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Managing asthma in primary care through imperative outcomes

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Abstract

Rationale, aims and objectives To evaluate asthma management and control in primary care clinics so as to design improvements based on guideline-directed outcomes.
Methods In this study, all medical records of asthma-diagnosed patients (children as well as adults, entire lifespan, asthma-related visits or not) were retrospectively reviewed as a basis for assessing the level of guideline adherence and asthma control. Six primary health care clinics were visited in the Dr Kenneth Kaunda Municipal District, Potchefstroom, South Africa during May to July 2008, 2009 and 2010.
Results A total of 323 asthma patient records were reviewed over the three time slots, resulting in 125, 87, and 111 patients respectively. A suboptimal clinical asthma control picture, with a mere 16% (n = 20) of females and 2% (n = 3) of males with Peak Expiratory Flow (PEF) percentages above 60%, were observed in the initial assessment. Improvement in control was observed during the following time slot, but with an end result in 2010 of no PEF percentages above 60% for males and only 9% (n = 7) for females.
Conclusion Over all three of the data collection periods adherence to effectively applied management of asthma guidelines proved to be below the minimum recommended clinical evaluation work-up as set out by the Expert Panel Report 3 (EPR3) of the National Asthma Education and Prevention Program (NAEPP). Applying a greater focus on essential outcomes through different disease management documents resulted in an improved quality of managed care, but still requires dedicated and continuous education and motivation. (NWU-0052-08-A5)

Introduction

Asthma poses a serious health problem worldwide [1,2] and is continuously increasing in prevalence [3–5]. Health care systems and expenditures are heavily burdened by asthma, including pharmaceutical costs and work- or school-related unproductivity [6,7], especially due to uncontrolled asthma [8]. Several studies considered this problem together with the complex challenges of managing and controlling asthma as it can not be reduced to one single measurement or view [9]. Little attention has been devoted to the evaluation and implementation of more recent (2007) revised guidelines of the National Asthma Education and Prevention Program (NAEPP), the Expert Panel Report 3 (EPR-3) [10], in primary care. These guidelines are designed to help with recognition of suboptimal asthma control and to improve the management of the disease. However, if various guideline-specific outcomes are adhered to, it can help to manage and control asthma. Successful practice guideline implementation can be measured by the ability to bring forth data that indicate health status improvement, based on or addressed by certain health recommendations [11,12]. The improved 2007 NAEPP revised guideline-directed care outcomes can be used by health care providers (HCPs) as steps towards disease control and severity management, because a large number of the population of rural areas obtain medical treatment at primary health care clinics that are mainly staffed by nursing personnel. Table 1 summarizes these essential outcomes.

The ultimate goal of this study was to measure the outcomes after implementation of these guidelines in the primary care clinics of the Dr Kenneth Kaunda Municipal District (Potchefstroom), South Africa, and to supply useful retrospective health status data.

Table 1 Outcome essentials for proper management skills

Management skills	Essentials
Ascertaining a diagnosis	Clinical features, presence and frequency
	Associated/trigger factors inquiry
Determination of severity	Symptom frequency
	PEF (patient height required for accurate evaluation)
Treatment initiation	Prevention/avoidance measures together with goal setting (education, action plans, technique monitoring, taking action on TCB dates)
	Pharmacotherapy
Achieving and maintaining control	Follow guidelines
	Maintain optimal clinical records
	Stepping up or down on treatment

PEF, peak expiratory flow; TCB, to come back.

The aim was to improve the management and control of asthma, which could lead, after analysis of practical recommendations, to data useful for wider implementation in the treatment of asthma patients.

Methods and materials

Overview

For this three-stage, non-experimental, quantitative, repeated measures, descriptive-designed study, approved by the Ethics Committee of the North-West University (NWU-0052-08-A5), Department of Health (DOH) and local government administrators, key performance measures and documented compliance were reviewed and evaluated for applicability in the setting. This setting was derived from and inspired by national and international asthma diagnosis and management guidelines. These measured outcomes were indicators in different domains, that is, (1) physiological assessment of functional symptoms and signs that are pivotal to asthma management (night symptoms, tightness of chest or chest pain, shortness of breath, cough, wheezing); (2) patient follow-up; (3) probing of exposure to environmental asthma trigger factors contributing to asthma severity (smoke exposure, other illnesses or drugs); (4) patients' response to therapy (pulmonary function monitoring); and (5) drug monitoring (medication according to guidelines).

All patient selection and data collection of the study were non-randomized and were conducted in six of the eight clinics of Potchefstroom, a rural area, forming part of the Dr Kenneth Kaunda Municipal District in South Africa. The clinics were statistically pre-selected for the purpose of this study. In order to obtain a representative sample, two of the health care clinics were excluded, because they did not render 'extended hour services' as was done by the other selected clinics. All asthmatic patients that attended the selected clinics whether for asthma-related conditions or not, were provided with the relevant study information (verbally by means of the HCP and in writing on the informed consent document) and were requested to voluntarily participate in the study. Candidates were also informed about their right to refuse participation or to withdraw at anytime during the study. A coding system protected each patient's identity.

Chart entries from the period 1 May 2008 to 31 July 2008 were reviewed solely by the principal investigator and used as baseline values.

Over the next year, a new checklist-format document, based on national and international asthma guidelines, was developed (e.g. Appendix A). The HCPs of these clinics were then, during an asthma workshop, instructed on how to implement this document.

A second analysis of the patient records of the clinics in which these HCPs worked (stage 2 – see Figure 1), based on the clinic-coded charts, took place from 1 May 2009 through 31 July 2009. Improvements were noticeable, although, overall asthma control was still unsatisfactory.

A third and final data collection period (stage 3 – see Figure 1) followed at the same clinics, repeating the process of the first two review activities. These dates, 1 May 2010–31 July 2010, thus were only one year later after the 1 May 2009–31 July 2009 data collection period.

Study population

Patients were included based on the inclusion and exclusion criteria determined for the study (Table 2).

The records of all asthma-diagnosed patients at six statistically verified pre-selected clinics of the Dr Kenneth Kaunda Municipal District (Potchefstroom), South Africa, with at least one clinic visit were analysed during the three 3-month intervals, set apart one year from each other (see Figure 1). The number of patients that were included was restricted by the fact that no asthma clinic was held at these primary health care clinics, and HCPs were limited at times due to extreme workload. As a result, no patient's medical record for the principal investigator's 'study box' could be collected. The study population rendered asthma patients ($n = 323$) ranging from birth to death (3–81 years). The male to female ratio was 1:3.

Data collection

After approval for the study from the Ethics Committee of the North-West University, DOH and administrators of local clinics had been obtained, the study team searched for patients who had been diagnosed with asthma and who had had either asthma-related or asthma-unrelated primary care clinic visits during the particular periods. These patients were fully informed about the study and agreed to participate. The HCPs obtained formal consent. Thereafter, the clinical notebooks were clinic coded to ensure nameless follow-up (e.g. PT_1 represented patient number one from Potchefstroom's town clinic). Because there was no direct patient–researcher contact, and the patients could stay anonymous, none of them refused to participate.

With the administrative requirements completed, methodological research into essential fields of asthma outcomes followed, with analysis to refine the understanding of the quality of care of asthma management in the clinics. The 1-year interval between the data collections were used for an asthma workshop on health care

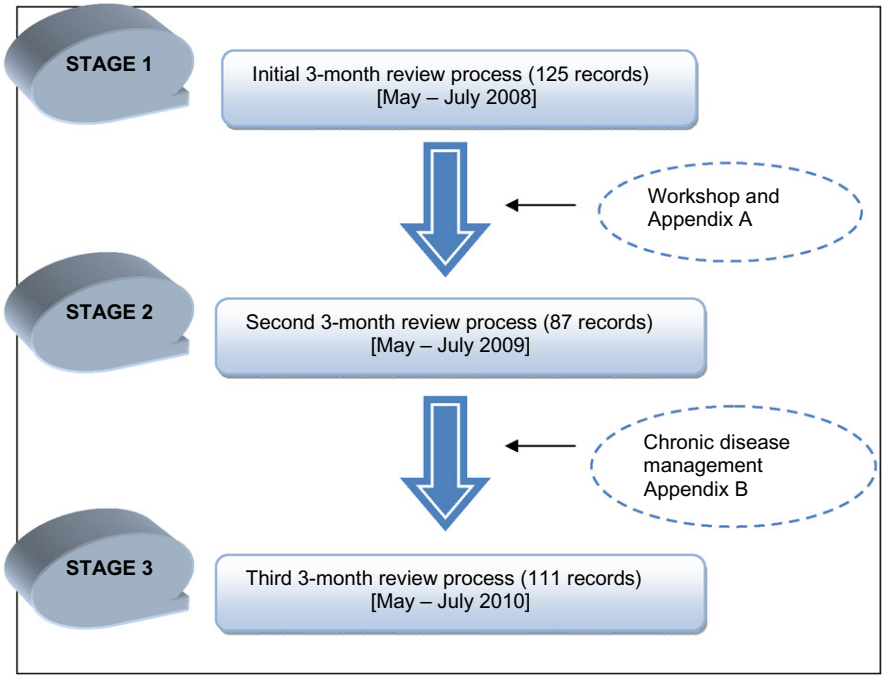

Figure 1 Process and planning.

Table 2 Study population criteria

Inclusion criteria	Exclusion criteria
All asthma patients (including or excluding other contingent illnesses), attending the six pre-selected provincial clinics of the Dr Kenneth Kaunda Municipal District, Potchefstroom, South Africa; newly diagnosed or follow-up patients; male and female patients; adults and children of all ages; smokers as well as non-smokers; and controlled as well as uncontrolled patients.	Subjects who refuse informed consent.

provider education and the implementation of the newly designed asthma patient follow-up forms.

Statistical analyses

All data were collected by the principal investigator and then captured into a spreadsheet by an independent data-capturer. Report was done by means of useful, uncomplicated descriptive statistics (frequencies and means) for individual audits. Dependent *t*-tests and two-way frequency tables were used to determine improvements over time in the patients involved in all audits. Analyses were performed by using STATISTICA 9.0, StatSoft, Inc. (2009) (Southern Africa, Sandton), STATISTICA (data analysis software system), version 9.0, http://www.statsoft.com.

Results

Description of the study

Of the 323 patients involved in the study, 28% were male ($n = 89$). The mean age of the patients was 52 years (median = 54 years), with ages ranging between 3 and 81 years. Patient records, 125, 87 and 111 from the three data collection periods, respectively, were clinic coded for follow-up purposes.

Measured outcomes

During the course of this study two sets of interventions took place. The first set included a HCP workshop and the implementation of a standardized form for documentation of guideline-based information about each asthma patient. This took place between stage 1 and stage 2 of the study (1 August 2008 and 30 April 2009). The second intervention period took place the following year between 1 August 2009 and 30 April 2010. A combined chronic disease management document was introduced as intervention during this interval.

It was clear from the results of the study that early childhood detection and diagnosis of asthma was low. Only seven patients (2%) through all stages of the data collection were ≤12 years (the age boundary set by the new asthma guidelines for children). Adult diagnoses, whether correct or incorrect, were unsatisfactory in the first collection group, with a 26% rate of undocumented diagnoses, whereas the second collection group showed significant improvement with a mere 6% not documented. The last stage of the study had no educational support (workshop), and the undocumented diagnoses rose to 35%.

Documentation of symptoms was inadequate if measured against the minimum recommended clinical evaluation work-up as set out by the newly revised asthma guidelines. An average of 12% of symptoms was documented during the 2008 collection, while the 2009 collection showed an average of 29% documented. The collection period of 2010 demonstrated deterioration from 2009, although there was still an improvement on 2008, with a result of 20% documented. No symptom frequency was recorded by HCPs. Therefore, therapy adjustments as recommended by the guidelines

Table 3 Age and sex variations

		2008 ($n = 125$)	2009 ($n = 87$)	2010 ($n = 111$)
Age	Mean	51 years	53 years	51 years
	Median	52 years	56 years	53 years
	Range	3–81 years	7–80 years	8–80 years
Gender	Male	30% ($n = 38$)	25% ($n = 22$)	27% ($n = 29$)
	Female	70% ($n = 87$)	75% ($n = 65$)	73% ($n = 79$)
	Male : Female	1:2	1:3	1:3

Table 4 Indicators documented in patient records during 2008, 2009 and 2010

Indicators	2008 % ($n = 125$)	2009 % ($n = 87$)	2010 % ($n = 111$)
Night symptoms	4 (5)	20 (17)	22 (24)
Tight chest	12 (15)	28 (24)	18 (20)
Shortness of breath	13 (16)	26 (23)	18 (20)
Cough	13 (16)	32 (28)	20 (22)
Wheeze	18 (23)	39 (34)	20 (22)
All five symptoms	2 (3)	13 (11)	15 (17)
Smoker	50 (62)	57 (50)	28 (31)
Follow-up date (TCB)	80 (100)	80 (70)	81 (90)
Hypertension (HT)	59 (74)	63 (55)	66 (73)
Diagnosis (Dx)	74 (92)	94 (82)	65 (72)

HT, hypertension; TCB, to come back, Dx, diagnosis.

were not implemented. According to Wechsler [13], it is not only the fact that symptoms and their frequency do not feature on paper that therapy adjustments are overseen, but elements such as overestimation of control and/or symptom prevalence underestimation also play a role.

Trigger factor assessment by means of smoking history of the patient, as well as that of people in the patient's near vicinity is important [14]. Therefore, the overall 44% documentation rate of smoking history is not good enough. Chalmers *et al*. [15] and Tomlinson *et al*. [16] pointed out that cigarette smoking does an injustice to the way asthmatic patients respond to inhaled corticosteroid (ICS) and that smokers on ICS therapy therefore required higher doses of treatment to be effective, but then, resulted in increased side effect risks. No evidence of dose adjustment could be found.

At the baseline (set at the first 2008 collection period – stage 1), the mean peak expiratory flow (PEF) percentage was 46, with the median = 47 and the range being 17–78. Age and sex variations can be viewed in Table 3 (Tables 4 & 5).

A meagre 0.6% of well-controlled asthmatic patients (PEF $\geq$ 80%) could be identified at the six selected clinics during the entire data collection period (stage 1 through stage 3).

An average of 80% of the total data population received dates for follow-up visits to come back (TCB). None of the initial patient records contained documentation or a copy of any existing asthma action/self-management plan as required by the guidelines, and there was no evidence of monitored inhaler techniques during any of the stages of data collection.

Looking at the medication management (pharmacotherapy) through the eye of the asthma guidelines, all asthmatic patients should receive an inhaled short-acting β_2 agonist such as salbutamol for symptom relief (as needed) and an ICS as baseline treatment (excluding mild intermittent asthma). If uncontrolled, in the primary health care setting, the ICS must be doubled and a slow-release theophylline added. Oral corticosteroids as maintenance therapy must be prescribed with extreme caution. The study found that the prescribing rate of the combination baseline treatment (salbutamol and beclomathasone) for the overall data population was 84% ($n = 271$), while the triple therapy (theophylline added) featured around 60% ($n = 195$). If we look at the documented pulmonary functions that reached a level of more than 60%, a total of 50 patients (22% of the documented data population) could be found. This would imply that 78% most likely had severe chronic persistent asthma depending on their symptoms and needed to be on triple therapy. No evidence of ICS dose adjustment was depicted. Overall, the medication management did not reveal significant discrepancies, even if the use of oral corticosteroids were well managed (Table 6).

One of the main reasons for not utilizing the newly recommended form (Appendix A) was confusion among the HCPs about using different forms for each chronic disease, as several asthmatic patients also had other chronic illnesses. This meant a separate document for each illness, which was not only time consuming, but also posed the problem of possible incomplete and inaccurate documentation. This complication drew attention to the need to design a standard combined chronic disease form (Appendix B). Appendix B shows the multiple disease management and control document, designed and reconstructed by the research team, with inputs from colleagues and all the HCPs of the involved clinics. The use of this document in the Dr Kenneth Kaunda Municipal District was approved for implementation as of April 2010.

Discussion

This study is, to our knowledge, one of the first conducted in Potchefstroom, an entity of the Dr Kenneth Kaunda Municipal District, South Africa, to address HCP knowledge about asthma, its triggers, clinical patient symptoms and control, and self-management tools placing emphasis on written asthma action plans (documentation) and guideline adherence.

Care deficiencies were identified in all realms of care. Overall, only 15% of the patients demonstrated partly controlled asthma (PEF = 60–80%), with 0.6% of the patients reaching the well-controlled level (PEF $\geq$ 80%), as stipulated by the 2007 updated guidelines for the diagnosis and management of asthma (the EPR-3) of the NAEPP [10]. The lack of, or incomplete information (e.g. no PEF monitoring documented or no age supplied to calculate the PEF percentage) regarding a patient's ongoing health situation limits the knowledge on which a HCP needs to base

Table 5 Pulmonary function monitoring (PEF)

	2008 % ($n = 125$)	2009 % ($n = 87$)	2010 % ($n = 111$)
Overall PEF documented	82 (103)	95 (83)	36 (40)
>60%	22 (23)	24 (20)	19 (7)
>70%	5 (5)	11 (9)	8 (3)
>80%	0	2 (2)	0
PEF percentages	2008 % ($n = 125$)	2009 % ($n = 87$)	2010 % ($n = 111$)
>60% of total male data population	8 (3)	5 (1)	0
>60% of total female data population	23 (20)	29 (19)	9 (7)

PEF, peak expiratory flow.

Table 6 Medication management/prescribed medication

	2008 % ($n = 125$)	2009 % ($n = 87$)	2010 % (111)
Salbutamol (inhaled short-acting β_2 agonist)	94 (117)	93 (81)	95 (105)
Beclomethasone (inhaled corticosteroid)	83 (104)	87 (76)	87 (97)
Theophylline (slow-release)	70 (87)	77 (67)	67 (74)
Predisone (oral corticosteroid)	3 (4)	1 (1)	4 (4)
Patients receiving the combination of salbutamol and beclomethasone	82 (102)	84 (73)	86 (96)
Patients receiving salbutamol, beclomethasone and theophylline in combination	58 (73)	63 (55)	60 (67)

asthma management. In fact, undocumented outcomes, as seen in this study, leave gaps for unnoticed asthma symptom burdens and limited asthma control.

Because management of patients can not feature without good tracking methods, such as regular patient follow-up visits and aided therapeutic decisions, the use of a monitoring document is of highest importance. Drs Tom James and Michael Fine [17] highlight the limitations of the use of retrospective and administrative claims data and the importance of careful symptom tracking to determine a patient's level of asthma control. They recommend a combination method for poorly controlled asthmatics. Therefore, the team recommended the use of a combined document that could not only serve as an asthma action plan but also monitor the patient as a person possibly suffering from additional chronic conditions other than asthma together with other therapy interactions.

The newly designed document (Appendix B) could render a more holistic view of a patient's overall condition, which in return would grant the HCP a clearer indication of the cause of the condition, for example, aggravation of condition. The design of outcomes management will assist in education and support on baseline establishment, progress documentation, goal setting and patient motivation, offering something to the 'patient, provider, and payer' [18]. This document then holds diagnostic and treatment benefits leading to a targeted management approach, for example, a chronic cough of an asthmatic patient might be aggravated by the use of some hypertensive drugs that can be easily detected on this one-page conclusive document.

Further improvement opportunities prevail in areas such as written action plans as self-management tools, optimizing PEF monitoring and proper history taking plus documentation thereof and providing patients with routine follow-up dates [19]. Self-management tools in clinics ask for additional work to promote the use thereof [19]. Less than optimal asthma control can further be linked to poor adherence by both the HCP and the patient. No information was identified on patient response towards medication adjustments (asthma action plans) in the cases of uncontrolled or partly controlled asthma, and HCP responses were sparse. Precise, yet brisk assessment of patient therapy response and adherence should be assisted by a composite of contributing asthma control and quality of life patient-reported factors recorded by HCPs. These diverse aspects of control measurements need to be incorporated over time.

All the abovementioned factors contribute to achieving and maintaining asthma control, which again may exercise an impact on the patient's quality of life and costs around chronic disease control. This comes to prove the importance of guideline adherence by HCP and patient.

Guidelines, action plans and documentation are considered useful, but HCPs lack sufficient continuous education and documentation skills. The chronic disease management document that is based on the asthma management and control guidelines is particularly suitable because the HCP can now manage the patient as a person. With full access to all necessary patient information on one page (drugs, allergies, symptoms and control of all contingent illnesses), various patient management and control difficulties may come to light.

In our opinion, in Potchefstroom and South Africa, such a chronic disease management document (Appendix B) can be implemented as a standard tool to monitor patients in primary health care settings. Presently, however, there is a lack of dedication towards clinical notes and documentation. The guidelines are there and we have developed the instruments to improve asthma management and control, but continuous education as reminders on the completion of these forms must feature as reinforcement.

We feel that the concept is feasible and provides a platform for introducing quality of care in the primary health care environment.

Conclusion

The study demonstrates sufficient opportunities for improving the quality of care for asthma patients at managed primary health care clinics. An asthma management document was developed, tested and considerably modified to render the easy-to-apply chronic disease management document. Each stage of the study has shown that a comprehensive approach through continuous education for HCPs and improved documentation skills may be necessary to address important care aspects through the refinement of guideline-defined essential outcomes.

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Declaration of interest

The authors report no competing interests. The authors alone are responsible for the content and writing of this paper.

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Appendix A

New checklist approach asthma document

Chronic patient follow up : ASTHMA			
Name and Surname:			**Birth date:**
Clinic no			
Start date		**M**	
		F	

Date							
Medication	**1**	**2**	**3**	**4**	**5****		**6**
Drs signature							
Qualification							
Peakflow							
Blood pressure							
Daytime symptoms more than 2X per week? Y N							
Wheeze Y N							
Night symptoms Y N							
Smoker Y N							
Limited activity Y N							
Technique checked Y N							
Date dispensed							

If hypertensive, u&e and CVS exam

Date							
Medication	**1**	**2**	**3**	**4**	**5****		**6**
Drs signature							
Qualification							
Peakflow							
Blood pressure							
Daytime symptoms more than 2X per week? Y N							
Wheeze Y N							
Night symptoms Y N							
smoker Y N							
Limited activity Y N							
Technique checked Y N							
Date dispensed							

Appendix B

Page 1 and 2 of the combined chronic condition document

					Client nr:		
Asthma		COPD		Hypertension			
Epilepsy		Diabetes		Other:			
Name & Surname:					Allergies:		
Clinic no:				Male	Female		
Date of birth:			Length:				
Start date:			Weight:			BMI:	
Date: Seen						Feet,	
Date: Follow-up						Eye	
Medication:	1	2	3	4	5	Care	6
Drs signature:							
Qualification:							
HCPs signature:							
BP:						U&E, &	
Cholesterol level:						CVS	
Glucose level:						exam.	
PEFR:							
Do you experience any of these: NO / Less than 2X per week / More than 2X per week.							
Wheeze:							
Cough:							
SOB:							
Chest pain:							
Night symptoms:							
Normal activity:							
Technique checked:							
Fits during last month:						Blood	
Drug levels:						levels.	
Urine dipstick:							
Hospitalized:							
Pill count:							
Alcohol:							
Smoker / Snuff:							
Health education:							

					Client nr:		
Asthma		COPD		Hypertension			
Epilepsy		Diabetes		Other:			
Name & Surname:					Allergies:		
Clinic no:				Male	Female		
Date of birth:			Length:				
Start date:			Weight:			BMI:	
Date: Seen						HBA1C,	
Date: Follow-up						&	
Medication:	7	8	9	10	11	Lipo-	12
						gram.	
Drs signature:							
Qualification:							
HCPs signature:							
BP:							
Cholesterol level:							
Glucose level:							
PEFR:							
Do you experience any of these: NO / Less than 2X per week / More than 2X per week.							
Wheeze:							
Cough:							
SOB:							
Chest pain:							
Night symptoms:							
Normal activity:							
Technique checked:							
Fits during last month:							
Drug levels:							
Urine dipstick:							
Hospitalized:							
Pill count:							
Alcohol:							
Smoker / Snuff:							
Health education:							