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Immediate Changes Following Common-Sense Model-Based Diabetes Education in Vietnamese Adults with Type 2 Diabetes: A Matched Quasi-Experimental Study

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Abstract **Original Research Article**

Diabetes self-management education may be strengthened when it addresses how people understand and respond to their illness. This matched controlled pretest–posttest study examined immediate changes following a 60-minute Common-Sense Model-based education session among adults with type 2 diabetes in Dak Lak Province, Vietnam. Sixty-six participants from two commune health stations were matched by sex, age group, and diabetes duration (33 intervention and 33 control). Outcomes were diabetes knowledge (24-item Diabetes Knowledge Questionnaire), illness perceptions (Brief Illness Perception Questionnaire), and diabetes management self-efficacy (Thai Diabetes Management Self-Efficacy Scale). Within-group and posttest between-group comparisons were conducted with paired t tests, reflecting the matched design. Immediately after the session, the intervention group had higher mean knowledge than the control group (20.42 ± 1.52 vs 10.36 ± 2.47; $p < 0.001$) and higher scores in dietary management, self-monitoring, physical activity, and regimen adherence (all $p < 0.001$). Posttest scores also differed between groups across all eight illness-perception dimensions ($p < 0.001$ for seven dimensions; emotional response $p = 0.011$). The proportion of intervention participants able to name a perceived cause of diabetes increased from 5/33 to 33/33, compared with 6/33 to 9/33 in the control group. The findings indicate substantial immediate changes in knowledge, self-efficacy, and illness representations following the theory-based session. Because one health station represented each study arm and outcomes were measured immediately, the results do not establish sustained behavioral or clinical benefit. Multi-site trials with longer follow-up are warranted.

Keywords: Type 2 diabetes mellitus, Common-Sense Model, diabetes education, illness perception, knowledge, self-efficacy, Vietnam.

INTRODUCTION

Type 2 diabetes mellitus is a major and growing public health challenge. Effective care requires not only pharmacological treatment but also sustained daily decisions about food, physical activity, medication use, monitoring, and prevention of complications. International guidance therefore places diabetes self-management education and support within routine care [1,2]. Evidence from low- and middle-income countries suggests that structured education can improve glycaemic and cardiometabolic outcomes, although intervention content, intensity, and implementation vary considerably [3].

Knowledge alone may be insufficient to change self-management. People interpret symptoms, causes, expected duration, consequences, and controllability of illness through personal cognitive and emotional representations. The Common-Sense Model of self-regulation proposes that these representations shape coping responses and subsequent appraisal [4]. In diabetes, a person who views the condition as intermittent, minimally consequential, or controlled only by clinicians may be less likely to sustain self-care. Conversely, an education session that elicits existing beliefs, corrects misconceptions, and links illness understanding with concrete actions may create a more coherent basis for self-management.

Self-efficacy is also central to behavior change. Bandura described self-efficacy as confidence in one's ability to organize and perform actions needed to achieve desired outcomes [5]. Diabetes education can support self-efficacy by making tasks understandable, achievable, and relevant to daily life. A quasi-

experimental study in Cambodia reported improved illness perceptions, knowledge, and self-efficacy after an education program based on the Common-Sense Model [6]. A small Vietnamese pilot likewise suggested that a locally adapted program was feasible and associated with short-term gains in these outcomes [7]. However, evidence from community-level diabetes services in Vietnam remains limited.

This study therefore examined immediate pretest-to-posttest changes after a brief Common-Sense Model-based diabetes education session among Vietnamese adults with type 2 diabetes. The primary outcomes were diabetes knowledge and self-efficacy for dietary management, self-monitoring, physical activity, and regimen adherence. Illness-perception dimensions were also assessed. We hypothesized that participants receiving the education session would have higher immediate posttest scores than matched participants receiving usual care.

MATERIAL AND METHODS

Study design and setting

A matched controlled pretest–posttest quasi-experimental design was used in July 2020. Two commune health stations were selected from 21 stations in Buon Ma Thuot City, Dak Lak Province, Vietnam. Tan An Commune Health Station served as the intervention site and Tan Thanh Commune Health Station served as the control site. Because each study arm was represented by one health station, site and intervention effects could not be separated. Reporting was informed by the TREND statement for nonrandomized evaluations and the TIDieR framework for intervention description where applicable [13,14].

Participants and sampling

Eligible participants were adults aged 18–60 years with type 2 diabetes who could read and write Vietnamese and were able to participate in the study activities. Individuals with a severe concurrent health condition that would prevent participation were excluded. Sample-size planning assumed a standardized effect size of 0.80, informed by a previous study reporting an effect of approximately 0.75, with a two-sided alpha of 0.05, 80% power, and allowance for 20% potential loss. The target was 33 participants per group.

Participants at the two sites were matched one-to-one by sex, age group, and duration of diabetes. Forty-five eligible matched pairs were identified, and 33 pairs were selected systematically. The final sample comprised 66 participants: 33 in the intervention group and 33 in the control group. All selected participants completed both assessments and were included in the analysis.

Intervention and usual care

The intervention was a 60-minute, group-based education session delivered to groups of eight or nine participants. It was organized around the Common-Sense Model domains and combined belief elicitation, corrective information, and practical self-management guidance. During the first 5 minutes, the educator established rapport and elicited participants' current beliefs and concerns. During the next 25 minutes, discussion addressed the nature and causes of type 2 diabetes, symptoms, emotional responses, and common misconceptions. The final 30 minutes addressed chronicity, consequences, personal and treatment control, and feasible actions related to diet, physical activity, medication use, stress management, monitoring, and foot care.

Teaching materials included an illustrated booklet, posters, food cards, a short video, and activity mats. Participants were encouraged to connect the information with their own experience and to identify specific actions they felt able to perform. The control group received routine services available at the commune health station and did not receive the structured session before posttest data collection. Educational materials were provided to control participants after study completion.

Measures

Diabetes knowledge was assessed with the 24-item Diabetes Knowledge Questionnaire (DKQ-24) [8]. Correct responses receive one point and incorrect or "do not know" responses receive zero points, producing a total score from 0 to 24; higher scores indicate greater knowledge.

Illness perceptions were assessed with the Brief Illness Perception Questionnaire (BIPQ) [9]. Eight quantitative items assess perceived consequences, timeline, personal control, treatment control, symptom identity, concern, understanding (coherence), and emotional response on 0–10 scales. The ninth item asks participants to identify perceived causes. The dimensions were analyzed separately because higher scores do not have a uniform favorable meaning: higher control and coherence scores indicate stronger perceived control or understanding, whereas higher threat-related scores indicate greater perceived consequences, chronicity, symptoms, concern, or emotional effect.

Diabetes management self-efficacy was assessed with the 20-item Thai Diabetes Management Self-Efficacy Scale (T-DMSES) [10]. Items are summed within four domains: dietary management (9 items), self-monitoring (4 items), physical activity (4 items), and regimen adherence (3 items). Higher scores indicate greater confidence in carrying out diabetes self-management tasks.

Translation, validity, and reliability

The instruments and intervention materials were translated from English into Vietnamese independently by two bilingual healthcare professionals,

a physician and a nurse educator. Their versions were reconciled and reviewed for linguistic and conceptual agreement. Face validity was assessed by one Vietnamese physician, one nurse, and five adults with type 2 diabetes. Three experts reviewed the intervention materials; the content validity index was 0.98. In a pilot with 15 participants who had characteristics similar to the study population, Cronbach's alpha was 0.75 for the DKQ-24, 0.78 for the BIPQ, and 0.82 for the T-DMSES.

Data collection

At the intervention site, baseline questionnaires were completed before the education session and posttest questionnaires were completed immediately after the session. At the control site, the baseline assessment was completed on the first day and the second assessment on the following day while participants continued to receive usual care. Questionnaires were checked for completeness at the time of collection.

Statistical analysis

Data were analyzed using IBM SPSS Statistics version 20. Continuous variables are presented as means and standard deviations, and categorical variables as frequencies and percentages. Distributional assumptions were assessed with the Shapiro–Wilk test. Paired t tests were used for pretest-to-posttest comparisons within each group. Because participants were matched one-to-one, posttest between-group comparisons were also conducted as paired comparisons across the 33 matched pairs. The causal item of the BIPQ was summarized descriptively. Tests were two-sided with $p < 0.05$ considered statistically significant. No multiplicity adjustment was applied; the set of outcome-specific p values should therefore be interpreted cautiously.

Ethical considerations

The study was approved by the Khon Kaen University Ethics Committee for Human Research (HE632132; July 1, 2020) and accepted by relevant local health authorities. All participants received information about the study and provided written informed consent before data collection. Participation was voluntary and confidentiality was maintained.

RESULTS

Participant characteristics

The 66 participants had an overall mean age of 50.48 ± 5.97 years and a mean diabetes duration of 5.33 ± 4.36 years. Matching produced identical distributions of sex, age group, and diabetes-duration category across study arms. Women represented 57.6% of each group, and 63.6% of participants in each group were aged 50–59 years. Most participants had lived with diabetes for 1–5 years (69.7% in each group) and were treated with oral glucose-lowering medication alone (97.0% in the control group and 93.9% in the intervention group). Baseline characteristics are shown in Table 1.

Table 1: Baseline characteristics of participants by study group

Characteristic	Control (n = 33)	Intervention (n = 33)
Sex		
Male	14 (42.4)	14 (42.4)
Female	19 (57.6)	19 (57.6)
Age group, years		
30–39	1 (3.0)	1 (3.0)
40–49	11 (33.3)	11 (33.3)
50–59	21 (63.6)	21 (63.6)
Married	25 (75.8)	26 (78.8)
Education		
Primary school	16 (48.5)	14 (42.4)
Lower secondary school	8 (24.2)	11 (33.3)
Upper secondary school	9 (27.3)	8 (24.2)
Diabetes duration, years		
1–5	23 (69.7)	23 (69.7)
6–10	7 (21.2)	7 (21.2)
>10	3 (9.1)	3 (9.1)
Oral glucose-lowering medication only	32 (97.0)	31 (93.9)

Values are n (%). Matching variables were sex, age group, and diabetes-duration category.

Knowledge and diabetes management self-efficacy

Knowledge in the intervention group increased from 9.06 ± 2.21 at baseline to 20.42 ± 1.52 immediately after education ($p < 0.001$). The control-group change from 9.96 ± 2.40 to 10.36 ± 2.47 was not statistically significant ($p = 0.108$). At posttest, knowledge was higher in the intervention group than in the matched control group ($p < 0.001$).

All four self-efficacy domains increased in the intervention group (each $p < 0.001$), whereas changes in the control group were not statistically significant. Posttest dietary management, self-monitoring, physical

activity, and regimen-adherence scores were higher in the intervention group than in the matched control group (all $p < 0.001$) (Table 2).

Table 2: Diabetes knowledge and self-efficacy scores at pretest and posttest

Outcome	Control Pretest	Control Posttest	Within p	Intervention Pretest	Intervention Posttest	Within p	Posttest between groups p
Diabetes knowledge	9.96 ± 2.40	10.36 ± 2.47	0.108	9.06 ± 2.21	20.42 ± 1.52	<0.001	<0.001
Dietary management	22.12 ± 2.10	22.48 ± 1.52	0.136	21.52 ± 1.79	29.39 ± 1.27	<0.001	<0.001
Self-monitoring	9.23 ± 1.30	9.42 ± 1.17	0.363	8.94 ± 1.17	13.73 ± 0.94	<0.001	<0.001
Physical activity	11.36 ± 1.25	11.52 ± 1.20	0.201	11.24 ± 1.17	13.36 ± 1.17	<0.001	<0.001
Regimen adherence	8.70 ± 0.73	8.91 ± 0.84	0.051	8.33 ± 0.78	11.15 ± 0.62	<0.001	<0.001

Values are mean ± standard deviation. Within-group comparisons and posttest between-group comparisons used paired t tests; between-group tests followed the 33 matched pairs.

Illness perceptions

The intervention group showed statistically significant pretest-to-posttest increases in all eight BIPQ dimensions (all $p < 0.001$). Control-group changes were not statistically significant. At posttest, the intervention group scored higher than the matched control group on seven dimensions at $p < 0.001$; the between-group difference in emotional response was also statistically significant ($p = 0.011$) (Table 3). These scores represent stronger perceptions in each specific dimension and should not be interpreted as a single uniformly favorable total change.

For the open causal item, 5 of 33 intervention participants could identify a perceived cause of diabetes at baseline, increasing to 33 of 33 after the session. In the control group, the corresponding frequency increased from 6 of 33 to 9 of 33. These frequencies were summarized descriptively.

Table 3: Brief Illness Perception Questionnaire dimension scores at pretest and posttest

Dimension	Control Pretest	Control Posttest	Within p	Intervention Pretest	Intervention Posttest	Within p	Posttest between groups p
Consequences	4.97 ± 0.98	4.88 ± 1.08	0.184	4.58 ± 1.25	8.33 ± 0.78	<0.001	<0.001
Timeline	5.55 ± 1.03	5.82 ± 1.07	0.059	5.06 ± 0.97	8.00 ± 0.79	<0.001	<0.001
Personal control	5.15 ± 1.25	5.30 ± 1.21	0.057	5.00 ± 1.22	8.24 ± 0.79	<0.001	<0.001
Treatment control	6.06 ± 0.79	5.97 ± 0.77	0.083	5.85 ± 1.18	8.33 ± 0.74	<0.001	<0.001
Identity	5.36 ± 1.14	5.36 ± 1.06	0.990	5.21 ± 0.96	8.48 ± 0.83	<0.001	<0.001
Concern	6.12 ± 0.89	6.06 ± 0.93	0.488	6.12 ± 1.02	8.33 ± 0.65	<0.001	<0.001
Understanding (coherence)	3.97 ± 0.77	4.12 ± 0.78	0.057	3.64 ± 0.74	7.85 ± 0.94	<0.001	<0.001
Emotional response	8.24 ± 0.97	8.30 ± 0.88	0.423	7.82 ± 0.85	8.79 ± 0.74	<0.001	0.011

Values are mean ± standard deviation. Dimensions were analyzed separately; higher scores have dimension-specific meanings. Paired t tests were used as described in Table 2.

DISCUSSION

This matched quasi-experimental study found large immediate changes in diabetes knowledge and all four measured self-efficacy domains after a single 60-minute Common-Sense Model-based education session. Participants also reported stronger representations across the eight illness-perception dimensions. In contrast, the matched control group showed no statistically significant changes over its brief assessment interval. The findings are consistent with the intended proximal mechanism of the intervention: eliciting illness beliefs, supplying

corrective information, and connecting those beliefs to feasible self-management actions.

The knowledge increase was marked, from a mean of 9.06 to 20.42 on the 24-item DKQ. Content alignment and immediate testing almost certainly contributed to this result. Immediate recall is a legitimate proximal educational outcome, but it should not be equated with durable knowledge or clinical improvement. Repeated exposure to the same questionnaire may also have influenced scores. Future studies should assess retention after several weeks or months and include outcomes that are less sensitive to immediate recall.

Self-efficacy increased across diet, self-monitoring, physical activity, and regimen adherence. This pattern is compatible with self-efficacy theory, which emphasizes confidence developed through understandable tasks, guided practice, and credible encouragement [5]. The session used concrete foods, illustrated materials, discussion of participants' beliefs, and specific self-care actions rather than information transfer alone. The direction of these findings is similar to previous Common-Sense Model-based education work in Cambodia [6] and to the Vietnamese pilot that preceded this study [7]. Psychologically informed and family-focused approaches have also been evaluated as ways to support diabetes behavior change [11]. More broadly, structured diabetes self-management education in low- and middle-income settings has shown potential to improve glycaemic control, although program intensity and quality vary [3,12].

The illness-perception results require nuanced interpretation. Higher posttest scores for personal control, treatment control, and understanding suggest that participants felt more able to influence diabetes and had a more coherent account of the condition. However, increases in consequences, timeline, identity, concern, and emotional response indicate greater perceived threat or salience, not automatically "better" perceptions. The session may have strengthened recognition that diabetes is chronic and consequential while simultaneously strengthening control beliefs. Such a balance may motivate action, but excessive threat without support could increase distress. Future interventions should assess diabetes distress and determine whether changes in specific illness-perception dimensions predict sustained self-management.

The increase in the number of intervention participants able to name a perceived cause suggests that the causal component of the illness representation became more explicit. Because this item was descriptive and responses were not coded by clinical accuracy in the present report, the finding should not be interpreted as proof that causal beliefs became correct. A future qualitative analysis could distinguish biomedical, behavioral, hereditary, and culturally specific explanations and examine how each relates to coping choices.

Several limitations materially affect interpretation. First, only one health station represented each arm; consequently, intervention status was completely confounded with site. Individual matching and paired analysis cannot remove site-level differences. Second, allocation was not randomized at the participant level, and participants and the educator were not blinded. Third, outcomes were measured immediately and were questionnaire-based; the study did not assess sustained behavior, glycated haemoglobin, complications, or quality of life. Fourth, the small sample, age limit of 60 years, and literacy requirement restrict generalizability. Fifth, the control and intervention assessment schedules were not identical, and no attention-control session was used. Sixth, intervention fidelity was not independently measured. Finally, multiple outcome tests were conducted without adjustment, increasing the possibility of chance findings.

Despite these limitations, the study contributes a clearly described, theory-informed education approach adapted for a Vietnamese community setting. Its matched comparison group, use of established instruments, and consistent direction of immediate findings provide a reasonable basis for a larger evaluation. A multi-site cluster-randomized or individually randomized trial should include standardized educator training, fidelity assessment, prespecified primary outcomes, effect estimates with confidence intervals, and follow-up at several time points. Clinical measures such as glycated haemoglobin should be considered alongside knowledge, self-efficacy, illness perceptions, self-care behavior, and distress.

CONCLUSION

A 60-minute Common-Sense Model-based diabetes education session was followed by substantial immediate increases in diabetes knowledge and self-efficacy and by marked changes in illness representations among adults with type 2 diabetes at one Vietnamese commune health station. The results support further evaluation of belief-focused education as a feasible component of community diabetes care. They do not demonstrate sustained behavioral or clinical effectiveness because follow-up was immediate and one site represented each study arm. Larger multi-site studies with longer follow-up are needed before routine implementation can be recommended.

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Conflict of Interest: The author declares no conflict of interest.

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Author Contribution

Ngo Thi Bich Nuong conceived the study, developed and implemented the intervention, collected and analyzed the data, interpreted the findings, and prepared the manuscript.

Data Availability: Aggregate data supporting the findings are reported in this article.

Ethical Approval: Khon Kaen University Ethics Committee for Human Research, approval number HE632132, July 1, 2020.

Informed Consent: Written informed consent was obtained from all participants.

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