Original Article

Diabetes ongoing sustainable care and treatment (DOST): A strategy for informational deliverance through visual dynamic modules sustained by near peer mentoring

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Abstract

Background: The informational continuity for a diabetic patient is of paramount importance. This study on a pilot basis explores the process utility of structured educational modular sessions grounded on the principle of near-peer mentoring. **Methodology:** Visual modules were prepared for diabetic patients. These modules were instituted to 25 diabetic patients in logical sequences. In the next phase, 4 persons of these 25 patients were designated as diabetic-diabetes ongoing sustainable care and treatment (DOST). Each diabetic-DOST was clubbed with two patients for modular session and informational deliverance during the next 7 days. Process analysis was performed with "proxy-indicators," namely, monthly glycemic status, knowledge assessment scores, and quality of life. Data were analyzed by interval estimates and through nonparametric analysis. **Results:** Nonparametric analysis indicated a significant improvement in glycemic status in terms with fasting blood sugar ($W = 78$ $z = 3.04$, $P = 0.002$), 2 h-postprandial blood sugar ($W = 54$, $z = 2.01$, $P = 0.035$), and in knowledge score ($\chi^2 = 19.53$, df = 3; $P = 0.0002$). Quality of life score showed significant improvement in 2 out of 7 domains, namely, satisfaction with treatment ([difference in mean score = 1.40 [1.94 to 0.85]) and symptom botherness (difference in mean score = 0.98 [1.3–0.65]). **Conclusion:** Because of inherent methodological limitations and innate biases, at this juncture no conclusive statement can be drawn. Although, primitive process evidences indicate the promising role of the diabetic-DOST strategy.

Keywords: Glycemic status, informational continuity, near peer mentoring

Introduction

Diabetes shares a major contribution in morbidity and mortality attributed to noncommunicable diseases in the Indian subcontinent.[1] Indeed India has ominously achieved the gloomy position of diabetes capital of the world.[2] The adverse effect of disease on every organ system and its economic impact is a matter of concern at individual and population perspective.[3] As of now, there is no potential curative modality available for diabetes so a person once labeled as "diabetic" has to live with the disease and its impending future implications.[4,5] This compelling long-term alliance with disease demands some essential adjustments made by patients for accommodating to the requirements of the disease and its complications. This accustomization demands the accessibility of informational continuity and uninterrupted psycho-behavioral support many a time.[5-8] Several evidence have indeed endorsed this fact that gratification of informational need and supportive care is as vital as anti-diabetic medication in achieving the good glycemic control.[8-12]

At this juncture, it may be prudent to think that whether this whole process of imparting information to a diabetic patient

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may be further reinforced and fortified with systematized time-tested educational techniques. Near-peer mentoring is a term borrowed from "education technology" which describes a unique empowering relationship in which "earned experiences and received wisdom" by the elder students are shared with his younger one (by virtue of duration spent in that particular environment) constantly.[7,13] This bi-directional interaction provides an opportunity for younger-ones to be coached and counseled. On one hand, the younger ones receive information, advice, support, and encouragement whenever required, it also offers an opportunity for the elder one to revisit and reflect on his learning, perceptions and thoughts around a subject whenever he shares the information and extends his support.[10,13,14] Thus, the process of near-peer mentoring may grant a privileged level of mutual assistance in which both individuals are mutually benefitted.[7,10,13,14] Can this mutually beneficial mentorship be initiated in chronic diseases like diabetes - this is the question to which this study is attempting to find an answer based on some "proxy" variables. This study is, in fact, the extension of another study (published in this journal) where investigators tried to disseminate information through crafted images for ease of processing through dynamic visual stimulations and further into actionable knowledge by the patient.[15]

Methodology

This facility based longitudinal follow-up study was conducted over a period of 1 year in the catchment area of an Urban Health Training Center. This study is the structured expansion (operationalization) of another study in which visual modules (using dynamic animation and image impositions) in vernacular (Hindi) were prepared, and effectiveness of these modules was ascertained by thematic analysis. Interested readers on the process of modular preparation can refer to the article published in the Journal of Family Medicine and Primary Care at July–September 2015 issue which offers a detailed description for the same.[15] After modular crafting, 25 diabetes patients (resided in the catchment area of Urban Health Training Centre under the aegis of Community Medicine Department) were registered for the study. For the study purpose, a diabetic was defined as – A person with fasting blood glucose ≥126 mg/dl on two separate occasions or 2 h postprandial blood glucose ≥200 mg/dl on two separate occasions or HbA_{1c} ≥6.5. All patients presented with co-existing compelling complications namely moderate and severe nonproliferative diabetic retinopathy a proliferative diabetic retinopathy; end-stage kidney disease, infected foot ulcers, New York Heart Association (0 stage 3 and 4 were excluded from the study as they might need vigorous intervention. The recruitment was followed by the division of participants into small batches with five participants in each. Each batch received three sessions in 3 subsequent days as per division of visual module using audiovisual aid. All the participants were constantly explained about their own concerns in between the sessions.

Of these educationally intervened 25 persons, 4 persons consented to serve as diabetic-diabetes ongoing sustainable care and treatment (DOST). These 4 persons served as the mentor for another 8 newly diagnosed diabetic patients detected from the community. Each diabetic-DOST was thus assigned the primary responsibility to educate the 2 patients on the predesignated aspects of disease with the aid of visual module in divided sessions for a duration of 3 h for 3 subsequent days. These initial sessions were closely supervised by the investigators. A day was fixed (1st/2nd/3rd/4th/Mondays of every month for 4 near-peer groups) for educational reinforcement of participants for a duration of next 6 months. These 6 follow-up sessions were primarily moderated by designated diabetic-DOST and supportively supervised by the investigators. Fasting and postprandial sugar assessment of the patients were done during these monthly visits for 6 months. Patients were also told to report encountered hypoglycemia events in between the two visits.

As most of the patients fitted to lower socioeconomic strata and as there was no HbA_{1c} facility available in the center, the effectiveness of this process was appraised on a nascent basis by following "proxy" variables:

- Time trend analysis of blood sugar monitoring (fasting, 2 h postprandial blood sugar [PPBS]) - At monthly interval on initial visit and subsequently at 1st, 2nd, 3rd, 4th, 5th, and 6th months through glucometer (seven readings per person in 7 months)
- Knowledge assessment score about diabetes at preeducational session and then 2nd and 4th months of follow-up through a structured 20 items questionnaire. The questions in this questionnaire were in alignment with received information.
- The quality of life assessment through a prevalidated questionnaire relevant to Indian set-up in seven domain - role imitation due to physical health, physical endurance, general health, treatment satisfaction, symptom botherness, financial worries, emotional/mental health, diet satisfaction at before intervention, and during the 3rd months in the process.

Data were entered into MS Excel and was descriptively analyzed with the data analysis tool (add-ins in MS-Excel). Nonparametric analysis for glycemic status and knowledge was performed using Wilcoxon signed rank test and Friedman test, respectively.

Results

The mean age of the participants was 42.6 ± 5.9 years. Of these 12 selected participants for intervention, 7 were males and 5 were females. The results of the interventions are shown in following sections.

Time trend analysis of glycemic status

Cumulative fasting blood sugar (FBS) of the group showed a decline from (131–168 mg/dl) to (94–124 mg/dl) in a spawn of 6 months while the downward trend in 2 h PPBS was not much obvious ([214–264mg/dl] to [140–226 mg/dl]) for the studied group.

To compensate the effect of unknown potential cofounders, the glycemic values of the participants were subdivided into first 4 months (1st half) and in subsequent 3 months (2nd half). Average values of both the halves were calculated [Tables 1 and 2]. These paired values were further analyzed by Wilcoxon signed rank test which showed a significant difference (improvement) both in FBS (sum of the signed rank [W] =78, number of signed rank = $n_{s/r}$ = 12, z = 3.04, P = 0.002) and 2 h PPBS (sum of the signed rank [W] =54, number of signed rank = $n_{s/r}$ = 12, z = 2.01, P = 0.035) in both halves. This is shown in Tables 1 and 2.

Knowledge assessment scores

The result of the knowledge assessment of participants is shown by the Radar diagram [Figure 1] which shows a cumulative knowledge and its expansion form baseline at immediate educational intervention period and then 2 and 4 months in the process (to ascertain the "recall" and "solidification" of received information). These grouped scores (prescore/postscores-immediate/postscores - 2 months/postscores – 4 months) were further analyzed statistically by Friedman test [Table 3] which showed a significant difference among the scores (χ^2 = 19.53, df = 3; P = 0.0002) at different time interval.

Quality of life

Out of the seven domains (mentioned in the methodology section) only two domains namely treatment satisfaction and symptoms botherness were significantly affected during the process (3 months postintervention). Participants were found to be more satisfied with the treatment (difference in post- and pre-score = 1.40 [1.94–0.85]) and less worried about their symptoms (difference in post- and pre-score = 0.98 [1.31–0.65]) [Table 4]. Point estimates related to financial concerns and social role restriction even showed a dip during the process.

Discussion

Diabetes near-peer mentor (diabetic-DOST) can be understood as an informed diabetic person who offers the information to relatively novice diabetic and may satisfy his psychological support requirements.[16-23] This description of near-peer mentoring is in accordance with the proposed definition in education technology.[16,17] There is some documented prerequirement of a near-peer mentor proposed by the educational institutes where this program is running.[24] A near-peer mentor is supposed to be good in academics, communication skills and endowed with leadership skills.[25] The same traits in a diabetic near-peer mentor (where academics can be replaced by informational richness) may enable him to assist actively the newcomer (newly diagnosed) to achieve his personal glycemic goal. This relationship has a bidirectional implication. The near-peer mentor also reflects and revisits his own approaches and degree of attainment of glycemic goal in this process and learns himself through teaching.[17-19] Moreover, as in education near-peer mentoring has the distinct advantages of overcoming competitive drive among students (as a mentor is somewhat elder in an educational context rather of same stature) the diabetic-dost may be perceived as more accommodative and trustworthy by his collective wisdom gained through the experiential encounter with disease and knowledge acquired.[17,19,20]

This study attempts to generate some initial evidence on the process of structured educational sessions delivered on the interface of near-peer mentoring. The reason for choosing diabetes for this intervention is obvious. This disease along with hypertension and dyslipidemia is presenting itself as "modern day epidemic" with catastrophic consequences.[26,27] Virtually, every organ-system is affected by the disease.[28,29] Moreover, the disease being a life-long phenomenon also affects adversely the quality of life and economic productivity.[30] With this context, it cannot be addressed by merely prescribing anti-diabetic medication or Insulin; rather informational need about disease, diet, complication and self-care are more decisive factors to decide the good glycemic control. Moreover, constant motivation and encouragement also interplay when it comes to adherence to medication, dietary plans, and life-style modification on a long-term basis.[31,32] These requirements of the patient are

Table 1: Glycemic status (fasting blood sugar) of participants in first 4 months and in next 3 months with nonparametric analysis

Fasting Blood Sugar of the participants during first four months of Intervention (gm/dl)												
Month (follow up)	****Dia_ Dost1**	**DD1-A**	**DD1-B**	**Dia_ Dost2**	**DD2-A**	**DD2-B**	**Dia_ Dost3**	**DD3-A**	**DD3-B**	**Dia_ Dost4**	**DD4-A**	**DD4-B**
Nov-14	142	158	154	150	146	168	141	153	143	132	157	134
Dec-14	123	135	101	112	132	132	98	135	117	110	158	112
Jan-15	138	117	93	118	145	142	96	149	132	112	132	119
Feb-15	116	100	104	99	145	136	102	113	121	128	126	116
Avg FBS (first 4 months)	129.75	127.50	113.00	119.75	142.00	144.50	109.25	137.50	128.25	120.50	143.25	120.25
Fasting Blood Sugar of the participants during next three months of Intervention (gm/dl)												
Mar-15	102	112	110	93	134	134	92	112	142	98	131	91
Apr-15	109	109	97	103	112	120	87	132	120	100	110	112
May-15	106	110	99	95	124	118	103	122	100	94	116	108
Avg FBS (last 3 months)	105.67	110.33	102.00	97.00	123.33	124.00	94.00	122.00	120.67	97.33	119.00	103.67

Sum of the signed Rank (W)=78, Number of signed rank=$n_{s/r}$=12, z=3.04, P=0.002 ** First row depicts alpha numerical codes assigned to each participant.

Table 2: Glycemic status (2 h postprandial blood sugar) of participants in first 4 months and in next 3 months with nonparametric analysis

Month (follow up)	Dia Dost1	DD1-A	DD1-B	Dia Dost2	DD2-A	DD2 -B	Dia Dost3	DD3 -A	DD3 -B	Dia Dost4	DD4-A	DD4-B
2 Hrs Post Prandial Blood Sugar of the participants during first four months of Intervention												
Nov-14	245	244	254	250	246	264	242	211	241	212	241	214
Dec-14	221	204	202	222	212	212	178	204	227	220	244	222
Jan-15	176	194	192	224	245	242	153	187	212	211	212	229
Feb-15	160	188	204	202	245	211	202	211	222	199	221	196
Avg 2 HrsPPBS (first 4 months)	200.50	207.50	213.00	224.50	237.00	232.25	193.75	203.25	225.50	210.50	229.50	215.25
2 Hrs Post Prandial Blood Sugar of the participants during next three months of Intervention												
Mar-15	182	222	220	191	182	190	168	201	173	176	212	168
Apr-15	164	214	149	201	169	220	249	194	150	162	220	254
May-15	206	192	140	174	160	224	226	218	200	168	226	234
Avg 2Hrs PPBS (last 3 months)	184.00	209.33	169.67	188.67	170.33	211.33	214.33	204.33	174.33	168.67	219.33	218.67

Sum of the signed Rank (W)=54, Number of signed rank=$n_{s/r}$=12, z=2.01, *P*=0.035 ** First row depicts alpha numerical codes assigned to each participant.

Table 3: Cumulative mean rank of knowledge assessment score at various time interval with nonparametric analysis

Participants	Preeducational scores	Posteducational score (immediate)	Posteducational score (2 months after session)	Posteducational score (4 months after session)
Mean rank for the sample	1.1	3.1	2.9	2.9

χ^2=19.53, df=3; *P*=0.0002

Table 4: Quality of life domains assessment scores of the participants

Domains _Quality of Life	Pre-Interventional		Post-Interventional		Difference in mean (95%CI)
	Mean Score	Std Deviation	Mean Score (in 3 months)	Std Deviation	
Role Limitation Due to Physical Health	2.28	0.62	2.22	0.45	0.06(−0.40-0.52)
Physical Endurance	3.1	0.94	3.21	0.69	−0.11(−0.81-0.59)
General Health	2.76	0.82	2.82	0.29	−0.06(−0.58-0.46)
Treatment Satisfaction	2.24	0.38	3.64	0.82	−1.40(-1.94-−0.85)
Symptom Botherness	1.28	0.4	2.26	0.38	-0.98(−1.31-−0.65)
Financial Worries	3.35	0.73	2.96	0.23	0.39(−0.07-0.85)
Emotional/Mental Health	1.75	0.27	1.73	0.61	0.02(−0.38-0.42)
Diet Satisfaction	1.76	0.34	1.92	0.37	−0.16(−0.46-0.14)

indeed very difficult to fulfill in a hectic and busy out-patient set up alone by a physician. Hence, to take care of patient needs and concerns, we may think about the development of an educational and support system through support groups who are also travelling through the similar path.[9,10,33] Creation of peer group support system is well-documented in literature not only for diabetes and other chronic disease related to kidney/heart but also for further cultivating positive life-style changes such as a fitness program.[34-38]

At this juncture, the study cannot make any generalized statement about the effectiveness of the support group firmly. The effect on glycemic status (more pronounce on fasting sugar) may be a cumulative effect of several other factors apart from this intervention, or it may be simply another example of Hawthorne effect in which participants had modified or improved an aspect of diet a night before the monthly follow-up. This may be a reason for better fasting glycemic control rather than postprandial status.

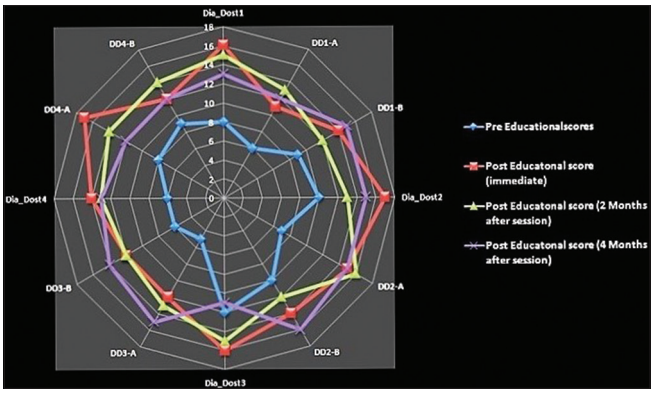

Figure 1: Radar diagram showing the expansion of knowledge at different time interval

Health belief model clearly states the fundamental requirement of informational enrichment to deal with chronic diseases like diabetes.[39,40] Only the person equipped with necessary information about disease will perceive the seriousness of disease and will act

further to adapt positive lifestyle changes. This addressing of informational gap is very vital to remove the fear of unknown and further to take action deterministically by the patient.[39-42] The above-mentioned facts may be exploited to understand why two domains (namely treatment satisfaction and symptom botherness) related with quality of life showed improvement during the process. One plausible hypothesis for this phenomenon may be that informational richness of participants actually helped them to understand their disease more objectively and neutrally. Moreover, as this ordered information was received through the person having the same disease, the perceived authenticity might be more and the whole progression might be less stressful.

This study attempts only to look into the process doesn't claim at this juncture about the effectiveness of the intervention deterministically due to some limitations like nonrepresentative sample size to different demographic strata and glycemic status with little controls on confounders/biases. However, primitive process evidence indicates the promising role of the diabetic-DOST strategy. Proxy variables such as glycemic status, knowledge gained in the process and quality of life scores on a pilot basis have motivated the investigator further to explore this mode of intervention for a longer period under controlled environmental conditions through multicentric community trial. The whole process provided an opportunity to refine and revise the long-established prejudices and suppositions through shared learning and to look into the sustainability aspect related to diabetic care. The ultimate vision of this exercise is to establish a cadre of informed peer support group for diabetes and to delegate the customary routine care from a single person (physician) to other well informed and motivated persons and consequently promoting the decentralization of health care.

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Conflicts of interest

There are no conflicts of interest.

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