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The effectiveness of four different educational interventions for asthma patients

Key Messages

1. Educational interventions directed at asthma patients were followed by significant improvements in knowledge about the disease and quality of life.
2. There was no significant difference between pamphlets, audiotapes, and videotapes in terms of improving the patient knowledge and quality of life.
3. Seminars were found to be the most adaptable and acceptable one among the four educational means.

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Introduction

Asthma as a chronic disease in Hong Kong is increasing. International studies show that education about asthma helps patients increase knowledge so as to better manage and prevent complications of the disease, and thus reduce recurrences, morbidity, and mortality. Apart from benefits to patients, health care organisations are also concerned about the cost-effectiveness of asthma education. Numerous studies found that pamphlets, audiotapes, seminars, and videos are effective means of enhancing patient knowledge about asthma.[1,2] However, only a few studies report on the comparative effectiveness of such different educational modalities. This study attempted to address this issue in the context of Hong Kong.

Methods

During the study period November 1998 to December 2000, patients who attended the asthma clinic of our hospital provided the sampling frame. Selection criteria included: patients diagnosed as having asthma, aged 15 to 65 years, able to speak and read Chinese, and who had never attended an asthma seminar in our institution. The Global Initiative for Asthma International Guideline formulated by World Health Organization was adopted as the diagnostic criteria for asthma.

The four educational interventions to be compared included: (1) a seminar, (2) videotapes, (3) audiotapes, and (4) pamphlets. The 2-hour seminar for eight to 10 patients was conducted by a nurse specialist. It covered the normal physiology of the lung, the nature of asthma and its triggering factors, medications used for treatment, self-management of asthma, and finally the introduction of Hong Kong Asthma Society (a patient support group). Questions from patients were actively invited to enable clarification of information and discussion of issues of interest. The videotapes, audiotapes, and pamphlets were developed for the same purpose, using the seminars as a blueprint. The video involved viewing a videotape of a seminar delivered by the nurse specialist. Similarly, the audiotape was an audio record of a seminar delivered by nurse specialists. The pamphlets contained the same content as the seminar. Since they entailed only one-way (passive) communication, education via videotape, audiotape, and pamphlet did not allow opportunities for questioning.

Patients recruited to the three passive intervention groups (videotape, audiotape, and pamphlet) were asked to take their respective educational material home for viewing, listening, or reading.

Sample size

Assuming that the interventions could achieve 80% power and a 5% significance level for a medium effect size of f=0.25, a target sample size of 64 subjects per intervention group was considered necessary. To allow for a 10% dropout rate, 296 subjects needed to be recruited.[3]

Study instruments

Three instruments were adopted to assess patient knowledge, quality of life, and perceptions of their educational interventions. For knowledge of asthma,

a 20-item asthma knowledge questionnaire (AKn-HK) was adopted. This questionnaire was a modification of two previously developed instruments (the "IQ" Quiz of the National Heart, Lung & Blood Institute, US Department of Health and Human Services and the questionnaire of the Hong Kong Asthma Society) by three respiratory specialists. The AKn-HK had been used by our clinical team for 6 years and demonstrated good applicability among Hong Kong patients. A true-and-false format was found particularly applicable, as most asthma patients were elders with limited formal education. All questions answered correctly scored 100.

The St George's Respiratory Questionnaire (SGRQ) with 17 multiple-choice items designed to assess quality of life, has been shown to be a sensitive and repeatable instrument. It allows comparative measurement of patient health between populations, including quality changes in health following therapy for respiratory diseases. The maximum score is 92.36 whilst the minimum is 1.05; the lower the score, the better the quality of life. The repeatability of SGRQ was favourable, with a coefficient of variation of 19% for paired measurements. For the current study, the SGRQ was translated (forward and backward) by a professional translator and a nursing faculty member. The content validity index (CVI) of 93% was obtained using the six member expert panel. The internal consistency and reliability was established with a Cronbach's alpha coefficient of 0.9.

Regarding patient satisfaction, acceptability, perceived appropriateness, applicability, and effectiveness of the educational interventions, a self-developed questionnaire was used. Patients were asked to rate the above five dimensions (items) on a five-point Likert scale from "5=strongly agree" to "1=strongly disagree". The CVI of 100% was obtained in this study using a six member expert panel.

The AKn-HK and the SGRQ were administered before and after each intervention. The post-intervention follow-up for asthma knowledge took place at three intervals: immediately, after the 8th week, and after the 16th week. Quality of life was measured twice, 8 weeks and 16 weeks, after the intervention. For patient satisfaction, acceptability, as well as perceptions of appropriateness, applicability and effectiveness of the educational interventions, only one episode of measurement was obtained immediately post-intervention.

Results

Number of patients recruited

A total of 296 patients were recruited but 14 dropped out; of the remainder (282 subjects), 92 attended seminars, 60 were offered the videotape, 62 the audiotape, and 68 the pamphlet. However, seven subjects could not complete the study; six defaulted at the 8th week and one at the 16th week. Eventually, 275 subjects completed the whole study.

Demographic data

There was no significant difference between the four groups of subjects in terms of age, duration of their asthma, type of housing, social class, and number of days off work or school. More females than males attended seminars and received audiotapes, whilst the converse was true for receipt of pamphlets (P=0.13). Of those attending seminars, 5% had not completed primary level education. More patients in the audiotape and videotape groups than the others reported having had only a single episode of asthma (P=0.028). By contrast, more in the seminar group had received prior information on asthma (P=0.022) and had a higher frequency of hospitalisation (P=0.000), general practitioner (GP) [P=0.032] and Accident and Emergency Department (AED) attendance (P=0.013) than those in the other three groups.

The recruited subjects included 151 males and 131 females; their mean (standard deviation [SD]) for age was 38 (14) years and for asthma duration was 16 (13) years. Nearly 64% of them were experiencing their first episode of asthma. The average number of days off work/school, visits to a GP, attending AED, and hospitalisation for asthma in the past year was: 2.0 (SD, 7.4), 2.6 (SD, 5.0), 0.6 (SD, 1.3), and 0.3 (SD, 0.6), respectively. Most (62%) of the subjects received secondary school level education. The majority (74%) of subjects were living in public and aided rental blocks or Housing Authority home ownership estates.

Asthma knowledge

Patients attending seminars attained significantly greater improvements in knowledge than in the other groups immediately after the intervention (F=12.5, P<0.001). However, there was no significant difference between the four educational interventions in terms of improvement after the 8th and 16th week (Fig 1). The use of Scheffe's post-hoc analysis indicated that regardless of the group, compared to baseline, post-education assessments resulted in significant improvements.

Quality of life

There was no significant difference between the four educational means in improving quality of life (Fig 2); quality of life improved after receiving any of the four forms of education.

Patients' perceptions of the educational means

In rating their satisfaction, acceptability as well as perception of appropriateness, applicability and effectiveness of the four educational interventions (from 1 to 5) for all dimensions, highest scores were accorded by those attending seminars. Regarding the latter, significant differences were attained for patient satisfaction (F=14.03, P<0.001), acceptability (F=19.19, P<0.001), appropriateness (F=26.28, P<0.001), applicability (F=16.42, P<0.001), and effectiveness (F=20.81, P<0.001).

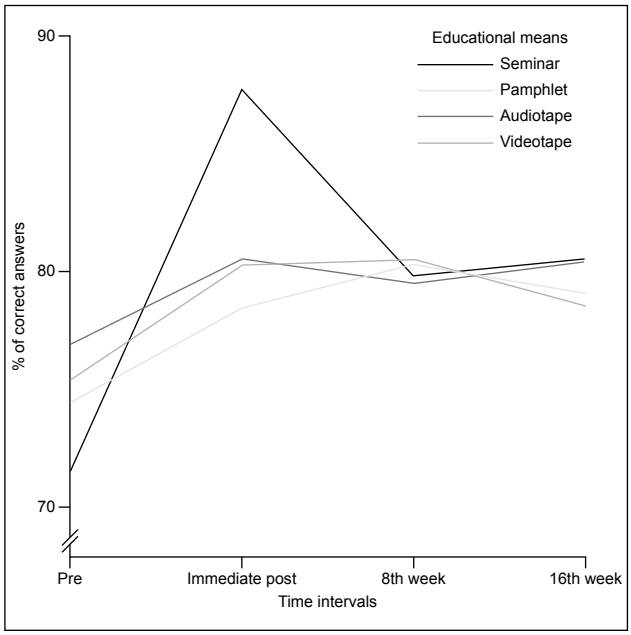

Fig 1. Knowledge gain of patients using different means of education (maximum score=100; minimum score=0)

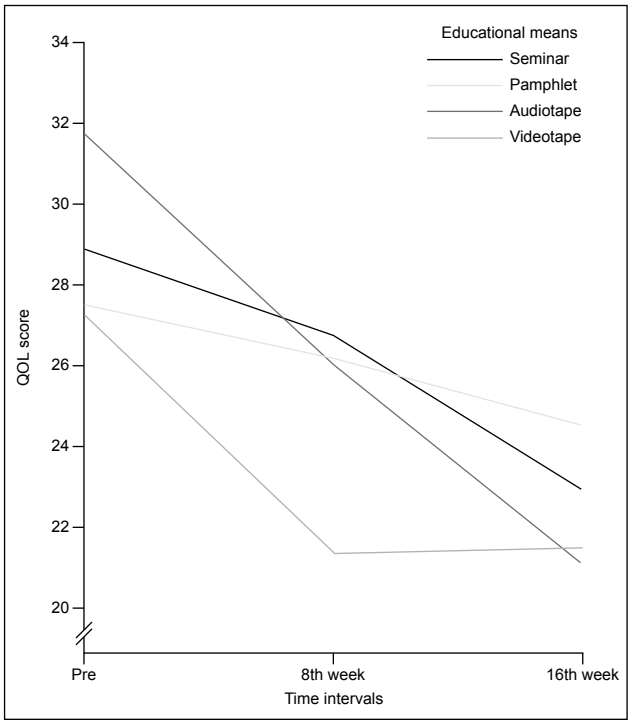

Fig 2. Mean quality of life (QOL) scores of patients using different means of education (maximum score=92; minimum score=1)

The lower the scores, the better the QOL status

Costs

The cost-effectiveness of four different educational interventions was calculated in terms of knowledge gain and improvement in quality of life. The immediate changes in knowledge and quality of life after the interventions were compared to the costs incurred, which served as indicators of cost-effectiveness. Accordingly, audiotapes were the most cost-effective educational tools for improving quality of life, whilst seminars were the most effective for improving knowledge. However, in the long run (referring to only recurrent costs) audiotapes were still considered the most cost-effective for improving quality of life, but videotapes were regarded as the most cost-effective for improving knowledge.

Discussion

During implementation of the study, a problem was encountered in the randomisation of patients. Thus, randomisation was improperly implemented.

When measuring the effectiveness of the four educational interventions, four intervals were selected. In general, improved asthma knowledge was sustained even 16 weeks later. Seminars were the best among the four tools for improving patient knowledge immediately post-intervention, but at the 8 weeks, differences from the other means of education had diminished. All four educational tools were able to sustain an improved quality of life till the 16th week post-intervention.

Concerning patient perceptions, the seminar was the most satisfying form of education, due to its being the most acceptable, appropriate, applicable, and useful. It enabled interaction between subjects and educators, problem solving, and clarification. From the above, it seems that personal education was the most effective in communicating asthma techniques. However, seminars also have limitations—not all patients can afford the time to attend, some people may prefer taking educational materials home.

Nevertheless, the seminar was the most adaptable and acceptable of the four educational tools. First, it was regarded by the patients as the most effective in transferring knowledge and received the highest satisfaction rating. Second, with respect to the recurrent costs, they better able to facilitate updating of knowledge, which can be incorporated very easily. However, seminars alone may not be good enough to achieve successful educational results. Further studies could explore addition of other educational means as part of the seminar (eg computer programs). A combination of the four tools could still be more cost-effective. The internet could also be used to facilitate suitable, constantly updated education on asthma, as could communication through e-mails. E-mails could also facilitate consultations and counselling (telemedicine).

Consistent with previous literature and studies, asthma education results in significant improvements in patient knowledge and quality of life; notably all four educational tools were effective and the improvement was significant and sustained for at least 16 weeks.

Although there is no significant difference between

pamphlets, audiotapes, and videotapes in improving the patient knowledge and quality of life, audiotapes were rated the poorest by respondents. Thus, visual instead of audio educational means appear more accepted by asthma patients, particularly as they may find it difficult to understand concepts such as inhalation technique just by listening descriptions. The findings of this study are therefore differ from those of Jenkinson et al[4] in which pamphlets were less effective than audiotapes in the transfer of knowledge. According to others, videotapes were more popular than leaflets.[5] Nevertheless, the results of this study showed that subjects rated pamphlets higher than videotapes in terms of satisfaction, acceptability, and effectiveness, but vice versa in terms of appropriateness and applicability. It might be that subjects preferred pamphlets more since they were more convenient and easier to use than videotapes, though they thought that videotapes were more effective in the transfer of knowledge.

Which educational means is the most cost-effective one in the long run will be more complicated to decide. In the near future, recurrent costs may prove to be indicators of cost-effectiveness over a period of time. However, due to advances in technology, a new set of materials need to be prepared periodically, and another set of 'initial costs' will be incurred.

Moreover, caution should be exercised in interpreting our results, as they were confined to a one-off intervention and might not be true in the much longer term.

Another limitation of this research project was the difficulty in recruiting subjects for the project, as were transferred out to another hospital from 2000. In addition, some patients might not have suitable audiotape or videotape players, for which reason they were excluded from the study. Subjects were allocated to the seminar group without randomisation; after recruitment had ended we discovered that data collectors and doctors in the asthma clinic had inadvertently assigned predominantly to that group, thus biasing data analysis. Finally, the results may not be generalised as illiterate subjects were excluded from the study.

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