



Continuing
Education
Series

Inpatient Asthma Clinical Pathways for the Pediatric Patient: An Integrative Review of the Literature

Nancy Cantey Banasiak
Mikki Meadows-Oliver

Background: Asthma is one of the most prevalent childhood chronic illnesses in the United States leading to nearly 190,000 pediatric hospitalizations yearly. In response to the increasing number of children with asthma being hospitalized, some institutions have developed and implemented clinical pathways and are now reporting their findings in the literature. The purpose of this paper was to conduct an integrative literature review of studies using an inpatient clinical pathway for the management of pediatric asthma.

Method: Five research-based articles evaluating clinical pathways for the management of inpatient pediatric asthma were included in this review. The integrative review was conducted using the guidelines set forth by Ganong (1987).

Results: The results revealed that clinical pathways appear to be effective in reducing length of stay and hospital costs associated with inpatient pediatric asthma. The pathways were not as effective in reducing readmission rates or affecting clinical outcomes for patients such as increasing asthma education, the use of controller medications, spacers, and peak flow meters.

Practice Implications: Although the pathways are effective in reducing hospitalization costs associated with asthma, there was little reported improvement in clinical outcomes. Nurses should ensure that each pediatric asthma hospitalization provides an opportunity to promote education about asthma. This approach may lead to decreased asthma admissions and increased self and family management of pediatric asthma. Future research should focus on the clinical outcomes of patients using the inpatient pathways and also on the development of pathways to be used in outpatient settings that manage pediatric asthma.

Asthma is one of the most prevalent chronic illnesses in the United States. Since 1980, the prevalence of Americans ever having been diagnosed with asthma increased nearly 74% (Mannino et al., 2002). In 1999, approximately 478,000 individuals were hospitalized for asthma with 190,000 of those cases being in children under 15 years of age (Mannino et al., 2002). Because of the large number of hospitalizations yearly, asthma accounts for a significant amount of health care dollars spent. In 1985, the economic cost of asthma on the health care system totaled \$4.5 billion (Weiss, Sullivan, & Lyttle, 2000).

Nancy Cantey Banasiak, MSN, PNP, APRN, BC, is Assistant Professor, Yale University School of Nursing, New Haven, CT.

Mikki Meadows-Oliver, MSN, MPH, CPNP, is Lecturer, Yale University School of Nursing, New Haven, CT.

The CE Posttest
can be found
on pages 465-466.

In 1998 the annual cost of treating asthma had risen to \$11.3 billion (National Institutes of Health, National Heart, Lung, and Blood Institute [NIH, NHLBI], 1999). The cost of hospitalizations alone for 1998 was \$3.6 billions, which was the single largest expense in asthma care (NIH, NHLBI, 1999).

In response to increasing numbers of hospitalizations in children with asthma, some institutions have developed and implemented clinical pathways. Clinical pathways are a systematic approach to guide health care professionals in managing a specific clinical problem (Cabana et al., 1999). They are usually developed for inpatient diagnoses requiring multi-disciplinary inputs and for which care is relatively predictable (Glauber, Farber, & Homer, 2001). The goals of clinical pathways are to reduce unintended variations in care, reduce resource utilization, improve patient education, and improve quality of care (Glauber et al. 2001). For pathways to be effective, a multidisciplinary team needs to be involved in the development and continual evaluation to ensure acceptance by clinicians. Clinical pathways

have been developed and studied in other disease processes including attention deficit/hyperactivity disorder, diabetes, pain management, care of the febrile infant, to name a few with positive outcomes (Magyary & Brandt, 2002; Pestian, Derkay, & Ritter, 1998; Miller, Sater, & Mazur, 1996; Pederson & Bjerke, 1999; Powell & Austin, 1998; Uzark et al., 1998).

An increasing number of studies have been published reporting the effects of clinical pathways on inpatient treatment of asthma. Although informative, individual studies do not always contribute significantly to the full understanding of the topic of interest. To achieve a greater understanding, the findings of the individual studies must be combined. An integrative review is one method for accomplishing this combination.

Integrative Reviews

The goal of an integrative review is to provide an accurate summary of previously conducted research. Several methods have been developed to assist researchers in conducting integrative reviews (Beyea & Nicoll, 1998;

Table 1. Characteristics of Studies Included in the Review

Authors	Year	Design	Mean Age	# Participants	Study Dates
Kwan-Gett et al.	1997	Before and after	Path: 6.4 years Non-path: 6.4 yrs	Path: 297 Non-path: 292	Path: 3/95 - 2/96 Non-path: 3/94-2/95
McDowell, et al.	1998	Nonrandomized prospective, controlled	Path: 7.3 years Non-path: 5.0 yrs	Path: 104 Non-path: 97	Path: 9/95 - 2/96 Non-path: 9/96 - 12/96
Kelly et al.	2000	Pre/post with historical control	Path: 7.3 years Non-path: 7.1 yrs	Path: 34 Non-path: 34	Path: 1995-1997 Non-path: 9/96-12/96
Johnson et al.	2000	Randomized control	Path: 8.2 years Non-path: 6.6 yrs	Path: 55 Non-path: 55	Path: 1995-1997 Non-path: 1995-1997
Wazeka et al.	2001	Retrospective cohort	Path: 2-18 yrs Non-path: 2-18 yrs	Path: 1004 Non-path: 206	Path: 1995-1998 Non-path: 1994

Cooper, 1982; Ganong, 1987; Jackson, 1980).

This review was designed to answer the following questions:

- Are pediatric asthma clinical pathways effective in reducing hospital costs?
- Are pediatric asthma clinical pathways effective in reducing hospital length of stay (LOS)?
- Does the use of pediatric asthma pathways for inpatient care affect readmission rates?
- Do inpatient clinical pathways improve patients' clinical outcomes, such as providing patient education, prescription of controller medications, peak flow meters, spacers, and having a follow-up appointment scheduled before discharge?

An integrative review rather than a meta-analysis was performed because of the diverse designs and heterogeneous populations used in the studies. This mix could lead to misleading or potentially uninterpretable results if the findings were pooled statistically.

Methods

This review was conducted using the guidelines set forth by Ganong (1987) that contend that integrative reviews should be held to the same rigorous standards as the primary research articles. Ganong's (1987) approach outlines steps that investigators should follow when conducting integrative reviews.

The following terms or combination of terms were used to conduct the article search:

- asthma
- clinical path
- care path

- critical path
- protocol
- algorithm.

The computerized databases of MEDLINE and CINAHL were used to conduct the search. Citations from the reference list of previously gathered articles also were searched to ensure that significant work would not be missed. Based on this search, a total of 27 citations were identified. Articles were included in this review if they were research based, focused on the evaluation of an in-patient clinical pathway for pediatric asthma patients, conducted in the United States, and published in English. The review was limited to studies conducted in the United States because of the likelihood that these protocols would be based on national asthma management guidelines as set forth by the National Asthma Education and Prevention Program (NAEPP, 2003). Articles were excluded that were not research based or focused on an adult population or on a pathway for use only in an emergency room setting. Studies that met some but not all of the inclusion criteria were excluded.

Of the 27 articles initially identified, 15 abstracts appeared to meet the inclusion criteria. Further review revealed that only five articles met the criteria for inclusion in the review. The others focused on an adult population (1 study), were used only in emergency department settings (5 studies), or were program descriptions and not research based articles (4 studies). Each article was analyzed using the data collection tool designed by the authors. Data included age, length of stay, costs associated with admission, and readmission rates.

Although no time limit was set for the search, the articles were published

between 1997 and 2002. All five studies were published in medical journals (see Table 1 for study characteristics).

Results

Length of stay. Four of the five studies included in the review showed a significant difference in the length of stay between children cared for using an inpatient clinical pathway and those who were not (see Table 2).

Kelly and colleagues (2000) found that children cared for using an inpatient asthma clinical pathway had a significantly shorter hospital stay than did children who were not cared for using an asthma pathway. Similarly, Johnson, Blaisdell, Walker, and Eggleston (2000) showed that when using an inpatient clinical pathway in the treatment of children with asthma, the length of stay was reduced for children cared for using the pathway. McDowell, Chatburn, Myers, O'Riordan, and Kerckmar (1998) found that the average hospital stay for children in the intervention group (using an asthma clinical pathway) was significantly shorter than for those children in the control group (using the standard treatment). On the other hand, Wazeka, Valacer, Copper, Caplan, and DiMaio (2001) did not find a significant difference in the length of stay for children using an asthma clinical pathway versus those who did not within the first year of using the clinical pathway at their institution. However, this group did find that the length of stay decreased significantly the longer that the pathway was used. During the fourth year of pathway implementation, a significant difference was found in the length of stay from the time of data collection with pre-pathway historical control group. Only one study included in this sample did not show a significant difference in the length of stay for chil-

Table 2. Length of Stay and Costs Differences

Authors/Year	Length of Stay	Costs per patient
Kwan-Gett et al. (1997)	Pathway: 2 days	\$26 (lab costs) \$32 (radiology costs)
	Non-path: 2 days	\$39 (lab costs) \$55 (radiology costs)
McDowell, et al. (1998)	Pathway: 2 days	\$2,550 (total costs)
	Non-path: 2.9 days	\$3,304 (total costs)
Kelly et al. (2000)	Pathway: 1.51 days	\$1,685 (total costs)
	Non-path: 2.94 days	\$2,894 (total costs)
Johnson et al. (2000)	Pathway: 40.3 hours	\$2,407 (room costs) \$42 (therapy costs)
	Non-path: 53.7 hours	\$3,116 (room costs) \$250 (therapy costs)
Wazeka et al. (2001)	Pathway: 2.7 days	\$6,875 (total costs)
	Non-path: 4.2 days	\$9,329 (total costs)

children cared for using an inpatient clinical pathway and those cared for using standard treatment. Kwan-Gett, Lozano, Mullin, and Marcuse (1997) found that the majority of the children in both the intervention and control group had a median length of stay of 2 days. Clinical severity of patients wasn't factored into the study and may have affected length of stay.

Cost. Four of the five studies in the review showed a significant reduction in at least a portion of the total hospital costs when comparing the usual care groups to the intervention groups. The exception was Wazeka et al. (2001). Due to differences in cost accounting, a comparison could not be made between costs in the pre-pathway period and those during the first year of the intervention period. However, their findings do show that there was a significant reduction in costs associated with asthma admissions in each successive year that the pathway was implemented.

Two studies reported a decrease in total hospital costs associated with inpatient asthma admissions. Kelly et al. (2000) reported a significant reduction in inpatient asthma costs after the implementation of the asthma clinical pathway because length of stay decreased by 50%. McDowell, Chatburn, Myers, O'Riordan, and Kercksmar (1998) reported similar reductions in total costs after the implementation of the inpatient clinical pathway.

The remaining two studies found a significant reduction in departmental

costs associated with inpatient asthma admissions. Kwan-Gett et al. (1997) reported that laboratory and radiology costs were significantly lower in patients who were cared for using a clinical pathway. Costs associated with room and therapy charges also were shown to be significantly lower for children in the intervention group (Johnson et al., 2000). The guidelines allowed the nursing staff more autonomy in weaning patients from therapy thus reducing therapy, medication, and room charges (Johnson et al., 2000).

Readmission rates. The studies used different follow-up times when collecting readmission information. Kwan-Gett et al. (1997) and Johnson et al. (2000) used a follow-up time of 2 weeks to assess for re-admissions. Kelly and colleagues (2000) and McDowell et al. (1998) used a follow-up time of 72 hours. Wazeka and colleagues (2001) did not compare the readmission rates of children receiving standard care to those cared for using the asthma clinical pathway. They did however conduct a small prospective follow-up study of 54 patients who were cared for using an inpatient clinical pathway. They found that the readmission rate for this group of patients was 0.02% within 2 weeks of hospital discharge.

When looking at readmission rates, there were no significant differences found in the remaining studies when comparing children cared for using an asthma clinical pathway and those that were not, despite the differences in the follow-up periods (Johnson et al.,

2000; Kelly et al., 2000; Kwan-Gett et al., 1997; McDowell et al., 1998).

Clinical outcomes. Three of the five studies reviewed reported clinical outcomes such as providing patient education, prescription of controller medications, peak flow meters, spacers, having a written asthma action plan and a follow-up appointment scheduled before discharge. Neither Wazeka and colleagues (2001) nor McDowell and colleagues (1998) reported clinical outcomes for patients in their study. Kwan-Gett and colleagues (1997) reported no statistical differences between the groups regarding patients who received prescriptions for peak flow meters or systemic steroids. There were no differences found in the number of clients, in either the control or intervention group, who received prednisone at discharge or had a follow-up appointment scheduled before discharge (Johnson et al., 2000).

Kelly and colleagues (2000) reported that children treated using the pathway were significantly more likely to receive asthma education and to be discharged with a prescription for controller medications, rescue medications, and oral corticosteroids. Those treated on the pathway also were more likely than those in the control group to have a follow-up appointment scheduled with their primary care providers within one week of discharge. The children on the pathway also were more likely to be discharged with a peak flow meter and a spacer device to be used with a metered dose inhaler.

Discussion

The results of this integrative review validate the claims that inpatient pediatric asthma clinical pathways are effective in reducing length of stay of asthma hospitalizations. Only one study in this review did not demonstrate a significant reduction in the length of stay. According to the authors, it may be possible that the pathway did affect length of stay but that the effects may have been masked by the clinical severity of each child's asthma, which, due to the retrospective design, was not measured during their evaluation (Kwan-Gett et al., 1997).

The clinical pathways appear to affect at least a portion of the hospital costs for those patients treated using the pathway. Many of the decreases in cost can be attributed to decreased length of stays for the patient using the pathway. Those patients treated using the pathway were hospitalized for less time, in effect, using fewer resources

and reducing overall costs associated with their asthma admissions.

Readmission rates were not affected by use of the clinical pathways. This may be because all of the studies had a relatively short follow-up time of 3-14 days. Also, readmissions only to the institutions conducting the study were assessed. Because readmission rates usually were assessed by chart review, those patients who were admitted to another institution would not be counted.

Clinical outcomes, although reported to a limited extent, were not the focus of these articles. This suggests that asthma clinical pathways are evaluated from the perspective of institutional quality improvement (Glauber et al., 2001) rather than from the point of view of improving outcomes for those with asthma. As studies continue to show decreased length of stay and costs associated with pediatric asthma hospitalizations, the focus of the pathways should now be modified to concentrate on clinical outcomes as well as use of clinical resources.

Nursing implications. Because patients spend the majority of their hospital stay being cared for by nurses,

we are in a unique position to assess knowledge levels and to provide education to children with asthma and their families. These acute care hospitalizations should be a time to promote awareness of asthma as a chronic and potential lifelong illness. For the children and families with asthma, nurses need to provide resources regarding education about asthma and trigger avoidance and work with families to ensure that their children with asthma have a health care home. As nurses continue to educate families and children, they may empower families to become proactive in the self-management of asthma and perhaps prevent future hospitalizations.

Asthma related morbidity and mortality have increased over the last 20 years despite recent advances in asthma care. Clinical pathways are becoming increasingly popular in hospitals. Clinical pathways may be a way to provide consistent care through evidence-based practice. Future research should focus on the clinical outcomes of patients treated using the inpatient asthma clinical pathways. Research also should focus on the development of clinical pathways to be used in outpatient clinical settings to reduce variations in outpatient care and improve patient outcomes. These outpatient clinical pathways would promote continuity of care among health care providers, meet the educational needs of families as well as providers, and reduce asthma-related morbidity and mortality along with decreasing costs associated with asthma care.

References

- Beyea, S.C., & Nicoll, L.H. (1998). Writing an integrative review. *AORN Journal*, 67(4), 877-880.
- Cabana, M.D., Rand, C.S., Powe, N.R., Wu, A.W., Wilson, M.H., & Abbound, P.C., et al. (1999). Why don't physicians follow clinical practice guidelines? *Journal American Medical Association*, 282(15), 1458-1465.
- Cooper, H.M. (1982). Scientific guidelines for conducting integrative research reviews. *Review of Educational Research*, 52(2), 291-302.
- Ganong, L.H. (1987). Integrative reviews of nursing research. *Research in Nursing and Health*, 10(1), 1-11.
- Glauber, J.H., Farber, H.J., & Homer, C.J. (2001). Asthma clinical pathways: Toward what end? *Pediatrics*, 107(3), 590-592.
- Jackson, G.B. (1980). Methods for integrative reviews. *Review of Educational Research*, 50(3), 438-460.
- Johnson, K.B., Blaisdell, C.J., Walker, A., & Eggleston, P. (2000). Effectiveness of a clinical pathway for inpatient asthma management. *Pediatrics*, 106(5), 1006-1012.
- Kelly, C.S., Andersen, C.L., Pestian, J.P., Wenger, A.D., Finch, A.B., & Strophe, G.L., et al. (2000). Improved outcomes for hospitalized asthmatic children using a clinical pathway. *Annals of Allergy, Asthma, & Immunology*, 84(5), 509-516.
- Kwan-Gett, T.S., Lozano, P., Mullin, K., & Marcuse, E. (1997). One-year experience with an inpatient asthma clinical pathway. *Archives of Pediatric and Adolescent Medicine*, 151(7), 684-689.
- Magyary, D. & Brandt, P. (2002) A decision tree and clinical paths for the assessment and management of children with ADHD. *Issues in Mental Health Nursing*, 23(6), 553-566.
- Mannino, D.M., Homa, D.M., Akinbami, L. J., Moorman, J.E., Gwynn, C. & Redd, S.C. (2002). Surveillance for Asthma—United States, 1980-1999. *MMWR*, 51(SS01), 1-13.
- McDowell, K.M., Chatburn, R.L., Myers, T.R., O'Riordan, M.A., & Kerckmar, C.M. (1998). A cost-saving algorithm for children hospitalized for status asthmaticus. *Archives of Pediatrics & Adolescent Medicine*, 152(10), 977-984.
- Miller, J., Sater, K., & Mazur, L. (1996) Impact of clinical pathway in the care of febrile infants. *Ambulatory Child Health*, 2(2), 123-127.
- National Asthma Education and Prevention Program (NAEPP) (2003). Expert panel report: Guidelines for the diagnosis and management of asthma: Update on selected topics 2002. Rockville, MD: *National Institutes of Health Publication No. 02-5074*.
- National Institutes of Health, National Heart, Lung, and Blood Institute (1999). Data fact sheet: Asthma statistics. Rockville, MD: U.S. Department of Health and Human Services.
- Pederson, C., & Bjerke, T. (1999). Pediatric pain management: a research-based clinical pathway. *Dimensions of Critical Care Nursing*, 18(3), 42-51.
- Pestian, J.P., Derkay, C.S., & Ritter, C. (1998). Outpatient tonsillectomy and adenoidectomy clinical pathways: an evaluative study. *American Journal Otolaryngology*, 19(1), 45-49.
- Powell, E.T., & Austin, A. (1998). Developing a pediatric critical pathway. *Pediatric Nursing*, 24(6), 558-561.
- Uzark, K., Frederick, C., Lamberti, J.J., Worthen, H.M., Ogino, M.T., Mainwaring, R.D., et al. (1998). Changing practice patterns for children with heart disease: a clinical pathway approach. *American Journal of Critical Care*, 7(2), 101-105.
- Wazeka, A., Valacer, D.J., Copper, M., Caplan, D.W., & DiMaio, M. (2001). Impact of a pediatric asthma clinical pathway on hospital cost and length of stay. *Pediatric Pulmonology*, 32(3), 211-216.
- Weiss, K.B., Sullivan, S.D., & Lyttle, C.S. (2000). Trends in the cost of illness for asthma in the United States, 1985-1994. *Journal of Allergy and Clinical Immunology*, 106(3), 493-499.

For Babies, Boomers, & Everyone Else.

There's something for everyone in Pueblo. Hundreds of free and low-cost federal publications tell you about getting federal benefits, starting a business, educating your children, even buying surplus federal property. They fill you in on jobs, good health, cars, travel, and much more.

And when you visit our web site, you can read all the publications and even order your own copy. Don't delay! Act today! Check out www.pueblo.gsa.gov.

Call 1 (888) 8 PUEBLO for our free Catalog. That's 1 (888) 878-3256.

U.S. General Services Administration