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SHORT RESEARCH REPORT

The impact of medication-focused workshops in a diabetes educational program in jail: a pilot study

Susanna Davoust[1] · Valerie Ghaleb[2] · Sandrine Guillon[2] · Valerie Amirat-Combralier[1] · Christophe Bartoli[2] · Guillaume Hache[1]

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Abstract *Background* Correctional institutions have unique circumstances offering care and the opportunity to adopt healthy behaviours for populations suffering from chronic diseases such as diabetes. In view of their expertise on medication, pharmacists can contribute to multidisciplinary educational health programmes in prisons. *Objective* To assess the effectiveness of a pharmacist led diabetes medication-related workshops. *Method* Pharmacists led workshops about patients' empowerment in their treatment within the educational program. On a prospective observational study basis, the impact was assessed in terms of relevance, learning outcomes and achievement transfer using the Kirkpatrick training assessment method. Hb1Ac was measured as glycemic control outcome. *Results* Fifteen patients involved in the workshops showed a significant decrease in HbA1c compared to the control group (-1.18 ± 0.52 vs. $+0.26 \pm 0.28$ %; $p < 0.001$). *Relevance*: All participants were satisfied and ready to join other sessions. *Learning outcomes*: *(LO)* Postworkshop scores were significantly improved (LO1: 4.2 ± 0.9 vs. 2.2 ± 1.4; LO2: 4.5 ± 0.9 vs. 2.6 ± 1.3; $p < 0.05$). Decrease in HbA1c was correlated to increase in LO2's scores. ($Y = 0.946 - 1.134X$; $R = -0.692$; $p < 0.05$). *Achievement transfer*: Key points from all LOs were reported. In case studies, 70 % of participants adopted healthy strategies (LO3). *Conclusion* These results highlight the positive impact of the workshops and the additive value of pharmacists' involvement within the educational program in jail.

Keywords Diabetes · France · Health educational program · Prison · Self-management

Impact of findings on practice

- Planning time dedicated to pharmacotherapy may be important to improve clinical outcomes of diabetic patients in jail.
- The Kirkpatrick training assessment method may be adapted to assess the impact of part or whole health educational programmes.

Introduction

Correctional institutions exhibit unique circumstances that must be taken into account in order to achieve international care standards and sensitize patients to self-management. Indeed, self-management is the corner stone of treatment for people with chronic diseases, such as diabetes [1]. Optimal management of type 2 diabetes mellitus (T2DM) requires multiple complex behaviors that have to be performed on a long-term basis. For example, adherence to treatment recommendations is crucial for improving health status, but more than 50 % of patients with T2DM are non-adherent in studies focusing on medication adherence [2]. Incomprehensible or confusing information is a massive barrier to adherence and improving communication with healthcare providers is necessary to lead the patients to better comprehension. In this way, patient educational

✉ Guillaume Hache
guillaume.hache@univ-amu.fr

[1] Penitentiary Center of Marseille, Pharmacy, 239 Chemin de Morgiou, Marseille, France

[2] Penitentiary Center of Marseille, Medical Unit, 239 Chemin de Morgiou, Marseille, France

programmes are relevant strategies to overcome barriers from the perspectives of patients and healthcare providers. These programmes aim to help patients adopt healthy behaviors on a long-term basis, and subsequently reduce severe health complications of T2DM [3]. Although 6.7 % of the incarcerated population suffers from diabetes in France [4], there are few reports about diabetes educational programmes in prison. Moreover, assessment of patient educational programmes are generally executed by different methods. This makes it difficult to distinguish the more relevant educational points to be covered in programmes, and to conduct more targeted and effective patient education. The Kirkpatrick model is a well-established method in general training evaluation, in which interest is growing in health education assessment. It delineates four levels of training outcomes: reaction, learning, behavior, and results. In practice, measures at these levels are addressed by three learner related impact markers (relevance, learning outcomes, achievement transfer) and one external marker (such as a biological parameter) [5].

As pharmaceutical care in diabetes provides positive clinical outcomes [6], pharmacists have an important role in providing care and education to patients in addition to medication supply. We thus challenged whether pharmacists may have a positive impact within diabetes educational programmes in jail (i.e. a short-term correctional institution), particularly to promote and help inmate patients adopt healthy medication-related behaviors.

Aim of the study

To assess the effectiveness of workshops focused on medication-related behaviors in a T2DM educational program implemented in jail.

Ethical approval

Prior to initiation of the project, the Institutional Review Board at Marseille University Hospital determined that the project was exempt from full IRB reviewed since it was a quality improvement project. Consent was collected from patients for the use of their anonymized medical information for statistical analysis.

Method

Procedure and patients

Within our institution, all male patients diagnosed with T2DM are invited to join the transdisciplinary educational program. On a voluntary basis, patients are allowed to choose workshops which are led by a pharmacist, physician and/or nurse(s), after completing a general module. Among these, the pharmacist leads two workshops focused on medication, combining theoretical knowledge and practical training about patients' empowerment in their treatment. Three learning objectives (LOs) were defined with the patients, to ensure they could:

LO1 identify their diabetes medication;
LO2 use medication safely and for maximum therapeutic effectiveness;
LO3 develop self-management decision-making in the event of side-effects and acute complications.

In groups of 4–6 individuals, patients participated in workshops lasting 90 min. Various tools were used to facilitate the sessions. Each session began with a round to assess the expectations of the patients, and ended with self-assessment questionnaires. For the first medication-related workshop, a slide presentation introduced the subject. Each topic opened discussion between the group's members in order to collectively define the ins and outs of diabetes' physiopathology, for a better understanding of their treatment. By the end of the session all participants collaborated to make summary sheets. The second session included three steps: (a) establishment of a personal daily drug management plan, (b) manipulation of drug packing to find the relevant information, and (c) the study of virtual cases in a game format.

We conducted the assessment from May to July 2014 in the jail of Marseille, France.

Assessment and measures

At the end of the sessions, self-assessment questionnaires were performed to assess:

1. relevance, by rating the level of satisfaction;
2. learning outcomes from LO1 and LO2, by self-rated scales (from 0 to 5) about perceived knowledge of these topics, both before and after the workshops. "for each item, please estimate your level of knowledge: (1) How my medications act on glycemia? (2) How should I use my oral antidiabetic medications?";
3. achievement transfer, by (1) posing questions about setting up new skills, such as "regarding your current treatment, which new skills will you set up in order to optimize clinical outcomes?" and (2) self-management in case studies such as: "Jack has type 2 diabetes and is prescribed repaglinide and metformin. Today, he is waking up later than usually, and take his medication with a coffee instead of his breakfast." Then, the case explored how to recognize hypoglycemia, its potential

relationship with current treatment and how to deal with it.

Impact of the workshops was estimated in terms of relevance, learning outcomes and achievement transfer [7].

Glycated hemoglobin (HbA1c) was measured at inclusion and 3 months after workshop attendance, as a retrospective measure of average blood glucose over the three past months. HbA1c is widely used as the central clinical indicator of glycemic control in T2DM. Patients who decided to start another workshop first were considered as control group for the statistical analysis of the change in HbA1c.

Taken together, these four parameters meet the four levels for training evaluation proposed by the Kirkpatrick model [5]. Relevance, learning outcomes and achievement transfer were the three learner/patient related impact markers and HbA1c measurement the external marker.

Statistical analysis

Data are expressed as mean ± SD. Statistical analysis were performed using Stat-View 5.0 Software (Abacus Concepts Inc., Berkley, California, USA). Significance was assessed by the repeated measure *t* test and the correlation was assessed by the Pearson's test. Significance was defined as a p value <0.05.

Results

Thirty patients with T2DM volunteered for this educational program during the observation period. Of these, fifteen participated in the medication-focused workshops first (MFWF group), whereas fifteen chose other workshops, such as "diet: good reflexes for better health" or "how to practice physical activity adapted to me?", to begin with (control group). The mean age was 49.3 ± 10.8 and 48.7 ± 13.9 years (NS), with a mean HbA1c of 7.8 ± 1.6 % and 7.2 ± 1.2 % (NS) before the study, for MFWF group and control group, respectively.

Relevance

All participants considered themselves 'satisfied' or 'very satisfied' and ready to take part in other sessions about medication (Fig. 1a).

Learning outcomes

Post-workshop scores were significantly improved for LO1 (4.2 ± 0.9 vs. 2.2 ± 1.4; $p < 0.05$ %) and LO2 (4.5 ± 0.9 vs. 2.6 ± 1.3; $p < 0.05$ %) (Fig. 1b), highlighting increases in perceived knowledge. Relative improvements of 77.4 and 78.8 %, respectively, illustrate the effectiveness of teaching.

Achievement transfer

To questions exploring the learned skills, key points from all LOs were reported with an average of two new skills per patient. During case studies involving situations inside and outside of jail detention, 70 % of the participants demonstrated an adoption of healthy strategies that they declared to be unaware of before (LO3) (Fig. 1c).

Glycemic control

MFWF group showed a significant decrease in HbA1c compared to the control group (-1.18 ± 0.52 vs. $+0.26 \pm 0.28$ %; $p < 0.001$). Furthermore, the decrease in HbA1c was significantly correlated to the increase in perceived knowledge score in LO2 ($Y = 0.946 - 1.134 * X$; $R = -0.692$; $p < 0.05$) (Fig. 1d).

Discussion

Assessing all measured parameters, our study emphasizes the positive impact of medication-focused workshops on patients with T2DM in jail (Fig. 1).

Firstly, we found a reduction in HbA1c of 1.2 %, highlighting a positive evolution in glycemic control post training. We cannot exclude confounding factors, such as diet modification during the study, but these results are comparable to those of previous studies assessing pharmacists' involvement in diabetes care. For example, patients who were monitored or counselled by community pharmacists over a 12-month period displayed approximately a 1.6 % reduction in HbA1c [6]. A comparable reduction (1.8 %) has been described as the result of community pharmacists' interventions consisting of monitoring and prescribing if necessary [8]. Yet, heterogeneous interventions as well as differences in the role of pharmacists in different countries contribute to the difficulty in identifying more effective methods. Interestingly, an educational intervention composed of two pharmacist-led sessions significantly reduced patients' HbA1c by 1.7 % at 3 months. In the first session, theoretical knowledge about pharmacotherapy was taught, and the second session covered information on adherence and self-management [9]. Thus, we chose to implement a similar framework within the T2DM educational program in jail, as it had previously demonstrated effectiveness in a wider community.

Secondly, patients' satisfaction and will to develop new skills illustrate their interest in health issues and need for information. Significant increases in post-workshop scores

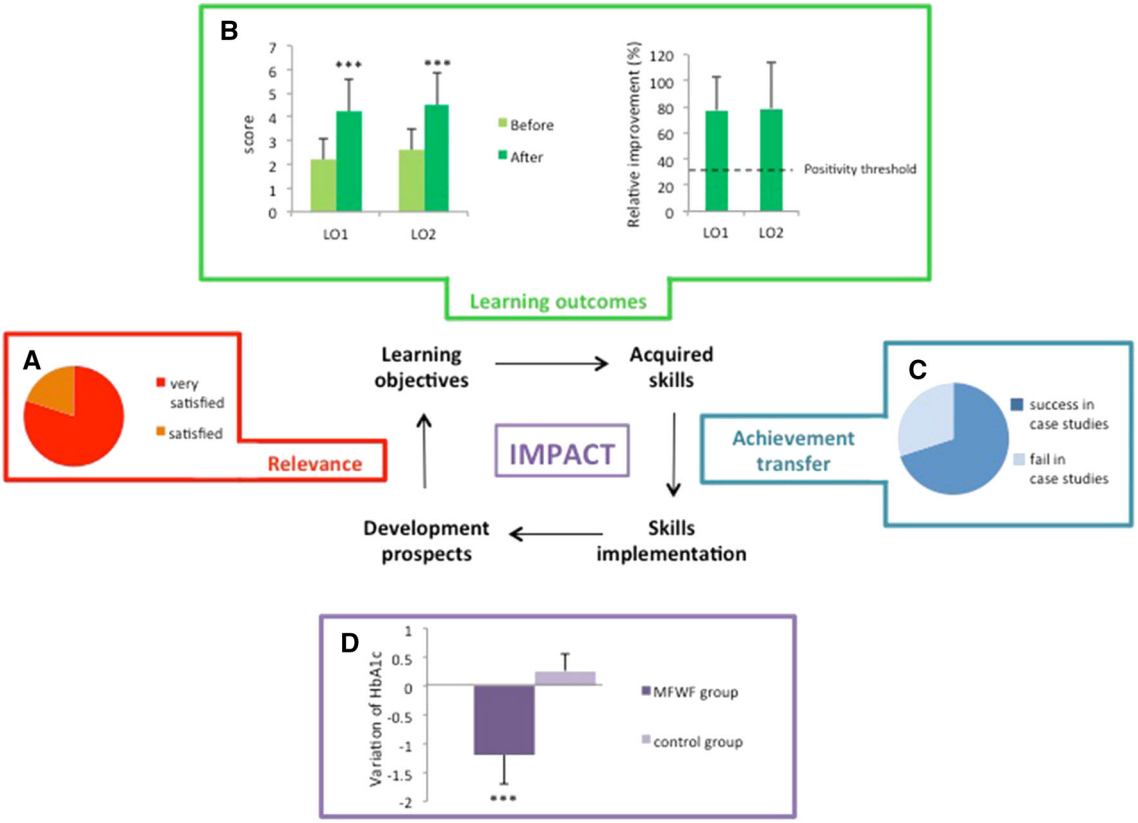

Fig. 1 The impact of workshops was assessed by the Kirkpatrick training assessment method. Relevance (**a**), learning outcomes (**b**) and achievement transfer (**c**) are the three learner-related impact markers; HbA1c (**d**) is the external one. *MFWF* medication-focused workshops first. **b** Data are plotted as mean ± SD. ***$p < 0.001$ versus before. **d** Data are plotted as mean ± SD. ***$p < 0.001$ versus control

demonstrate that participants felt they acquired knowledge: a metacognitive approach of learning [6].

In addition, the relative improvements (>75 %) for each LO highlight the teaching effectiveness of the sessions and contribute to the validation of our educational framework [7]. Assessing transfer was challenging as behavioral evolutions in inmates' daily life was difficult to explore. All participants reported intention to set up new skills and 70 % demonstrated to have adopted the healthier behavior in case studies. Although virtual, these results suggest that patients were not reluctant to changes, and that they felt able to improve their behaviors. Interestingly, perceived competence (or self-efficacy), has been identified as a motivational parameter involved in both adoption of, and long-term adherence to self-management behaviors in T2DM [10]. Taken together, these four parameters meet the four levels for training evaluation proposed by the Kirkpatrick model [5]. Relevance, learning outcomes and achievement transfer were the three learner/patient related impact markers and HbA1c measurement the external marker. To our knowledge, our study reports the use for evaluation of educational health programmes in jail for the first time. The positive results of our study suggest that planning time dedicated to pharmacotherapy may be important to improve clinical outcomes of diabetic patients in jail. In this regard, meetings with healthcare providers are systematically scheduled within the few days following imprisonment. This may present an initial opportunity to discuss these considerations with patients, but the first days of an inmate's stay are stressful and busy, therefore it is unlikely to be the most relevant period to do so. However, integrating a 2-session intervention into an educational program later on can avoid organizational issues at the beginning of an inmates stay, and have a positive impact leading to better clinical outcomes.

Interestingly, we found a significant correlation between increases in the short-term perceived knowledge score and decreases in HbA1c ($Y = 0.946 - 1.134 * X$; $R = -0.692$; $p < 0.05$), which highlights that metacognition may be linked to improvement in self-management. To our knowledge, the link between metacognition and clinical outcomes in a jail population has been reported for the first time in this study. These short-term results are very encouraging, although the lack of long-term evaluation may represent a limitation of this study. However, if confirmed in larger scale studies, we suggest that metacognition might be a co-predictor of clinical

outcomes, in addition to self-efficacy. Metacognition assessment may help to propose alternative strategies for patients who felt less confident in perceived knowledge. Moreover, the continuity of education is of major importance for the long-term adherence to self-management behaviors in T2DM. As the average length of stay in jail is 5 months in France, it should be taken into consideration in health educational programmes in jail to a greater extent.

Conclusion

These results have emphasized that an educational program may be a powerful healthcare intervention to generate positive changes in the lifestyle and health status of patients with T2DM in jail. More specifically, our study has demonstrated that patients who participated in workshops focused on medication after a general module, had better clinical outcomes than those who had not yet participated. This reflects a positive evolution in daily inmate life. Interestingly, along with sessions, we encouraged the translation of educational points and behaviours to situations outside of jail, in order to promote the maintenance of these new skills after release. Our report highlights the positive impact of pharmacists' involvement in T2DM educational program in jail.

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Conflicts of interest The authors declare no conflict of interest.

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