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Empowering Community Health Cadres as Promoters of Emergency Prevention and Neuropathy Screening in Diabetes Mellitus Case

Minarti[1], Ach. Arfan Adinata[2*], Rini Ambarwati[3]

[1,2,3] Nursing Department, Poltekkes Kemenkes Surabaya, Indonesia

***Corresponding author:** ach.arfanadinata608@gmail.com

ABSTRACT

Background: Diabetes mellitus (DM) remains a growing global health concern, particularly due to its acute and chronic complications, including hyperglycemic crisis, hypoglycemic episodes, and diabetic neuropathy. Strengthening the role of community health cadres is an essential strategy to improve early detection and community-based prevention. **Object:** This community engagement program aimed to empower 40 health cadres in Pacar Kembang Urban Village through structured training, hands-on workshops, and mentoring sessions**. Method:** The intervention consisted of education on DM emergencies, practical skills training for early detection of hyperglycemia and hypoglycemia, and neuropathy screening techniques. Evaluation using pre–post assessment and observation checklists demonstrated a significant improvement in cadres' competencies, including recognition of emergency signs and accurate performance of neuropathy screening using sensory examination tools. Mentoring sessions reinforced their practical skills, increasing confidence and readiness in community-level implementation. **Results:** The program highlights the effectiveness of cadre empowerment as a scalable approach to enhance early detection, reduce delayed treatment, and strengthen community-based diabetes care **Conclusion:** This program provides evidence that cadre empowerment using structured cognitive–psychomotor training can serve as a scalable model for strengthening primary-level diabetes complication prevention.

Keywords: Diabetes Mellitus, Community Cadre, Neuropathy, Emergency Prevention, Empowement, Community Engagement

BACKGROUND

One of the most significant threats in uncontrolled diabetes is the occurrence of hyperglycemic emergencies (such as diabetic ketoacidosis and hyperosmolar hyperglycemic state) and hypoglycemic events that may lead to loss of consciousness and even death if unrecognized. Chronic complications such as diabetic neuropathy further increase the risk of foot ulcers and amputations (Armstrong et al., 2023; Edmonds et al., 2021). Diabetes mellitus is a chronic metabolic disease characterized by sustained hyperglycemia, resulting from impaired insulin secretion, insulin resistance, or both (Jadon et al., 2024). According to international health reports, diabetes continues to rise globally, especially in low- and middle-income countries where access to health services and awareness remain limited(Smokovski, 2021). Indonesia ranks among the countries with the highest burden of diabetes, with communities experiencing both acute and chronic complications (Mboi et al., 2022).

The 2019 Surabaya City Health Profile Data, in the Pacar Keling Community Health Center area, shows that the number of diabetes mellitus sufferers

was 1,989 people, of whom 1,291 people or 64.91% received services.(Dinas Kesehatan Surabaya, 2022) This high caseload positions Pacar Keling as a priority area for strengthening community-based early detection strategies. Community-based prevention and detection are essential strategies to reduce these complications (Alhuwayfi et al., 2024).

In the Indonesian healthcare system, community health cadres (kader kesehatan) play an important role in supporting primary healthcare centers (puskesmas) through health promotion, basic screening, and reporting. However, many cadres have limited training on diabetes complications, including how to identify early warning signs.This study aimed to evaluate the effectiveness of a structured cadre empowerment program in improving knowledge and practical competencies related to emergency detection and neuropathy screening among community health cadres. Empowering cadres through structured training and supervised practice is therefore critical(Sood, 2025). This program was implemented in Kelurahan Pacar Kembang, involving 40 cadres to improve their skills in detecting DM emergencies and performing neuropathy screening.

RESEARCH METHODS

This community service program was conducted in Kelurahan Pacar Kembang, an urban administrative area characterized by active community involvement in local health initiatives. The location was purposively selected due to its established structure of community health cadres and its ongoing commitment to improving early detection and prevention of non-communicable diseases, including diabetes mellitus.

A total of 40 community health cadres were recruited as participants in the program. The recruitment process was carried out in coordination with the local health office and the primary healthcare center to ensure appropriate participant selection. Cadres were included based on predefined criteria, which encompassed: (1) active engagement in community-based health activities; (2) availability to participate in the complete series of training sessions; and (3) willingness to undertake practical skills training and mentoring. These criteria ensured that the selected cadres possessed the capacity and commitment necessary to integrate the acquired competencies into their routine community health responsibilities.

Description of Materials or Research Subjects

The intervention consisted of three core components designed to improve knowledge, technical skills, and practical readiness:

1. Educational Module

   Participants received structured educational sessions covering fundamental concepts of diabetes mellitus, clinical manifestations of hyperglycemia and hypoglycemia, emergency signs requiring prompt referral, and the pathophysiology and risks of diabetic neuropathy. The sessions were delivered using lectures, visual aids, case-based discussions, and interactive question-and-answer activities.

2. Skills Training Workshop

   A skills-based workshop was conducted to train cadres in the early detection of diabetes emergencies and neuropathy screening. Practical activities included demonstrations and return demonstrations on:

   a. Recognition of early and advanced signs of hyperglycemic and hypoglycemic states
   b. Performance of neuropathy screening using standardized tools such as the 10 g monofilament and 128 Hz tuning fork

c. Foot inspection procedures assessing skin integrity, temperature, deformities, and sensory disturbances

These activities were supervised to ensure accuracy, consistency, and adherence to screening guidelines.

3. Mentoring and Supervised Practice
   Following the workshop, cadres participated in mentoring sessions designed to reinforce practical competencies. During these sessions, cadres applied their skills in simulated and real-world scenarios under the supervision of trained facilitators. Mentoring emphasized clinical decision-making, documentation of findings, and communication of referral recommendations for suspected emergency cases or individuals at risk of neuropathy.

Research Design

This community service program employed a participatory training and capacity-building approach aimed at enhancing the competencies of community health cadres in detecting diabetes mellitus emergencies and screening for neuropathy. The program consisted of structured education, skills-based workshops, and supervised mentoring sessions designed to strengthen both theoretical understanding and practical skills.

Ethical Considerations

This program adhered to ethical principles of voluntary participation, confidentiality, and informed consent. Ethical clearance is not required as classified under community service, but is performed following ethical guidelines.

RESULT AND DISCUSSION

This community service program was implemented over a three-day period on 16 May 2024, 18 May 2024, and 29 June 2024. Activities were conducted at the RW 5 community hall in Kelurahan Pacar Kembang and were attended by 40 community health cadres. The following subsections describe the characteristics of participants, the implementation of activities, and outcomes of knowledge assessments and practical screening exercises.

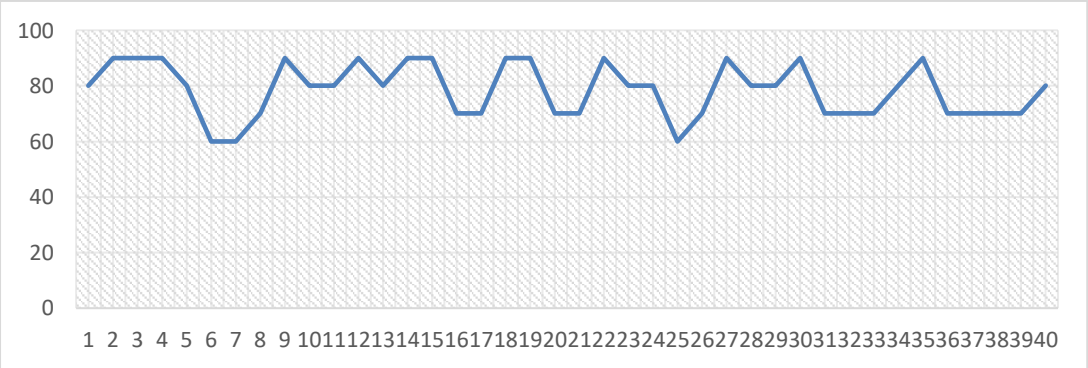

Figure 1. Pre-test Scores

Characteristics of Community Health Cadres

Overall, the participating cadres were all female (100%), with an age range of 40–56 years. The majority had completed senior high school education, and their experience as community health cadres ranged from 1 to 11 years, indicating a relatively well-established cadre workforce. This background likely contributed to their baseline familiarity with chronic disease management.

Implementation of Program Activities

a. 1st Section: Opening Session, Pre-test, and Educational Materials

The first day began with participant registration, followed by the opening ceremony attended by the village head, community leaders, and representatives from the local primary healthcare center. A pre-test was administered to assess baseline knowledge regarding hyperglycemia, hypoglycemia, and diabetic neuropathy.

Pre-test scores ranged from 60 to 90, indicating that while cadres demonstrated adequate understanding of diabetes mellitus and acute glycemic imbalance, their knowledge regarding neuropathy-related symptoms remained limited. This variation in baseline knowledge corresponded with differences in cadre experience and exposure to training. As reported in the literature, knowledge acquisition is significantly influenced by prior training and duration of work experience, which in turn shapes performance and competency(Gachino & Worku, 2019).

Following the pre-test, educational sessions were delivered by the non-communicable disease (NCD) program nurse and the community engagement team. Topics included diabetes mellitus pathology, recognition of hyperglycemia and hypoglycemia, effective communication with patients, and identification of neuropathy risk factors.

b. 2nd Section: Skills Training and Practical Screening

In the second section, cadres participated in a structured skills training workshop. Participants were divided into three skill stations, where they practiced identifying symptoms of hyperglycemia, hypoglycemia, and neuropathy through simulated patient encounters. Cadres then conducted direct screening on individuals with diabetes mellitus. The characteristics of these individuals included: 90% female, age ranging from 28 to 76 years, and duration of diabetes between 2 and 15 years.

c. 3rd Section: Review of Screening Results, Foot Exercise, and Post-test

In the third Section, cadres reviewed the results of the screening activity, participated in diabetic foot exercise sessions, and completed a post-test evaluation.

Post-test scores ranged from 70 to 100, demonstrating an overall improvement from baseline. Comparative analysis of pre- and post-test scores indicated that 82.5% of cadres experienced an increase in knowledge. This improvement confirms the effectiveness of combining cognitive instruction with psychomotor practice. As noted in prior studies, education delivered through multiple modalities enhances knowledge adoption and positive behavioral change(Zakiyah Zahrah, Nonik Ayu Wantini, 2020).

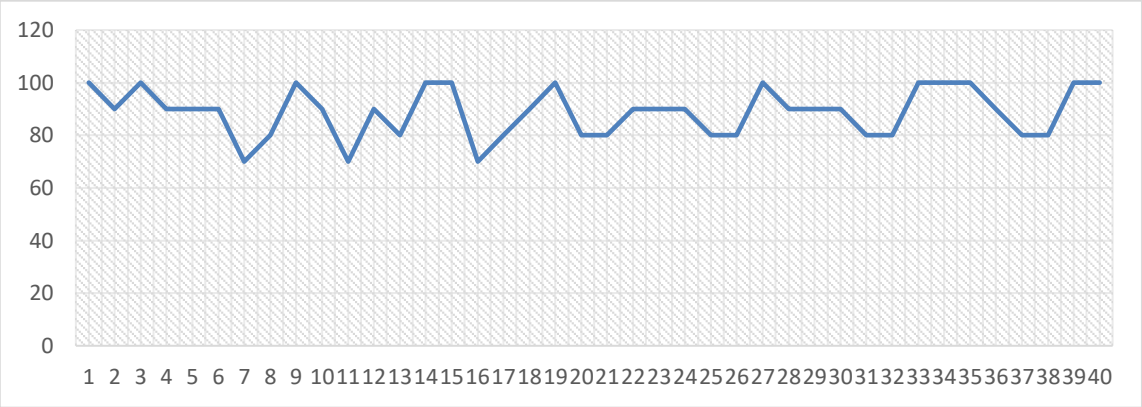

Figure 2. Post-test Scores

Furthermore, cadres demonstrated the ability to apply knowledge at the application level, corresponding to the third tier of Bloom's taxonomy. This was evidenced by their successful implementation of practical screening tasks across three skill stations: recognition of hyperglycemia, recognition of hypoglycemia, and basic neuropathy screening.

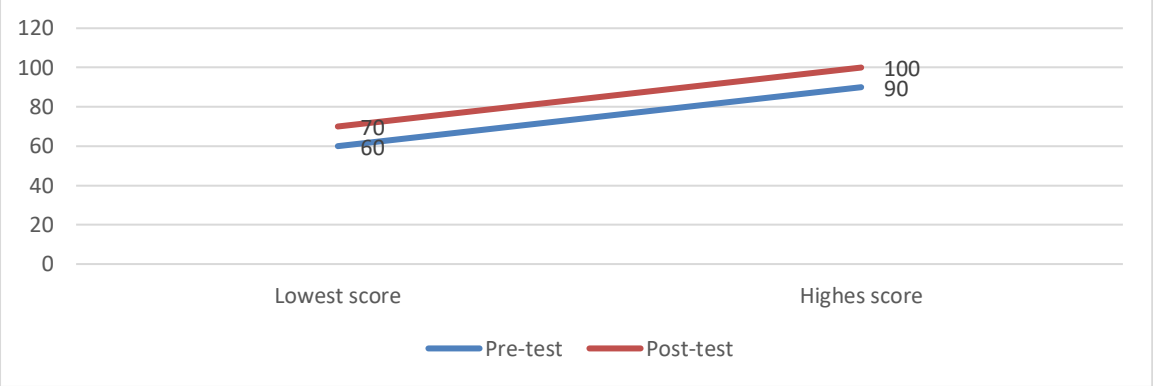

Figure 3. Comparison of Pre-test and Post-test

Despite these gains, some cadres reported lacking confidence when implementing screening procedures independently. This challenge may reflect lingering community perceptions regarding the role of cadres in non-communicable disease management. Continued support and repeated practice are therefore essential to strengthen cadres' self-efficacy and community acceptance.

Discussion

The findings of this community engagement program demonstrate that structured training combined with practical skills reinforcement is effective in enhancing the competencies of community health cadres in identifying diabetes-related emergencies and early neuropathy symptoms. The significant improvement observed in pre- and post-test scores, as well as cadres' successful completion of supervised screening exercises, indicates a positive shift in both cognitive and psychomotor domains of learning.

The improvement in cadres' knowledge-reflected by an 82.5% increase in post-test performance—suggests that the educational strategies employed effectively addressed gaps in understanding, particularly regarding neuropathy symptoms, which had been

identified as a weak area during the pre-test assessment. This finding aligns with literature emphasizing that experiential learning, reinforcement, and repetitive exposure are crucial to strengthening health workers' knowledge and confidence in managing chronic disease symptoms (Wongcharoen et al., 2024). Education delivered through multimodal methods-including lectures, visual demonstrations, and scenario-based discussions-contributes to deeper retention and improved applied competencies (Zakiyah Zahrah, Nonik Ayu Wantini, 2020).

The cadres' improved ability to detect hyperglycemic and hypoglycemic symptoms reinforces the value of structured skills stations. Such interactive approaches are known to enhance learners' critical thinking, decision-making, and accuracy in clinical assessments. Consistent with Notoatmodjo's framework, the cadres progressed to the application level of knowledge, demonstrating the capacity to translate concepts into direct practice(Notoatmodjo, 2014). The hands-on screening practice also mirrors the findings of Restuastuti and Restila (2017), who emphasize that training involving real or simulated clinical scenarios facilitates behavioral change and strengthens readiness for independent task execution (Restuastuti et al., 2017).

The results of the neuropathy screening conducted by cadres further highlight the importance of community-based detection. Nearly half of the screened individuals demonstrated high-risk scores for neuropathy, with symptoms such as tingling and numbness being widely reported. These findings are consistent with existing evidence showing that diabetic neuropathy is a prevalent complication among individuals with long-standing diabetes and poorly controlled glycemic levels (Pradeepa & Mohan, 2024; Quiroz-Aldave et al., 2023; Yavuz, 2022). The ability of cadres to detect such symptoms accurately underscores their potential to contribute meaningfully to early prevention efforts, thereby reducing the likelihood of progression to foot ulceration or amputation. Similarly, the identification of hyperglycemia and hypoglycemia symptoms among persons with diabetes in the community supports the relevance of cadre involvement in routine monitoring. Symptoms such as polyuria, polydipsia, trembling, and cold sweats were commonly recognized during assessments and are in accordance with well-established clinical signs of acute glycemic disturbances (Nepomnyashchaya, 2022; The American Diabetes Association (ADA), 2024; Yuan et al., 2021).

Early recognition of these signs is essential in preventing severe metabolic complications and in guiding timely referrals for medical attention. Despite these positive outcomes, the results also reveal persistent challenges. Some cadres expressed limited confidence in applying their newly gained skills independently in community settings. This hesitation may be attributed to longstanding societal perceptions regarding the role of cadres in non-communicable disease management, where cadres may be viewed as having limited authority or competence in handling conditions beyond maternal and child health. This barrier underscores the need for ongoing mentoring, continuing education, and stronger advocacy to reinforce the legitimacy of cadres as frontline supporters in chronic disease prevention.

Continuous exposure to practical tasks and periodic refresher training may further enhance cadre self-efficacy (Funes, 2025; Tan & Piao, 2025). In addition, the findings highlight the need for greater community awareness regarding foot care practices among individuals with diabetes, as more than half of those screened did not perform routine foot care. This indicates an opportunity for cadres to be mobilized not only in screening but also in health

promotion, family engagement, and community-led preventive education. Strengthening cadres' roles in these areas may enhance long-term outcomes and reduce the burden of diabetes complications at the primary care level (Samaran & Mamo, 2025).

Overall, the outcomes of this program affirm the feasibility and effectiveness of cadre empowerment as a strategy to enhance early detection and prevention of diabetes complications at the community level. The integration of structured education, hands-on practice, and supportive mentoring provides a model that may be replicated in other urban communities seeking to strengthen non-communicable disease prevention effort.

CONCLUSION

This community engagement program effectively strengthened the competencies of community health cadres in Kelurahan Pacar Kembang by enhancing their knowledge and practical skills in detecting diabetes emergencies and screening for neuropathy. The improvement in post-test scores and successful performance during supervised screening activities demonstrates that the combined approach of education, skills training, and mentoring is both feasible and impactful.

Cadres were able to identify key symptoms of hyperglycemia, hypoglycemia, and neuropathy among individuals with diabetes, indicating their readiness to contribute to early detection efforts at the community level. Although some cadres expressed limited confidence in independent implementation, continued mentoring and periodic refresher training are expected to support sustained competency. Overall, this program highlights the potential of cadre empowerment as an effective strategy to strengthen community-based prevention and early detection of diabetes-related complications, offering a scalable model for similar urban settings.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest related to the implementation of this community engagement program, the preparation of this manuscript, or the reporting of its findings.

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