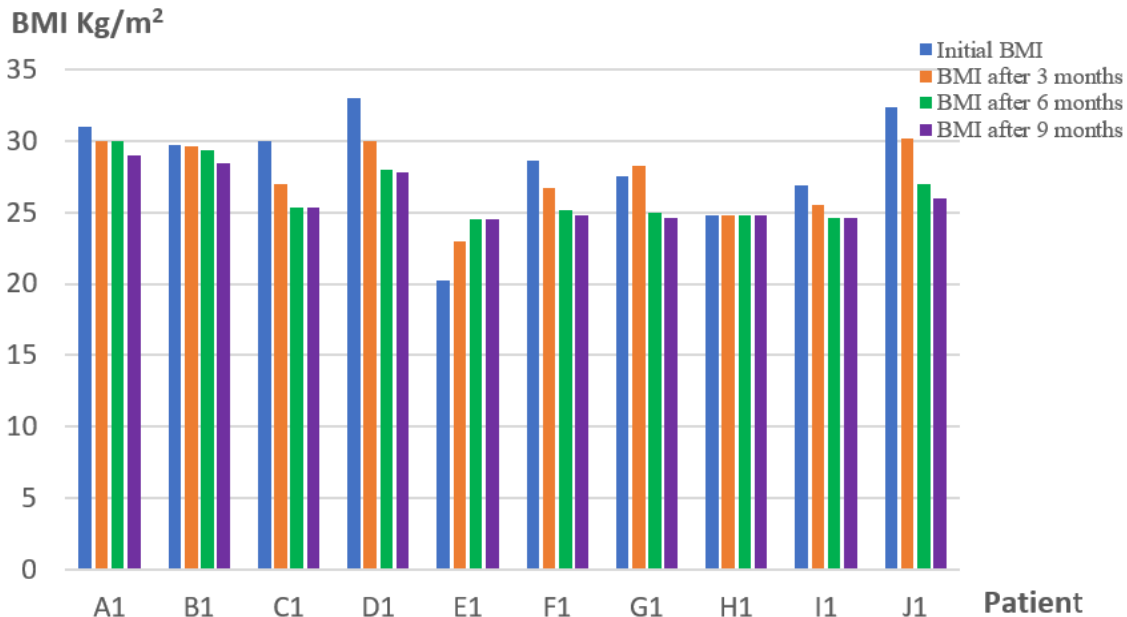
Figure 6.
Evolution of the BMI per Gpe1 CSU diabetology patient during the PCA intervention.

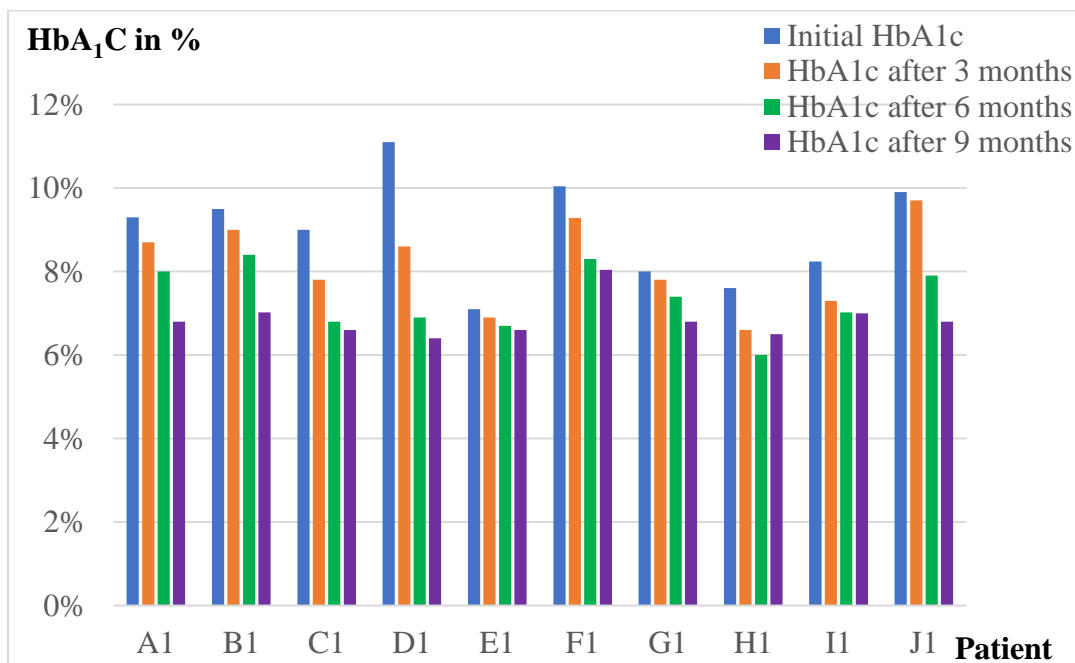Figure 7 Shows evolution of HbA1C per patient of the Gp1 of the diabetology UHC during the PCA intervention.

Figure 7.
Evolution of HbA$_1$C per patient of the Gpe1 of the diabetology CSU during the PCA intervention.

Figure 8 presents evolution of the BMI per patient of Gp2 of diabetology UHC during the PCA intervention.
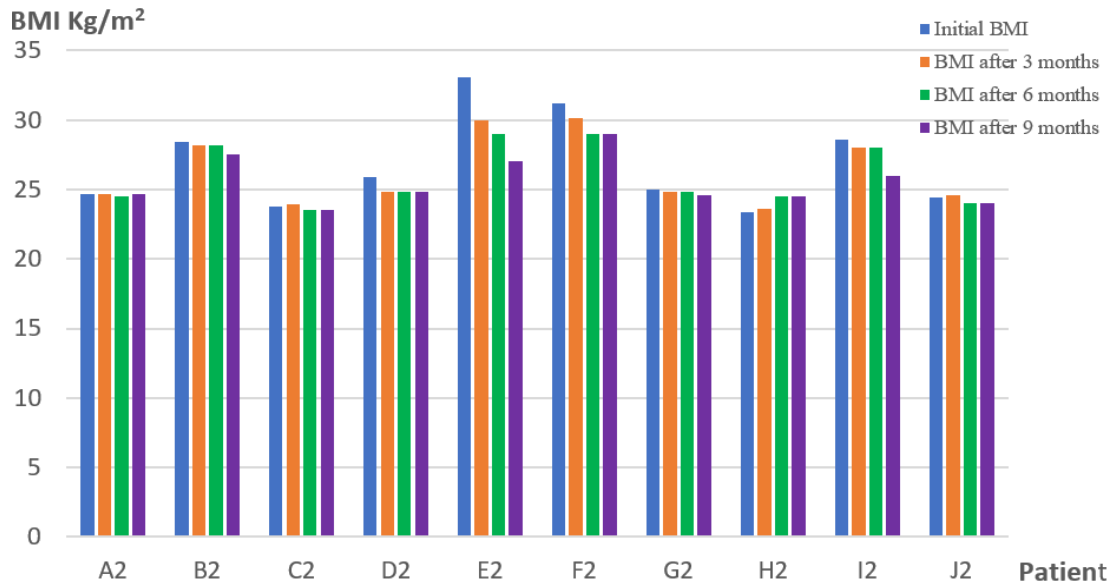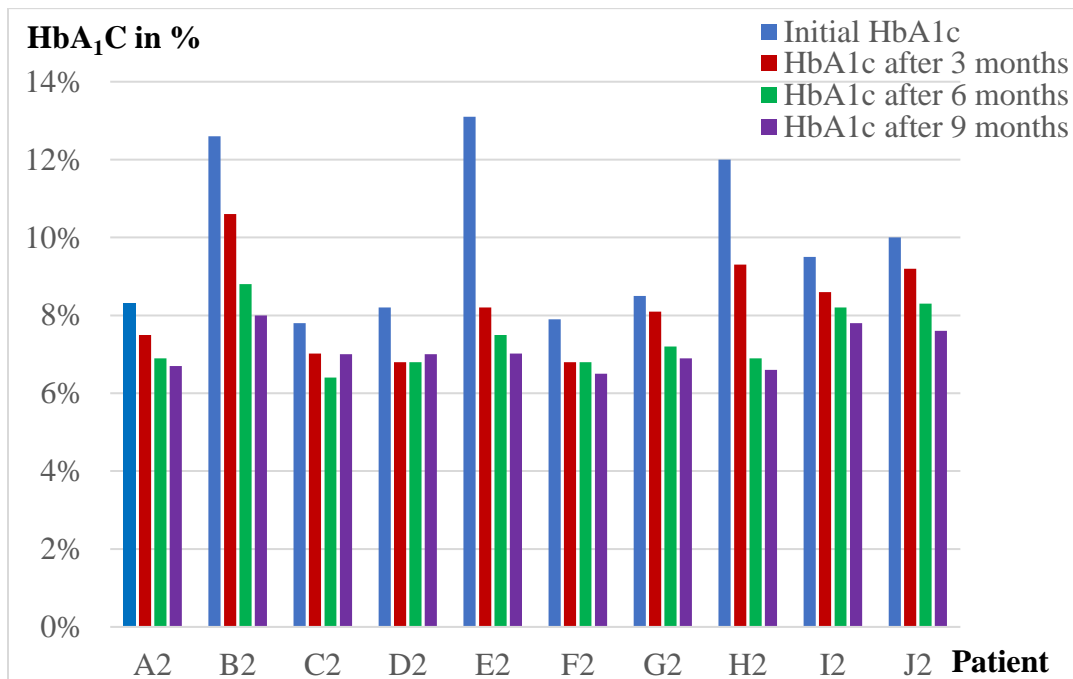
Figure 8.
Evolution of the BMI per patient of Gpe 2 of the diabetology CSU during the PCA intervention.

Figure 9 shows evolution of HbA1C per patient of the Gp2 of the diabetology UHC during the PCA intervention.

Figure 9.
Evolution of HbA$_1$C per patient of the Gpe2 of the diabetology CSU during the PCA intervention.

Figure 10 Shows evolution of the BMI per patient of Gp3 of diabetology UHC during the PCA intervention.
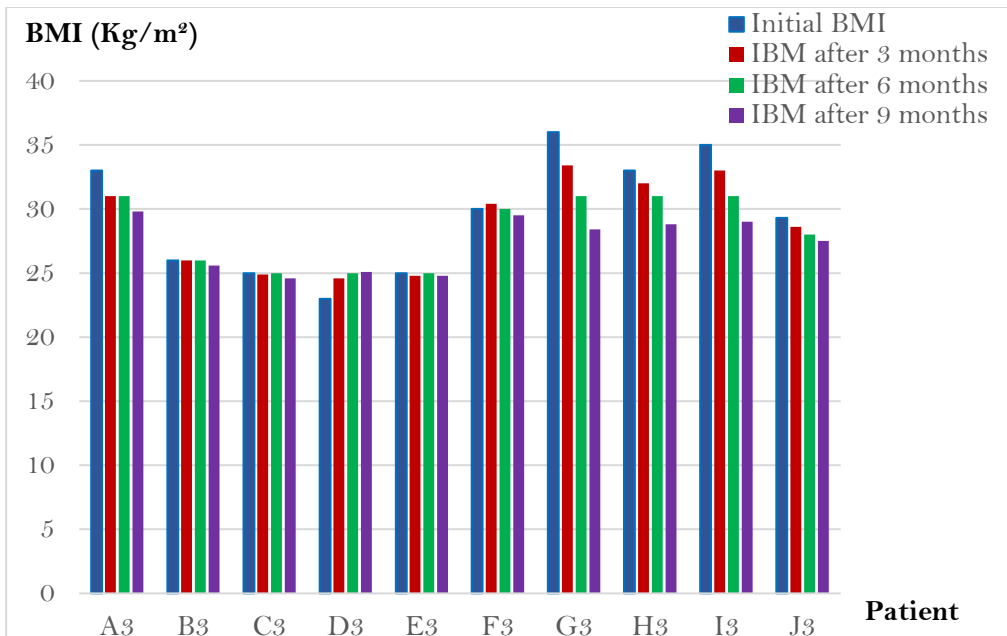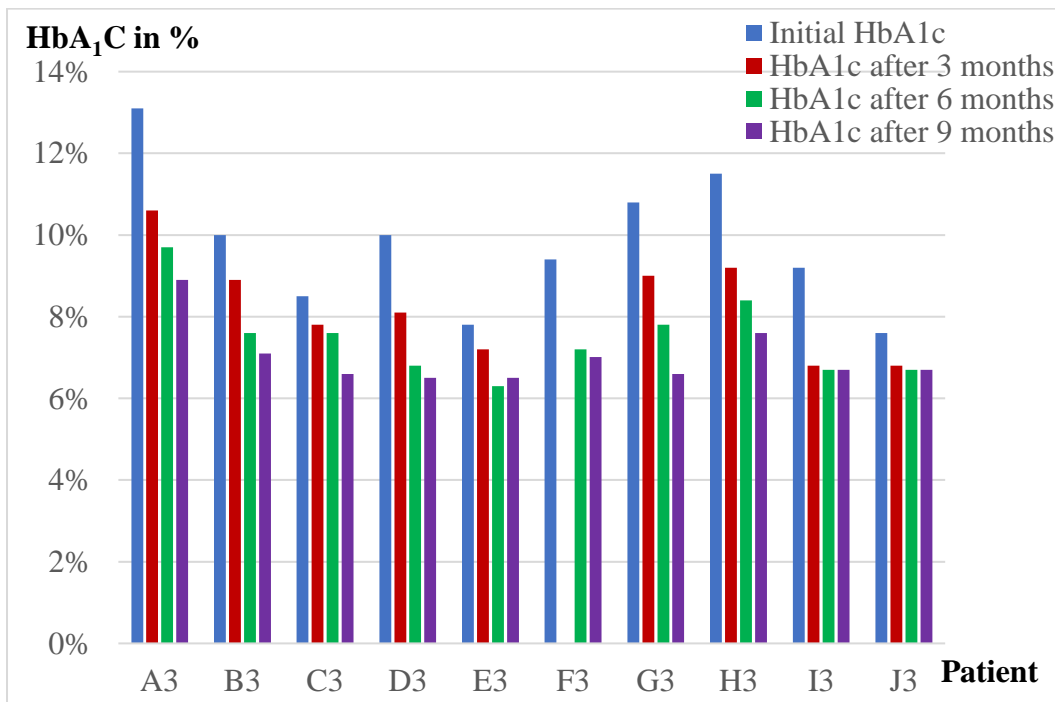
Figure 10.
Evolution of the BMI per patient of the Gpe 3 of the diabetology CSU during the PCA intervention.

[Figure 11](#) shows evolution of HbA1C per patient of the Gp3 of the diabetology UHC during the PCA intervention.

Figure 11.
Evolution of HbA_1C in % per patient of the Gpe 3 of the diabetology.

Comment:

The results of our study allow the following observations among the participants of the diabetology center:

Patients showed a significant decrease in HbA$_1$C:

- Achievement of the HbA1C target ≤ 7 in the 9 patients in Group 1, and the 8 patients in Group 2.
- Achievement of the personalized HbA$_1$C target between 7% and 8% in patient F1 of Group 1, patients B2 and I2 of Group 2, patients H3 of Group 3.
- Patient A3 of Group 3 has failed to reach the HbA$_1$C target.
- Stabilization or improvement of BMI (≤ 29.9 kg/m²) in patients of the 3 groups.

4.2. Limits and Contextual Constraints of PCA

Issue 1: How do you evaluate the integration of the principles of PCA into your psychotherapeutic support strategies for diabetic patient?

Issue 2: What are the limits and contextual constraints that hinder the use of the patient-centered approach by doctors in the process of supporting diabetic patients in the context of public health promotion?

The results highlight contextual constraints for both doctors and patients: exogenous and endogenous factors imposed by national and regional health policies that directly influence the relevance, effectiveness, and efficiency of PCA treatment approaches:

- There is lack of in-depth psycho-pedagogical skills required to implement an effective PCA approach.
- Lack of an adequate initial and continuing training program in PCA for public health doctors.
- Lack of didactic and psycho-pedagogical materials (audiovisual aids, conversation maps, collaborative psychosocial supports, educational tools like tool sheets, personalized information tools such as brochures, posters, games, quizzes, "diabetes" websites in rural areas, and files for individualized appointment management).
- There is shortage of personnel with PCA training.
- Lack of specialized training dedicated to the PCA of diabetic patients.
- Ignorance of new approaches and support techniques for diabetic patients is a significant issue.
- A large number of patients per doctor (Ratio: 7.1 doctors per 10,000 inhabitants).
- Difficulty in global follow-up of multiple pathologies and individualized support and personalized care.
- Psychotherapeutic support is generally punctual and decontextualized.

4.3. Summary

The results we obtained allow us to highlight several principles of PCA effectiveness: Diabetic patients have emphasized the importance of patient-centered support skills to create conditions for responsible management of compliance and therapeutic adherence, reflexivity, and motivation in the promotion of health.

PCA has developed the skills of self-management and self-direction, therapeutic compliance, and patient well-being. Additionally, we note a significant improvement in behavior, self-knowledge, and self-esteem in the majority of diabetics who benefited from these patient-centered interventions, along with the enhancement of cognitive strategies and a substantial improvement in bioclinical parameters (BMI, HbA$_1$C).

From our study, it is evident that through the patient-centered approach, patients can mobilize their cognitive and metacognitive resources, gradually leading to a deeper understanding of themselves and their disease. The patient develops their own "self-concept" (self-esteem, self-confidence, self-efficacy, self-determination, and self-management) and stimulates learning through self-assessment of successes and mistakes. More than an observer, the patient becomes a decision-maker, an actor, and a self-

observer.

Our practical experience as a family doctor and diabetologist at the Moghress RHC since 2012 has demonstrated these achievements. The encouraging results obtained with our diabetic patients of a very low socio-economic and cultural level motivated us to conduct this study.

The Moghress RHC serves a population of 20,770 inhabitants (one doctor for every 20,770 inhabitants), with 502 patients being monitored for diabetes, as indicated in the routine report of June 2022, showing continuous growth.

Aware of the challenges our patients face due to the difficulties of their lives and the limited resources in the rural commune of ArbiaaMoghress (classified as a vulnerable commune located 41 km from the city of El Jadida, experiencing accessibility issues, with a poverty rate of 30%, an illiteracy rate of 57.9%, and an unemployment rate of 45%) [30] we have dedicated ourselves to our traditional practice, focusing on the needs and satisfaction of patients. Recognizing the hardships faced by patients and the scarcity of resources, as diabetologists, we have endeavored to streamline their care, address the needs of this population, and satisfy them by enhancing their cognitive skills. This effort has resulted in increased motivation, empowerment, integration, and commitment to self-management among the patients.

Over a span of 9 years, these patients have not only acquired responsibility but have also become active participants in their care. Their motivation led to their commitment to adhere to their treatment, which initially resulted in the creation of the Basma Association of Diabetics, in the municipality of Moghress. We were able to establish this association in 2019 with the initial support of diabetic patients, the municipality association of Mazagan (located in El Jadida), and the company Gylmed, the exclusive representative of Acon International.

The association that we successfully established was the result of a patient-centered approach. It incorporates a diabetic patient and a relative of a diabetic patient into its office, empowering them to play an active role in their care. The association has streamlined diabetic care by offering various services, including the measurement of HbA_1C, blood sugar, blood pressure, glucose research, ketone bodies in the urine, weight gain, height measurement, and BMI calculation. These services, which patients previously had to travel 41 km to receive from the on-site diabetologist, are now conveniently accessible.

Furthermore, the association has addressed the needs of diabetic patients and played a crucial role in screening for diabetes and high blood pressure among all applicants. It has provided facilities for obtaining glucometers, blood pressure monitors, and to conduct analyses. The association has ensured that services for fragile individuals are provided free of charge. Notably, during the COVID-19 vaccination campaign, the association played a vital role in measuring blood sugar, blood pressure, and HbA_1C to determine eligibility for anti-COVID-19 vaccination.

Additionally, through this association, we have responded to the employment needs of the population of the municipality of ArbiaaMoghress by providing a job within the association for a graduate who is unemployed and also has diabetic relatives. In addition, the association provides assistance to needy patients.

The effectiveness of Patient-Centered Care (PCA) with this population inspired us to conduct our study, demonstrating that despite socio-cultural and economic constraints, as well as work-related challenges, PCA has proven effective in the reflective and responsible management of diabetic patients.

5. Conclusion

Our study suggests that the Patient-Centered Approach (PCA) model is well-suited for diabetes management. It has demonstrated effectiveness in influencing disease experience, improving the quality of life, and, notably, significantly impacting self-care capabilities.

The results are highly encouraging, particularly concerning self-care, a primary goal in interventions akin to "disease management." Despite limitations and challenges faced by both patients and doctors, the PCA approach has proven effective. This effectiveness was evident in the positive

outcomes observed among the study's subjects in the rural environment of Moghress, even in the face of resource difficulties and a low socio-economic and cultural level. Through this approach, we successfully fostered self-esteem, autonomy, responsibility, and motivation for effective and responsible care.

This study has provided insight into the operational aspects of the PCA model as a therapeutic system. Comparison with other models has further enriched our understanding, explained its mechanisms, and highlighted processes of change and adaptation.

Within the competency-based approach, the PCA model could serve as a focal point for specific teaching. It also presents a valuable research area for the discipline of general medicine, particularly in studying its effectiveness in managing diabetes-related consequences. To broaden its application, it is imperative to assess its effectiveness, especially in relation to diabetes's primary consequences.

Exploring the potential synergies of combining the PCA approach with other methods holds promise for enhancing the management of diabetic patients, suggesting a promising avenue for future research and development.

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Institutional Review Board Statement:
The Ethical Committee of the Ministry of Health and Social Protection to the Province of El Jadida, Morocco has granted approval for this study on 6 March 2023 (Ref. No. 7812).

Transparency:
The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Competing Interests:
The authors declare that they have no competing interests.

Authors' Contributions:
All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

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