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A multi-faceted intervention to improve screening of erectile dysfunction for men with diabetes mellitus in public health clinics: A pilot study

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Abstract

Introduction: Erectile dysfunction (ED) is common in men with diabetes and is associated with coronary artery disease and psychological distress. However, discussion of ED in primary care consultations is uncommon. Interventions, such as audit and feedback, mandate of management, and workshop on men's sexual health, have been proposed to improve ED screening in public health clinics. This study aimed to pilot test a multi-faceted intervention to increase ED screening among men with diabetes and to improve knowledge and confidence in ED screening among primary healthcare providers (PHPs).

Methods: We conducted an interrupted time-series quasi-experimental study with PHPs at public health clinics in Perak, Malaysia from February 2019 to February 2020. Doctors, nurses, and assistant medical officers involved in diabetes care were recruited. The intervention was conducted between July and September 2019 and comprised two phases: audit and feedback, and mandate from management (phase 1), and an interactive face-to-face workshop (phase 2). The primary outcome measure was monthly ED screening rate, and the data were retrieved from health records and the clinical diabetes registry. The PHPs completed a questionnaire on ED knowledge and confidence in ED screening before and after the workshop.

Results: The total number of attendances by patients with diabetes was 50,325 during the study period, of which 21,413 were by men. A total of 30 PHPs participated in the training workshop: 7 (23.3%) doctors, 12 (40%) medical assistants, and 11 (36.7%) nurses. The mean duration of employment at a health clinic was 7 ± 5 years. The majority of the participants were male (56.7%), Malay (80%), married (76.7%), and had no experience with working in a urology department (76.7%). There was a significant improvement in the mean knowledge score (39.0 ± 11.4 vs. 63.6 ± 6.2, $p<0.001$) and median confidence level in ED screening from 2 (IQR 2–3) to 4 (IQR 4–4) after the workshop ($p<0.001$). After phase 1, the rate of ED screening increased from a baseline of between 10.3% (February 2019) and 12.7% (June 2019) before intervention to between 15% (July 2019) and 18.9% (September 2019) and was maintained between 18% (October 2019) and 17.9% (December 2019) after phase 2. Subsequently, the ED screening rate declined from 14.6% (January 2020) to 10.9% (February 2020).

Conclusion: This study found that audit and feedback with mandate from management increased ED screening and detection rate. The workshop improved the participants' knowledge and confidence in ED screening but did not further increased ED screening. The improved practice was sustained for 6 months after the intervention, while the detection rate of ED persisted. We propose regular audit and feedback with mandate from management to sustain the practice of ED screening in men with diabetes.

Introduction

Erectile dysfunction (ED) is a common health problem. In Malaysia, 7 out of 10 men aged over 40 years old in the primary care setting have ED.[1] ED has a significant impact on physical, psychological, and social health. It has been reported that vasculogenic ED is associated with coronary artery diseases;[2] therefore, ED screening enables the identification of men with high cardiovascular (CV) risk who require early intervention.[3] ED is also associated with depression; one in six men with sexual dysfunction suffers from moderate depressive symptoms.[2] A meta-analysis indicated that the incidence of depression was three times higher in men with ED than in those without ED.[4] ED also causes

sexual dissatisfaction, which may lead to marital conflict and impaired quality of life in the family.[5]

Primary healthcare providers (PHPs) are in a strategic position to screen men with diabetes mellitus (DM) for ED. Men with DM were found to be at least three times more likely to develop ED than those without diabetes.[6] The Princeton III Consensus recommends stratification of CV risk using the Framingham Risk Score for men with vasculogenic ED.[7] It is recommended that men with vasculogenic ED who are at a high risk for CV events be referred to a cardiologist, while those with intermediate risk who are asymptomatic may consider undergoing further non-invasive evaluation, such as exercise stress testing.[8]

Although ED is common and has significant health implications, it is often overlooked as a health problem among patients and healthcare providers. The reluctance to seek medical advice among men with ED could be due to taboo in discussing sexual issues, embarrassment, and fear of the complications of treatment.[9] Moreover, most PHPs do not routinely screen for ED. A local study by Tay et al. found that PHPs had poor knowledge and low confidence in ED screening, citing a lack of training as the main reason.[10]

Several strategies have been found to be effective in changing PHPs' practice. First, audit and feedback against explicit standards and taking remedial action in areas not achieving those standards have been shown to improve patient care.[11] The effectiveness of audit and feedback depends on the baseline performance and how the intervention is delivered.[11] Giving feedback in a threatening manner or to PHPs who are high achievers risks eliciting a defensive reaction and leading to burnout.[12] Therefore, motivating PHPs and setting realistic and achievable targets for poorer performers is important when considering the audit and feedback approach to improve care. Second, mandate from management and engaging subordinates in pursuit of common goals can elicit change in practice among PHPs.[13] Leaders address the subordinates' needs, anticipate their responses, and teach them about the common goals, resulting in increased job satisfaction and productivity.[13] Third, systematic reviews have shown that certain educational interventions are effective in changing practice behaviour.[14] For example, interactive teaching, such as workshops and seminars, has been shown to be more effective than didactic methods.[15]

Therefore, we designed and conducted a multi-faceted intervention—a combination of audit and feedback, mandate from management, and educational workshop on men's sexual health—with the aim of improving ED screening among PHPs in Malaysian public health clinics. The aim of this pilot interrupted time-series study was to evaluate the effectiveness of these three interventions in improving the knowledge, confidence, and practice of ED screening of men with diabetes among PHPs.

Methods

Study design

This was an interrupted time-series quasi-experimental study.

Study setting

A total of 11 public health clinics in the district of Larut, Matang, and Selama (LMS), Perak, Malaysia were involved in the study. Of the 11 health clinics, 4 were located in urban, 2 in suburban, and 5 in rural areas. From February 2019 to February 2020, the 11 health clinics were attended by a total of 50,325 patients with DM, of whom 21,413 were men. There were 94 PHPs in total, including 80 doctors and 14 medical assistants (MAs) or nurses, involved in the management of patients with DM attending the clinics.

Before intervention, there was no usual flow of ED screening at these clinics, and the doctors were the only PHPs verbally screening for ED. Following consultation, the MAs and nurses would retrieve the case notes for the doctors' documentation of ED for follow-up.

Interventions

The intervention to increase ED screening consisted of two phases conducted 2 months apart. During the first phase, an audit and feedback and a mandate from management were conducted simultaneously on July 10, 2019, during a monthly meeting involving 80 doctors from 11 clinics. The meeting was chaired by a district health officer (DHO) who was the public health specialist in charge of clinical key performance indicators (KPI) in the district. Screening of ED for men with DM was one of the KPIs. During the first 25 minutes of audit and feedback session, a family medicine specialist (FMS) presented the audit outcome of ED screening, which included the number of monthly ED screenings among men

with DM and the number of ED cases detected at each health clinic from February to June 2019. The FMS reinforced the importance of ED screening and explained the process of ED screening and the use of validated 5-question International Index of Erectile Function (IIEF-5) for ED screening. The PHPs also discussed the reasons for low ED screening rates, such as time limitation, lack of training, and a lack of PHPs in charge of screening. The DHO then mandated that ED screening be performed for all men with DM, assigned specific PHPs from each clinic to be in charge of documenting the ED screening and detection, and was to be updated every month on the results of the ED screening.

During the second phase, a 1-day workshop on men's sexual health was developed based on literature review and expert discussion with consultant FMSs and psychiatrists on both the content and delivery methods. A workshop with 10–30 participants can lead to a more open and integrated event than a conference; therefore, the workshop was conducted for total 33 PHPs from the 11 clinics in combination.[16] The workshop was conducted by an FMS and a psychiatrist in September 2019 and included short lectures on ED screening, assessment and management, case scenarios, role play, group discussions and presentations, and interactive question-and-answer sessions before and after the workshop. The two outcomes that measured the effectiveness of the interventions encompassed the knowledge and attitude scores of participating PHPs and the screening and detection rates of ED.

Participants of the workshop

We selected 33 of the 94 PHPs from the 11 health clinics who were involved in the management of patients with DM for the phase 2 intervention, and all consented to participate in the study. Each clinic selected three PHPs (a doctor, an MA, and a nurse) who were also part of the clinic's non-communicable diseases (NCD) team.

The PHPs were responsible for the changes in the process of ED screening following the interventions and the implementation of a systematic ED screening process. The ED screening was initiated at the triage counter by the MA or nurse. Men with DM were informed of the ED screening and were provided with a self-administered IIEF-5 questionnaire during waiting time. The questionnaires were collected by the MA or nurse for documentation upon return. Following screening, the men with ED were referred to the doctor for further management.

Instruments

The participants completed an ED knowledge and confidence questionnaire validated by Tay et al.10 before and after the workshop, on the same day. The questionnaire was in Malay and English and consisted of demographic data (6 items), ED knowledge (76 items), and confidence on the screening of ED in the public health clinics (1 item). For the knowledge items, there were three response options: 'true', 'false' and 'don't know'. One mark would be scored for each correct response and zero marks for an incorrect or 'don't know' response. The maximum knowledge score was 76. The confidence level in ED screening was evaluated using a 1–5 Likert scale that ranged from 'not confident at all', 'not confident', 'neutral', 'confident', to 'very confident'.

Data collection

The data on the number of diabetic attendances and ED screening and detection rates were documented and entered into a clinical diabetes registry and Microsoft Excel by the MA or nurse during day-to-day practice at the clinics. Data cleaning and compilation were completed monthly by the district chief MA in charge of NCD and the data were stored in thumb drives and e-mails. Confidentiality in the process of data collection was well-preserved as only the district chief MA and FMS in charge of NCD (the principal investigator) could assess the data for the 11 clinics. The data collection for this study was started in June 2019 by the principal investigator for the audit and feedback part of phase 1 intervention. Subsequently, data collection was continued monthly until February 2020 to delineate the year (February 2019 to February 2020) of ED screening and detection.

The PHPs' completed questionnaires on ED knowledge and confidence in ED screening before and after the workshop were collected on the day of the workshop.

Statistical analysis

Statistical analysis was performed using SPSS version 25. All continuous data were plotted as histograms and tested for normality using the Kolmogorov–Smirnov test. Data with normal distribution, such as the knowledge score, are presented as mean with standard deviation; skewed data, such as the confidence

level in ED screening, are presented as median with interquartile range. The PHPs' sociodemographic characteristics are presented as frequency and percentage. The comparison of mean knowledge of ED and confidence in ED screening pre- and post-intervention was performed using a paired t test and Wilcoxon signed-rank test, respectively. The rate of ED screening was analysed using the number of ED screenings as the numerator and attendance of men with DM as the denominator. The rate of ED detection was obtained using the number of men with DM diagnosed with ED after screening as the numerator and the number of ED screenings as the denominator. Level of significance was set at $p<0.05$.

Ethical considerations

The study was registered with the National Medical Research Registry (NMRR-19-2618-50697). The approval to execute this study was obtained from the Medical Research Ethics Committee (MREC), Ministry of Health Malaysia, and the District Health Office of Larut, Matang and Selama, Taiping, Perak. Written informed consent was obtained from all participants.

Results

Sociodemographic data of workshop participants

The workshop participants comprised 33 out of the 94 PHPs involved in NCD at the 11 public health clinics in the district of LMS, Taiping. The response rate was 35.1%. We received 30 completed questionnaires from 7 (23.3%) doctors, 12 (40%) medical assistants, and 11 (36.7%) nurses. The mean age of the participants was 34.8 ± 7.3 years. Most of the participants were male (43.3%), married (76.7%), assistant medical officers (40%), and of Malay ethnicity (80%). Most participants had no employment experience in a urological department (76.7%) and the mean duration of work experience at health clinics was 7 ± 5 years (**Table 1**).

Table 1. Sociodemographic characteristics of participants attending the men's sexual health workshop (N=30).

Domains	Total	Doctor	MA	Nurse
Age (years) (mean ± SD)	34.8 ± 7.3	32.4 ± 4.7	32.3 ± 7.9	39.2 ± 6.4
Gender (n %)				
Male	17 (56.7)	5 (71.4)	12 (100)	0 (0)
Female	13 (43.3)	2 (28.6)	0 (0)	11 (100)
Ethnicity (n %)				
Malay	24 (80.0)	4 (57.1)	10 (83.3)	10 (90.9)
Chinese	2 (6.7)	2 (28.6)	0 (0)	0 (0)
Indian	4 (13.3)	1 (14.3)	2 (16.7)	1 (9.1)
Marital Status (n %)				
Single	7 (23.3)	2 (28.6)	4 (33.3)	1 (9.1)
Married	23 (76.7)	5 (71.4)	8 (66.7)	10 (90.9)
Years Working at Health Clinic (mean ± SD)	7.0 ± 5.0	5.4 ± 5.1	6.3 ± 4.7	8.9 ± 5.2
Previous Experience in Urological Posting (n %)				
Yes	7 (23.3)	4 (57.1)	1 (8.3)	2 (18.2)
No	23 (76.7)	3 (42.9)	11 (91.7)	9 (81.8)

IQR: interquartile range MA: medical assistant SD: standard deviation

Knowledge score and confidence level in erectile dysfunction screening before and after the workshop

Before and after the workshop, the doctors achieved the highest knowledge scores; however, there was no difference in the median of confidence level in ED screening among the three groups of participants (Table 1). The mean knowledge score was 39.0 ± 11.4 and 63.6 ± 6.2 before and after the workshop, respectively ($p<0.001$). The median confidence level increased significantly from 2 (IQR 2–3) to 4 (IQR 4–4) after the workshop ($p<0.001$) (**Table 2**).

Table 2. Knowledge score and confidence level in erectile dysfunction (ED) screening before and after the men's sexual health workshop (N=30).

Variables	Pre-workshop	Post-workshop	*t* statistic (df) 95% CI	Z statistics	*p* value
Knowledge Score Mean (SD)	39.00 (11.40)	63.57 (6.24)	14.629 (29) 21.132–28.001		<0.001*
Doctor	45.1 (13.3)	66.9 (6.7)			
MA	36.8 (10.8)	62.3 (3.3)			
Nurse	37.5 (10.4)	62.8 (8.0)			
Confidence Level Median (IQR)	2 (2, 3)	4 (4, 4)		-4.736	<0.001#
Doctor	2 (2, 4)	4 (4, 5)			
MA	2 (2, 3)	4 (4, 4)			
Nurse	2 (2, 3)	4 (4, 4)			

*Paired t-test #Wilcoxon signed-rank test CI: confidence interval

Screening of erectile dysfunction among diabetic men

In the pre-intervention phase from February to June 2019, the attendance of men with DM ranged from 29.1% (n=1562) to 25.2% (n=1353), and the rate of ED screening ranged from 10.3% (n=161) to 12.7% (n=172). After the audit and feedback with mandate from management (phase 1) on 10 July 2019, the ED screening rate increased, ranging from 15% (n=282) in July 2019 to 18.9% (n=273) in September 2019. After the interactive face-to-face workshop (phase 2) on 26 September 2019, the ED screening rate was maintained, ranging from 18% (n=335) in October 2019 to 17.9% (n=317) in December 2019. The ED screening rate subsequently decreased, ranging from 14.6% (n=219) in January 2020 to 10.9% (n=195) in February 2020. (**Figure 1 & Table 3**)

Detection rate of erectile dysfunction

Prior to the intervention, the detection rate of ED among men with DM ranged from 2% (n=4) in February 2019 to 6.4% (n=11) in June 2019. There was 4–5-fold increase in the detection rate of ED after phase 1, and it remained static after the phase 2 intervention. After the phase 1 intervention, the detection rate of ED increased from 24.8% (n=70) to 27.1% (n=82) and 21.6% (n=59) in July, August, and September 2019, respectively. After the workshop (phase 2), the detection rate of ED ranged from 17.9% (n=60) in October 2019 to 26.2% (n=51) in February 2020 (**Figure 1 & Table 3**).

Table 3. ED screening and detection rates among men with diabetes mellitus (DM) before and after the phase 1 and 2 interventions.

Phases	Date	Attendance of men with DM, n (%)	ED Screening, n (%)	Men with DM diagnosed with ED after screening, n (%)
Pre-intervention	Feb 2019	1562 (29.08)	161 (10.31)	8 (4.97)
	Mar	1744 (32.47)	193 (11.07)	8 (4.15)
	Apr	1894 (35.26)	203 (10.72)	4 (1.97)
	May	1281 (23.85)	132 (10.30)	9 (6.82)
	June	1353 (25.19)	172 (12.71)	11 (6.40)
Audit & Feedback, Mandate of Management: July 10, 2019 (phase 1)	July	1880 (35.00)	282 (15.00)	70 (24.82)
	Aug	1459 (27.16)	303 (20.77)	82 (27.06)
Workshop: Sept 26, 2019 (phase 2)	Sept	1445 (26.90)	273 (18.89)	59 (21.61)
	Oct	1866 (34.74)	335 (17.95)	60 (17.91)
	Nov	1856 (34.56)	347 (18.70)	51 (14.70)
	Dec	1775 (33.05)	317 (17.86)	44 (13.88)
	Jan 2020	1504 (28.81)	219 (14.56)	65 (29.68)
	Feb	1794 (34.37)	195 (10.87)	51 (26.15)

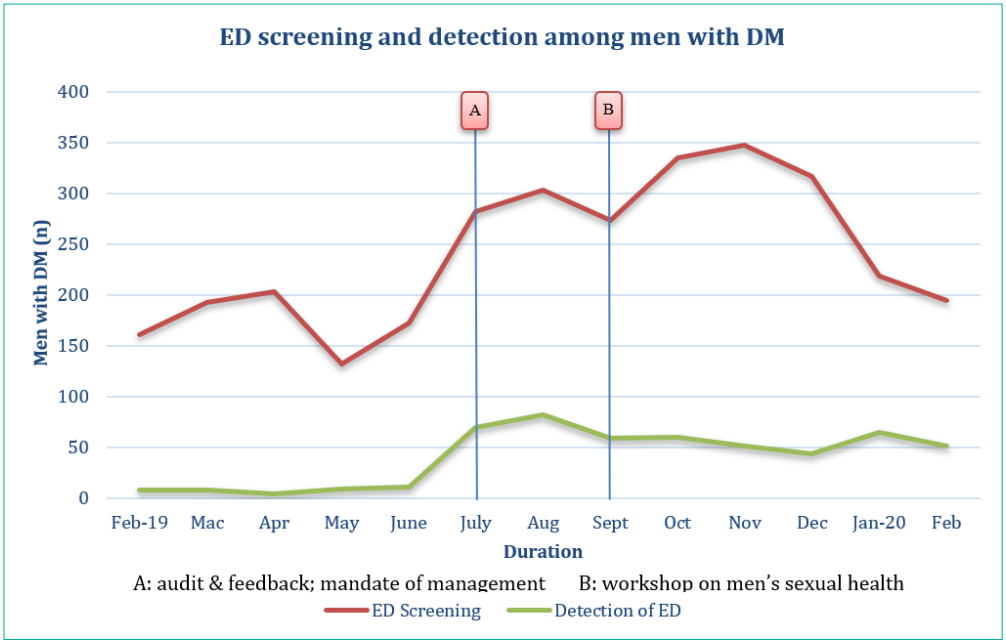

Figure 1. Impact of phase 1 and 2 interventions on ED screening and detection among men with DM.

Discussion

In this study, ED screening among men with DM increased drastically after the first phase of intervention (audit and feedback with mandate from management). The audit and feedback session was delivered with a tangible action plan for improvement where the PHPs were empowered to use the validated IIEF-5.[12] The proper utilisation of the IIEF-5, which was not used before audit and feedback, was likely to have contributed to the increased detection rate of ED due to its high sensitivity (97%) and specificity (88%).[17] Self-administering the IIEF-5 during waiting time at the clinic may overcome some barriers in ED screening, such as limited consultation time, embarrassment, and reluctance of patients to discuss sexual health candidly.[18] In addition, using the validated IIEF-5 in Malay as an objective ED screening tool can improve documentation and avoid 'failure to diagnose'.[19]

Health priority, directives, and support from higher authorities are some of the key facilitators for effective implementation of a clinical interventions.[20] The mandate from the DHO, who was the key performance indicator (KPI) assessor, had a direct effect on the PHPs' practice in ED screening.[20] PHPs were reminded that ED screening is part of KPIs in the NCD programme. Assignment of specific doctors and paramedics in each clinic to be in charge of the ED screening audit by the DHO created a sense of responsibility.[13] The mandate from the DHO was continuous, but there were no regular meeting sessions with the PHPs to discuss issues regarding ED screening. PHPs are burdened with implementing many programmes and KPIs from time to time, which may have resulted in the screening rate declining to baseline levels after the intervention. Barriers to ED screening, such as lack of encouragement by colleagues or superiors, cannot be remedied by educational intervention; instead, motivation and incentives should be considered.[21] For example, showing appreciation for the highest achiever in ED screening by awarding a certificate or providing extra allowances may serve as a motivation.

The 1-day interactive workshop on men's sexual health improved healthcare providers' knowledge and confidence in ED screening. This observation was similar to a study conducted in Australia, where they found that a 2-day workshop on evidence-based practice improved the knowledge and confidence in evidence-based practice among occupational therapists.[22] Educational workshops can be an important intervention to improve the quality of ED screening and management; however, this study did not find any improvement in the number of ED screenings conducted after the workshop. This was likely due to the heavy workload at the public health clinic and the ceiling effect after the phase 1 intervention when the participants had already received some education on ED screening.[23] A similar study in Australia found a lack of behavioural changes after an educational intervention.[22]

The rate of ED screening started to decline 6 months after the first phase of intervention and 3 months after the workshop (phase 2); this was likely due to the lack of follow-up structural feedback, reinforcement of mandates from the management, and a refresher workshop to sustain the implementation. A Canadian mixed-method study showed that physicians' behaviours related to the practice of evidence-based medicine could be improved through a 1-day workshop, with sustained improvement observed 3–6 months later.[23] An Iranian study on educational interventions reported the change in behaviour persisting up to 3 months after the intervention, but decreasing over time.[24] There is a need for regular intervention at 6-month intervals to refresh knowledge until PHPs fully understand the benefits of ED screening or until the PHPs enter the maintenance stage of behavioural changes. This is compounded by staff turnover in addition to diminishing motivation. Our study indicated that the combined 40-minute audit and feedback with mandate from management (phase 1) may be more effective than the 1-day workshop (phase 2) in sustaining the ED screening. Further studies are needed to confirm this observation.

This was the first pragmatic study to assess the real-world practice of ED screening of men with DM in a Malaysian public health clinic setting. This study has provided the opportunity to conduct more definitive trials in the future to determine the impact of each component of this multi-faceted intervention so that a more sustainable screening programme can be incorporated into the clinic system.

There were several limitations in this study. First, the phase 1 intervention comprising audit and feedback with mandate from management was conducted simultaneously for logistic reasons; therefore, the exact impact of each component on the practice of ED screening could not be differentiated. In addition, important patient-reported outcome measures, such as patient satisfaction, were not evaluated. There were some confounding factors that might have influenced the ED screening after intervention. The movement control order during the COVID-19 pandemic may have lowered the priority for screening for ED among men with diabetes. Mobilisation of PHPs from diabetes care to front-line teams for COVID-19 sampling centres, assessment centres, and vaccination centres may have reduced the manpower available for ED screening. A staff transfer rate of about 10% each year may have also influenced the ED screening rate.

Audit and feedback with mandate from management were strategies that improved ED screening for up to 6 months in public health clinics. A 1-day interactive workshop focusing on men's sexual health increased healthcare providers' knowledge on ED and their confidence in ED screening but did not further increase the practice of ED screening. Future studies evaluating each component of the interventions, the effectiveness of the phase 2 intervention when more PHPs were trained or changing the order of each component may help to further improve or streamline the multi-faceted intervention. We recommend a regular (every 6 months) audit and feedback, and mandate of management to sustain the practice of ED screening in men with diabetes.

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Conflicts of interest

No conflicts of interest are declared.

How does this paper make a difference to general practice?

- This research indicated that audit and feedback in addition to mandate from management at regular 6-month intervals can sustain the practice of ED screening by PHPs in public health clinics.
- The workshop on men's sexual health improved the knowledge of ED and confidence in ED screening but did not further increase the number of ED screenings among the healthcare providers.
- Future research evaluating each component of the multi-faceted intervention is necessary to identify the key component to making the ED screening intervention effective.

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