Nurse versus physician led-care for the management of paediatric asthma
Küthe, M.C.

Citation for published version (APA):
Küthe, M. C. (2014). Nurse versus physician led-care for the management of paediatric asthma

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: http://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
CHAPTER 6

Construction of a New "Knowledge of Asthma Questionnaire" for children.

Maarten C. Kuethe,
Anja A. P. H Vaessen-Verberne,
Paul G.H. Mulder,
Wim M.C. van Aalderen.

submitted
ABSTRACT
The aim of the study was to construct a new “Knowledge of Asthma Questionnaire” for children by combining items from previously constructed and validated questionnaires.

Methods
After a PubMed search we selected two questionnaires, the first was constructed and validated in a paediatric population and the second had a good reliability with a Cronbach $\alpha$ of 0.82 and a good content validity. We selected and combined items from these questionnaires. Children with asthma and children with other condition completed the questionnaire at a routine clinic review and a retest was completed several weeks later. Children with asthma also completed the ACQ.

Results
110 children with asthma completed the combined asthma knowledge questionnaire and the ACQ. 88.2% completed the retest. 113 children with other diagnoses completed the combined asthma knowledge questionnaire. 80.5 % completed the retest.

The mean percentage of correct answers of children with asthma was higher than that of children with other conditions ($p < 0.0005$). There was a significant learning effect from test to retest in the asthma group ($p < 0.0005$). The learning effect was significantly stronger in the asthma group ($p = 0.043$). The principal components analysis hardly matched those of the predefined domains. The Cronbach $\alpha$ of the item sets of the 5 predefined domains in either group at either test were poor ranging from -0.02 to 0.58.

Conclusion
We could not construct a new asthma knowledge questionnaire with better psychometric properties by combining two previously constructed instruments. The instrument has discriminating properties if completed by children with asthma or other conditions.
INTRODUCTION

Asthma is the most prevalent chronic condition in childhood\(^{11}\). It is commonly agreed that the pharmaceutical cornerstone of asthma management in children is treatment with an inhaled corticosteroid (ICS)\(^{[2,3]}\). To achieve good disease control, regular follow-up is considered of the utmost importance. This follow-up should include assessment of asthma control status, comprehensive patient education, institution of (inhaled) medication and instructions on inhalation technique, implementation of a self-management plan, and regular medical review\(^{[4-6]}\). In order to test comprehensive patient education specific instruments are needed. However, only a few of such “knowledge of Asthma Questionnaire” are published and the majority of those questionnaires are developed for adults. The aim of our study was to construct a new instrument by selecting and combining two previously constructed instruments, to assess its validity and reliability and to test if the instrument has discriminating properties if completed by children with asthma in comparison to children who attended hospital practice for other conditions. Furthermore, we investigated whether higher scores on the asthma knowledge questionnaires were related to asthma control status in the group of asthmatic children.

METHODS

Questionnaires

After a search in PubMed for “asthma knowledge questionnaires”\(^{[7-14]}\), two out of eight questionnaires were selected. We selected the questionnaire used by Ho et al\(^{[13]}\) containing 25 items, because, that the instrument was constructed in a paediatric population and by Nguyen et al\(^{[14]}\) containing 40 items, because of its reliability with a Cronbach \(\alpha\) of 0.82 and its good content validity. The latter questionnaire was developed in adult patients. Both questionnaires were combined into a new questionnaire (and translated into Dutch) by selecting 19 items from both questionnaires. The six other questionnaires were not selected because of other target groups, such as adults, guardians of young children and healthcare professionals, language or design.\(^{[7-14]}\)

Each item was filled in by the child on a three-point scale (true, not true, don’t know) and was compared with the correct standard answer. To each item a score was assigned as either correct (if the given answer matched the correct standard answer) or incorrect (if the given answer did not match the correct standard answer or if “don’t know” was completed). This dichotomous score was used in the statistical analyses. A total knowledge score was defined as the percentage of correct answers across all 19 items. At face value we attributed beforehand sets of items to the five domains taken from Nguyen: biomedical (5 items), symptom perception (4 items), asthma specific (6 items), controller medication (3 items) and rescue medication (2 items), whereby controller and rescue medication were classified in two different domains because of their different modes of action, their different indications especially during deterioration of symptoms. Furthermore the validated Dutch version of the Asthma Control Questionnaire (ACQ) was used to assess asthma control. The ACQ rates 6 items on an ordinal 7 points scale [range 0-6]\(^{[15-17]}\).

Patients

Two groups of children were included in this study: an asthma group and a non-asthma group. The asthma group consisted of children aged 7–18 years, attending the pediatric outpatient clinic of a large community hospital (Amphia Hospital Breda, Netherlands). The diagnosis asthma was based on the guidelines of the pediatric pulmonologists of the Dutch Pediatric Society\(^{[18-20]}\). Children had good command of the Dutch Language. Children with other co morbidity chronic conditions were excluded. The non-asthma group consisted of children aged 7–18 years, attending the pediatric outpatient clinic of the same hospital for other diagnoses' than asthma. Children who used asthma medication over the previous five years were excluded.
Design

Prospective observational study. Children with asthma are asked to complete the knowledge questionnaire and the ACQ during their outpatient clinic visit. Children attending the outpatient clinic for other medical reasons (the non-asthma group) completed the knowledge questionnaire in the same way. In order to retest, in both groups the questionnaire was mailed to the home address with a toll-free return-envelope after two weeks. If needed a second mailing was sent as a reminder two weeks later.

The Medical Ethics Committee evaluated the study protocol and judged that approval was not necessary.

Statistics

Knowledge questionnaire

The dependence of the total knowledge score on group (a dichotomous between-patient factor asthma yes/no) and test (a dichotomous within-patient factor test/retest) was analysed using linear mixed modelling. Also the group-by-test interaction was included in the model. Reliability of the total knowledge score was evaluated by means of the intraclass correlation coefficient adjusted for group and learning effect, using the variance components based on the residuals of the linear mixed model. The intraclass correlation coefficient is defined as the between-subjects variance as proportion of the total variance of the residuals. It measures the similarity of duplicate measurements within the same subject.

A principle components analysis with varimax rotation was performed in either group in order to try to obtain a confirmation of the five predefined domains. Internal consistency of sets of items of the knowledge questionnaire was quantified by using Cronbach $\alpha$. Construct validity of the questionnaire was also investigated by calculating Cronbach $\alpha$ for each of the six item sets according to the predefined domains in either group.

Asthma Control Questionnaire

An average score across the 6 items (each with an ordinal scale ranging from 0 to 6) was calculated. ($<0.75$ is good control, $0.75-1.50$ is moderate control and $>1.50$ is poor control) $^{16}$ This average score was correlated with the percentage of correct answers on the knowledge questionnaire using Spearman’s rank correlation coefficient.

RESULTS

110 children with asthma completed the combined asthma knowledge questionnaire and the ACQ. Of these children 97 subjects (88.2%) completed the retest knowledge questionnaire and the ACQ after several weeks (median 5.6 weeks). 113 children with other diagnoses (non-asthma group) completed only the combined asthma knowledge questionnaire. Of this non-asthma group 91 (80.5%) children completed the retest questionnaire after several weeks (median 5.8 weeks).

Knowledge questionnaire

The mean percentage of correct answers of children with asthma was higher than that of children attending the hospital for other conditions ($p < 0.0005$). This was the case in the test as well as in the retest setting (Table 6.1). There was a significant mean increment ('learning effect') from test to retest in the asthma group ($p<0.0005$). The learning effect appeared to be significantly stronger in the asthma group ($p = 0.043$). The intraclass correlation coefficient of the total knowledge score was 0.61, which is poor. The principal components analysis with varimax rotation in the asthma group resulted in components with corresponding item sets that hardly matched those of the predefined domains.
The Cronbach $\alpha$ of the item sets of the 5 predefined domains in either group at either test were poor ranging from -0.02 to 0.58. So, the item sets corresponding with the 5 predefined domains had a weak (sometimes almost none) internal consistency. The overall Cronbach $\alpha$ of all 19 items at either test in either group ranged from 0.51 to 0.65.

<table>
<thead>
<tr>
<th></th>
<th>Test</th>
<th>Retest</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma group</td>
<td>59.3 ±14.2</td>
<td>65.8 ±14.9</td>
<td>6.4 (3.8-9.1)*</td>
</tr>
<tr>
<td>Non-asthma group</td>
<td>48.7 ±14.8</td>
<td>51.2 ±16.8</td>
<td>2.5 (-0.25-5.2)</td>
</tr>
<tr>
<td>Difference</td>
<td>10.7(6.8-14.5)*</td>
<td>14.6 (10.2-19.0)*</td>
<td>3.9 (0.12-7.8)*</td>
</tr>
</tbody>
</table>

Table 6.1. Total knowledge score (% correct answers), presented as means ±SD or means (95%CI)  * p < 0.0005  # p = 0.043

**Asthma Control Questionnaire**

The average score across the 6 items had a median of 0.5 and a range of 0.0-3.5 in 110 patients. The respective numbers (percentages) of patients in the categories < 0.75 ("good control"), 0.75-1.50 ("moderate control") and > 1.50 ("poor control") were 73 (66.4 %), 22 (20.0 %) and 15 (13.6 %). The Spearman rank correlation coefficients with the percentage of correct answers on the knowledge questionnaire were $-0.03$ ($p = 0.73$) and $+0.03$ ($p = 0.77$) for respectively test (figure 6.1) and retest of the knowledge questionnaire.

Figure 6.1 Mean ACO score and percentage of correct answers for children in the asthma group
DISCUSSION

The goal of this study was to construct a asthma knowledge questionnaire suitable in children by combining appropriate items of two previously constructed instruments and to evaluate its psychometric properties. Developing a complete new questionnaire would be costly and time consuming, as this needs installation of focus groups and expert panels. By combining items from two previous validated questionnaires we attempted to construct a new questionnaire while saving out these costly and time-consuming aspects.

A number of reasons may explain why we failed in constructing a better instrument by combining two previously published instruments. The instruments we selected were the best we could find, but nevertheless those studies had some flaws. In the study by Nguyen [14] a panel of experts developed the questions. Furthermore this group predefined five different domains, but did not present the results of a principle component analysis and Cronbach \( \alpha \) values of the different domains. In the study by Ho [13], although carefully selected, the 25 items were also either made by experts or selected from previously published studies. No different domains of asthma knowledge were defined whereas the internal consistency across all items was poor but adequate (Cronbach \( \alpha = 0.69 \)), providing marginal support that asthma knowledge as measured by this questionnaire was unidimensional. A principle component analysis yielded nine “significant” factors, accounting for two-third of the overall variance. However the first factor in this study explained only 15.4% of the overall variance, arguing against unidimensionality.

Our study, like the two studies it was based on, discriminated between subjects with asthma and subjects with other diagnoses. In the ‘test-retest setting’ we found a learning effect for children with asthma where as this effect was not present in non-asthmatic children. This in itself is not surprising for the children with asthma have the experience what it is to have asthma and have supposedly received education to promote self efficacy. To our knowledge this learning effect has not previously described in the literature.

Finally we looked at a possible correlation between asthma control and knowledge, while the study of Ho [13] looked at a correlation between adherence and asthma knowledge. In both cases a correlation could not be demonstrated.

The statement, that a patient is unlikely to adhere to the advice a doctor gives, if the doctor does not supply the patient with comprehensive information, sounds rational but even on the level of systematic reviews data are contradicting. An older review showed[21] that self-management-teaching does not improve asthma morbidity while a more recent Cochrane review showed that self-management education programs in children with asthma improve a wide range of measures of outcome.[22;23] In a review for pediatric chronic conditions in general[24] the results were also ambiguous and the authors conclude that education interventions alone are insufficient to promote adherence in children and adolescents, and that incorporating a behavioral component to adherence interventions may increase potential efficacy. More recent studies emphasize on disease perception and believe, rather than on knowledge[25;26].

Conclusion

We could not construct a new asthma knowledge questionnaire with better psychometric properties by combining two previously constructed instruments. We found that the instrument has discriminating properties if completed by children with asthma in comparison to non-asthmatic children. Furthermore, the knowledge level seems not an important contributing factor for asthma control.
REFERENCES


