

Does clinic-based education have a sustainable impact on asthma patient awareness?

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ABSTRACT

Introduction: Asthma patient education is an essential component of asthma management, just as inhaler treatment adherence and inhaler technique education. These issues face challenges in the developed world communities and the literature demonstrates data of various validity supporting the need for educational activities. However, communities with poor health-care facilities and low socioeconomic status have seen little or no effort to tackle this challenging area of research.

Methods: This interventional study aims to impact on sustained asthma awareness with clinic-based asthma patient education. The quasi-experiment recruited asthma patients from a chest clinic within a poor healthcare system at desperate economic and political times. The educational intervention consisted of an educational video, posters and leaflets, in addition to the doctor's clinic encounter and inhaler technique education by clinic nurse.

Results: 24 patients of the initially recruited 87 patients were re-assessed 4 to 12 weeks later, on the impact of the educational activity on certain asthma awareness parameters. Patients' awareness of their diagnosis of asthma did not improve despite the educational activity with $p = 0.141$. However, there was a significant improvement with the awareness of patients for the need of long-term inhalers ($p = < 0.0001$), adherence to inhaler treatment ($p = < 0.0001$) and correct use of inhaler ($p = < 0.021$).

Discussion & Conclusion: The study supports the feasibility and efficacy of asthma patient education in poor health-care circumstances at basic levels of asthma knowledge, adherence and inhaler technique. This interventional study is unique in the circumstances it was carried out under. Limitations include the large number of dropouts.

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1. Introduction

Asthma is the most common chronic respiratory disease. Its prevalence can vary from 1% to 24% of the population [1,2]. As such, it has become a public health concern, especially as prevalence is on a gradual increase worldwide [3].

Patient follow-up is usually enough at primary health-care level for above 95% of patients [4]. However, a difficult minority of asthmatics require intense specialist clinic and in-patient management for prolonged periods.

Major respiratory, asthma and health-related professional bodies worldwide advocate the need to educate asthma patients as part of the holistic asthma management. The three main areas of asthma education are (1) knowledge, (2) adherence and (3) inhaler technique.

A Cochrane systemic review of 20 adherence interventional studies of variable size and material found 20% improved adherence [5]. Doctor-based education reported improved inhaler technique, QOL and ACT [6], improved knowledge and improved SGRQ [7], improved clinical outcomes [8]. Whereas pharmacist-based

education reported improved symptoms and less rescue use with verbal education [9], improved knowledge [10], improved inhaler technique and reduced hospitalisations and ED visits [11].

Other attempts included educational sessions delivered by nurses and other health-care professionals documented improved knowledge parameters, adherence and inhaler technique associated with clinical outcomes such as ED visits, hospitalisations, symptom burden, rescue use and SGRQ, QOL and ACT [12–16].

The above review demonstrates the literature is rich in attempts to justify, design, conduct and measure the impact of various patient-directed educational programmes. However, optimal composition, content, depth, mode of delivery and style of the programme remain a challenge in terms of standardisation, measurement, reproducibility and monitoring. Furthermore, outcome measures (e.g., QOL, Asthma Control Test (ACT), lung function tests, exacerbation risk, morbidity and mortality) were not uniformly standardised, which poses a major external validity and generalisability challenge to any study.

Furthermore, gaps in knowledge include the optimal cost-effective standardised method of education,

their impact on patient-related outcomes, the best method to supervise and detect non-adherence and finally, the sustainability and effectiveness of inhaler technique training.

This study will attempt to test the degree to which asthma patients in Misurata, Libya respond to a number of one-stop educational interventions in a specialist clinic. This assessment is repeated at the next visit to test retention of the basic, but important points of the educational material (primary objective). The study will try to answer the following questions:

- (1) Can these educational methods impact on patient awareness?
- (2) Can these educational interventions impact on inhaler adherence?
- (3) Is inhaler technique education feasible and effective?

2. Methods

2.1. Study design

A quasi-experimental design was selected mainly because it is not possible to control who receives the awareness campaign and who does not in the clinic setting [17]. A randomised controlled trial design would require randomisation of the sample as well as a control arm, both of which are not possible for this study, ethically, culturally and logistically.

The Null Hypothesis states 'There is no sustainable impact of clinic-based education on asthma patient awareness'.

2.2. The intervention

This project entails a multi-faceted one-stop programme of educational activities. The educational activities included; reading the leaflet, watching the video and observing the posters, in addition to a standardised education-focused clinic encounter and an inhaler technique training session, as detailed in Table 1 and Appendices 1–3.

Quota sampling strategy was employed. All patients fitting criteria will be considered for recruitment in the

Table 2. Asthma awareness parameters surveyed pre & post-intervention.

Survey question	Available response
(a) Patient awareness of the diagnosis of asthma	Yes – No – Suboptimal
(b) Patient awareness on need for long-term inhaler treatment	Yes – No – Suboptimal
(c) Patient adherence to inhaler treatment	Yes – No – Suboptimal
(d) Correct use of inhalers	Yes – No – Suboptimal

study until the limit of 100 patients, which was thought to be an appropriate sample size according to similar research projects.

Inclusion criteria: All patients with a new or previous diagnosis of asthma

Exclusion criteria: Patients below the age of 18, patients outside area of Misurata, patients whose diagnosis of asthma is not clear and needs further workup before starting treatment, and finally, acutely unwell asthma patients, who are too unwell to comprehend the educational material in the clinic.

Recruited patients were requested to return within 4 to 12 weeks to be re-surveyed with the same awareness markers to complete the assessment.

Patients were surveyed with regards to the awareness parameters, which are related to knowing the diagnosis, being aware of the need for long-term inhaler treatment, degree of adherence and inhaler technique assessment, Table 2. It should be noted that adherence was checked verbally with the patient in clinic, and inhaler technique was assessed and corrected in a separate clinic room by a trained respiratory nurse.

The study was conducted with ethical approval from Sheffield-Hallam University, Sheffield, UK as well as Misurata Hospital for TB and Respiratory Medicine. Participant information sheet and participant consent form were both designed in accordance with Sheffield-Hallam guidance and were reproduced in Arabic.

3. Results

Ninety patients were recruited, but three did not consent to enter the study. Only 24 patients came for a follow up visit during the study period, out of 87 consented patients (27.6%). Data from the 24

Table 1. Details of asthma clinic-based educational interventions.

Doctor interview	During clinic encounter, 3 basic educational points are discussed with the patient and relative. These are (1) the name of diagnosis 'asthma', (2) the fact that this is a chronic condition and that (3) inhaler use should be long term rather than a short course.
Leaflets	Leaflets were designed locally to answer common questions and correct misconceptions. They include much wider and deeper information about asthma, but further emphasise the main points of awareness of the study (diagnosis, chronicity, inhaler adherence and technique). Leaflets also included a side on inhaler technique.
Posters	4 (two A2 and two A3) educational posters were also produced with the same messages (diagnosis, chronicity, inhaler adherence and technique). They included caricatures, patient stories, pictures of celebrities using inhalers and inhaler technique instructions.
Video	A 41-minute educational video was produced locally to include a TV programme and other videos demonstrating 6 inhaler techniques.
Inhaler technique clinic	A separate nurse clinic was setup to assess and correct inhaler technique by the clinic nurse. In the subsequent clinic (post-intervention) the same routine of inhaler technique assessment was carried out.

Table 3. Patient demographics (age, sex and smoking status).

Age	16–25	2
	26–35	3
	36–45	5
	46–55	5
	56–65	3
	> 65	6
Sex	M	10
	F	14
Smoking Status	Never smoker	20
	Current smoker	3
	Ex-smoker	1

patients will be analysed for the comparative study. Table 3 shows patient demographics, indicating even distribution amongst all age groups, the majority to be non-smokers – 20 out of 24 (83%). Other asthma-related patient parameters such as PEFr, spirometry, ACT, exacerbation rate and hospitalisations were not collected from patients notes. However, the clinic has an open-door setup accepting any respiratory patients. Mean follow-up interval was 61 days, ranging from 12 to 138 days.

Pre and post-intervention data show clear numerical trend towards improvement in 'awareness of diagnosis' (10 to 16), 'awareness of need for long-term inhaler treatment' (6 to 18), 'adherence to inhaler' (1 to 16) and 'correct inhaler technique' (0 to 5), see Table 4.

The 50th percentile (median) for the four parameters pre and post-intervention was calculated by ranking the scores from 1 for the highest favourable result. The Wilcoxon test was used for this ordinal data to compare baseline with post-intervention data. The data do not follow the normal distribution curve. Table 5 shows the results of the Wilcoxon test.

Despite the mean value changing for the first parameter of 'awareness of diagnosis' from 2 to 1 post-

intervention, the test did not detect a significant change at a p-value = 0.141. This indicates the null hypothesis to be true with regards to the awareness of diagnosis. However, 'awareness of need for long-term inhaler treatment', 'adherence to inhaler treatment' & 'correct use of inhaler' had significant p values of < 0.0001, < 0.0001 & 0.021, respectively. The null hypothesis for the three latter respective parameters was not true, indicating the clinic-based interventions can improve asthma patient awareness.

4. Discussion

This study is an important informative step towards improving the overall awareness, education and knowledge of asthma patients in general, but more specifically in similar communities and circumstances to today's Libya [18].

The results of the study demonstrate a statistically significant impact of clinic-based education on basic asthma awareness and inhaler adherence and technique. Despite no significant improvement in patients' awareness of the diagnosis of asthma ($p = 0.141$), there was improved patients' awareness of the need for long-term inhalers ($p = < 0.0001$), improved patient adherence with inhalers ($p = < 0.0001$) and improved rates of correct inhaler technique ($p = 0.021$). Successful implementation of such clinic-based educational activities requires the utilisation of a combination of leadership and personal skills.

The design of the educational intervention offers reproducibility, ease of access, and credibility to the confused patient in similar cultural backgrounds. Finally, the benefits are universal to all, and not just to those recruited. However, engagement is not

Table 4. Pre and post-intervention survey results.

	Pre-intervention (n = 24)	Post-intervention (n = 24)
1. Patients' awareness of the diagnosis of asthma		
Aware of diagnosis	10	16
Not sure of diagnosis	7	2
Not aware of diagnosis	4	6
New diagnosis	3	0
2. Patients' awareness of need for long term inhaler treatment		
Recognises need for long term inhaler treatment	6	18
Does not recognise need for long term inhaler treatment	15	6
New diagnosis	3	0
3. Patients' adherence to inhaler treatment		
Takes preventer treatment regularly	1	16
Takes preventer treatment intermittently	4	1
Only uses rescue inhalers	6	5
Uses no inhaler treatment	10	2
New diagnosis	3	0
4. Correct inhaler technique		
Correctly using inhalers	0	5
Incorrect use, corrected to a large degree	12	9
Incorrect use, corrected to a moderate degree	2	2
Incorrect use, corrected to a small degree	1	0
Inhaler technique not assessed	1	0

Table 5. Wilcoxon signed ranks test results.

	Pre-intervention	Post-intervention	Wilcoxon Signed Ranks Test (p value)
Awareness of diagnosis of asthma	2.0000	1.0000	0.141
Awareness of need for long term inhaler treatment	2.0000	1.0000	< 0.0001
Adherence to inhaler treatment	4.0000	1.0000	< 0.0001
Correctly using inhalers	2.0000	2.0000	0.021

guaranteed with material such as leaflets, posters and videos.

The quantitative data demonstrate a favourable statistically significant impact of educational interventions on asthma awareness in the clinic setup in the patient population. Despite the large number of dropouts for the post-intervention analysis, the overall result is encouraging for asthma patients in similar health-care settings.

Contrary to the efforts to develop asthma patient education in the developed world, the literature does little to add applicable interventions to the underdeveloped communities. This study covers uncharted territory of an asthma educational activity in an underdeveloped country in a low socioeconomic environment at a time of collapsing public health-care facilities [18]. The steps taken to achieve this clinical and statistical significance are few and simple and can be feasibly applicable to such societies. The harsh environment surrounding this study is unmatched in other studies, even in those countries belonging to the 'third world'.

The knowledge aspect of the study only addresses the very basics of asthma. The quasi-experimental data do not show improvement in awareness of diagnosis, but awareness of need for long-term inhaler use has improved with statistical significance. The reasoning for this includes poor health literacy, poor documentation standards, the phenomenon of shopping around doctors and denial related to social stigma. Attempting to address in-depth knowledge of asthma using scores such as KASE-AQ, AKQ, AKBQ or ABC questionnaires is the next stage up from this current basic step at the first visit. These questionnaires cannot be applied to patients who do not know their diagnosis. This strongly reflects the NAEPP recommendation of tailoring educational activities to the health-literacy levels of communities [19].

The significant improvement in adherence in the quasi-experiment is reflected in various studies otherwise. Normansell reported a 20% improvement in adherence with 95% CI 7.52–32.74 in a meta-analysis of 20 RCTs [5]. The adherence data, although small, adds to the body of evidence that simple educational interventions could make a difference. Furthermore, the data is unique in terms of simplicity, applicability and generalisability to such poor health-care systems.

The most improved educational activity from the current study was inhaler technique education which was statistically and clinically significant (p-value = 0.021) reflecting clinical studies findings from various settings including difficult asthma clinics, ED patients, primary care settings.

There is good internal validity of this prospective study, as the survey items directly measure the degree of the asthma patient awareness as documented by the doctor during the clinic to minimise the threat to data validity.

The study is limited by a lack of external validity to the awareness survey items, as these have been extrapolated from real-life clinic practice. More importantly, attrition bias has had the most negative effect on the study, as the pre-intervention phase recruited 87 patients from Dec 2017 to Apr 2018. Only 24 (28%) returned within the period of the study. Any effect of the interventions on the 63 (72%) patients who dropped out could not be accounted for in concluding the study. Rater bias could also be argued in this study; however, the effect of rater bias could only be minimal as the survey items needed minimal judgement when being scored. Furthermore, selection bias in this cohort is minimal as the hospital is public, with all classes of the community are seen.

The main reasons for the large dropout rate are related to health-literacy, cultural phobias of inhaler treatment, lack of clinic management system, and a limited access to the clinic, despite offering an open walk-in option to study recruits.

5. Conclusion

Clinic-based education appears to have a sustainable impact on asthma patient awareness in communities of similar settings and conditions as Misurata. These findings need to be interpreted with caution when generalising to other communities and settings. Amongst the other study limitations is the high rate of dropouts causing a large attrition bias.

Finally, this is an overall positive finding in an otherwise untouched territory of asthma awareness in communities of poor health-care services.

This area of research has seen increasing interest in the recent few decades; however, the setting at which this study was undertaken has not been matched before in the literature. Further research is therefore desperately needed with certain precautions to mitigate the limitations that faced this study.

Doctors and nurses in similar communities should not despair of the low awareness levels amongst asthma patients. Indeed, they should focus on certain aspects of education such as knowing the diagnosis, emphasis on adherence and inhaler technique training. These have been shown to improve overall education as a surrogate for improved quality of life and reduced morbidity.

Disclosure statement

The author reports no conflicts of interest. The author alone is responsible for the content and writing of the paper.

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Appendices

Appendix 1.

Asthma leaflet in Arabic (colour printed on both sides and folded in 3)

أسئلة متكررة وأجوبة شائعة

الربو Asthma

أسئلة متكررة وأجوبة شائعة

هل الربو مرض معد؟
لا، الربو ليس مرضاً معداً، ولكنه مرض مزمن يصيب الشعب الهوائية في الرئتين، مما يجعلها تضيق وتورم، مما يؤدي إلى صعوبة التنفس والسعال.

هل الربو مرض خطير؟
في معظم الحالات، الربو مرض مزمن يمكن التحكم فيه بسهولة باستخدام الأدوية المناسبة. ومع ذلك، إذا لم يتم علاجه بشكل صحيح، يمكن أن يؤدي إلى مضاعفات خطيرة مثل التهاب رئوي أو فشل قلبي.

هل الربو مرض مزمن؟
نعم، الربو مرض مزمن، مما يعني أنه لا يمكن شفاؤه تماماً، ولكنه يمكن التحكم فيه بشكل جيد باستخدام الأدوية المناسبة.

هل الربو مرض يصعب علاجه؟
في كثير من الحالات، الربو مرض مزمن يمكن التحكم فيه بسهولة باستخدام الأدوية المناسبة. ومع ذلك، إذا لم يتم علاجه بشكل صحيح، يمكن أن يؤدي إلى مضاعفات خطيرة مثل التهاب رئوي أو فشل قلبي.

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في كثير من الحالات، الربو مرض مزمن يمكن التحكم فيه بسهولة باستخدام الأدوية المناسبة. ومع ذلك، إذا لم يتم علاجه بشكل صحيح، يمكن أن يؤدي إلى مضاعفات خطيرة مثل التهاب رئوي أو فشل قلبي.

مفاهيم الربو

ما هو الربو؟
الربو مرض مزمن يصيب الشعب الهوائية في الرئتين، مما يجعلها تضيق وتورم، مما يؤدي إلى صعوبة التنفس والسعال.

ما هي أعراض الربو؟
أعراض الربو تشمل:
- سعال متكرر، خاصة في الليل أو في الصباح الباكر.
- ضيق في التنفس، خاصة عند ممارسة الرياضة أو عند التعرض للهواء البارد.
- صفير عند التنفس، خاصة عند الزفير.
- الشعور بالضغط على الصدر.

ما هي أسباب الربو؟
السبب الدقيق للربو غير معروف، ولكنه يعتقد أنه ناتج عن تفاعل بين العوامل الوراثية والبيئية.

ما هي مضاعفات الربو؟
المضاعفات المحتملة للربو تشمل:
- التهاب رئوي متكرر.
- فشل قلبي.
- انخفاض جودة الحياة.

كيف يمكن علاج الربو؟
يمكن علاج الربو باستخدام الأدوية المناسبة، مثل الكورتيكوستيرويدات المستنشقة، والتي تساعد على تقليل التهاب الشعب الهوائية وتوسيعها.

كيف يمكن تجنب الربو؟
يمكن تجنب الربو عن طريق تجنب العوامل البيئية التي تثيره، مثل:
- الدخان.
- تلوث الهواء.
- الحساسية.

Appendix 2.

Asthma awareness posters printed on A2 and A3 size sheets. These were stuck to corridors and waiting rooms

هل تعاني من حالة الربو (حساسية الصدر)؟

ما هو مرض الربو؟
 يعرف الربو بصفة أخرى من أمراض الرئة، وهو مرض مزمن يصيب الشعب الهوائية في الصدر، مما يؤدي إلى تضيقها وتورمها، مما يجعل التنفس صعباً. الربو مرض مزمن، مما يعني أنه لا يمكن التخلص منه تماماً، ولكن يمكن التحكم به.

ما هي أعراض مرض الربو؟
 تختلف أعراض الربو من شخص إلى آخر، ولكن من الشائع أن يصاب أحد أو عدد من الأعراض التالية:
 - السعال أو سعال في الليل
 - الشعور بالثقل في الصدر
 - ضيق في التنفس
 - الشعور بعدم الراحة، خاصة في الليل أو بعد النشاط البدني
 - الشعور بالتعب والضعف، خاصة في الصباح

هل يمكن علاج الربو؟
 نعم، يمكن علاج الربو بشكل فعال. العلاج يشمل الأدوية التي تساعد على توسيع الشعب الهوائية، مما يجعل التنفس أسهل، وكذلك الأدوية التي تقلل من التهاب الشعب الهوائية، مما يمنع حدوث نوبات الربو.

كيف يمكن تجنب نوبات الربو؟
 يمكن تجنب نوبات الربو عن طريق تجنب المحفزات التي تؤدي إلى حدوثها، مثل:
 - الحساسية تجاه بعض المواد (مثل حبوب اللقاح، الغبار، وبر الحيوانات الأليفة)
 - الإصابة بالعدوى الفيروسية (مثل نزلات البرد والإنفلونزا)
 - ممارسة الرياضة بشكل معتدل، خاصة في الأماكن المغلقة أو في الطقس البارد
 - تجنب التدخين أو التعرض للدخان

مستشفى صحتك للدراسات والأبحاث الطبية بالتعاون مع مستشفى صحتك

هل تعاني من حالة الربو (حساسية الصدر)؟

ما هو مرض الربو؟
 يعرف الربو بصفة أخرى من أمراض الرئة، وهو مرض مزمن يصيب الشعب الهوائية في الصدر، مما يؤدي إلى تضيقها وتورمها، مما يجعل التنفس صعباً. الربو مرض مزمن، مما يعني أنه لا يمكن التخلص منه تماماً، ولكن يمكن التحكم به.

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 - السعال أو سعال في الليل
 - الشعور بالثقل في الصدر
 - ضيق في التنفس
 - الشعور بعدم الراحة، خاصة في الليل أو بعد النشاط البدني
 - الشعور بالتعب والضعف، خاصة في الصباح

هل يمكن علاج الربو؟
 نعم، يمكن علاج الربو بشكل فعال. العلاج يشمل الأدوية التي تساعد على توسيع الشعب الهوائية، مما يجعل التنفس أسهل، وكذلك الأدوية التي تقلل من التهاب الشعب الهوائية، مما يمنع حدوث نوبات الربو.

كيف يمكن تجنب نوبات الربو؟
 يمكن تجنب نوبات الربو عن طريق تجنب المحفزات التي تؤدي إلى حدوثها، مثل:
 - الحساسية تجاه بعض المواد (مثل حبوب اللقاح، الغبار، وبر الحيوانات الأليفة)
 - الإصابة بالعدوى الفيروسية (مثل نزلات البرد والإنفلونزا)
 - ممارسة الرياضة بشكل معتدل، خاصة في الأماكن المغلقة أو في الطقس البارد
 - تجنب التدخين أو التعرض للدخان

مستشفى صحتك للدراسات والأبحاث الطبية بالتعاون مع مستشفى صحتك

النوبة الحادة للربو (حساسية الصدر)

أعراض حالة:
 - ضيق في التنفس، خاصة في الليل أو بعد النشاط البدني
 - الشعور بالثقل في الصدر
 - السعال أو سعال في الليل
 - الشعور بالتعب والضعف، خاصة في الصباح

أسبابها:
 - التهاب الشعب الهوائية
 - تضيق الشعب الهوائية
 - تورم الشعب الهوائية
 - زيادة إفراز المخاط

كيف يمكن تجنب نوبات الربو الحادة؟
 يمكن تجنب نوبات الربو الحادة عن طريق تجنب المحفزات التي تؤدي إلى حدوثها، مثل:
 - الحساسية تجاه بعض المواد (مثل حبوب اللقاح، الغبار، وبر الحيوانات الأليفة)
 - الإصابة بالعدوى الفيروسية (مثل نزلات البرد والإنفلونزا)
 - ممارسة الرياضة بشكل معتدل، خاصة في الأماكن المغلقة أو في الطقس البارد
 - تجنب التدخين أو التعرض للدخان

مستشفى صحتك للدراسات والأبحاث الطبية بالتعاون مع مستشفى صحتك

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Appendix 3.
Screenshot of a combined asthma educational video (inhaler technique + explanatory information)

