The ability of A&E personnel to demonstrate inhaler technique

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Abstract
Objective—To determine the ability of accident and emergency (A&E) personnel to demonstrate metered dose inhaler technique.
Methods—25 senior house officers and 25 nurses working in A&E were individually interviewed and assessed on their knowledge of inhaler technique and competence in demonstrating the correct use of a metered dose inhaler.
Results—Demonstration of inhaler technique was generally poor by the staff assessed. Although 22 (88%) of the senior house officers were aware of the British Thoracic Society guidelines, only 10 (40%) routinely checked inhaler technique when discharging asthmatic patients.
Conclusions—The A&E department offers an important opportunity for patient assessment and reinforcement of metered dose inhaler technique. Staff should be made aware of the British Thoracic Society guidelines and be competent at assessing and teaching inhaler technique.

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Asthma is an important problem in the United Kingdom and a common presentation to accident and emergency (A&E) departments. In the majority of cases these patients are already using metered dose inhalers (MDI) as these allow a rapid, cost-effective, and safe method of delivering drugs directly to the lungs. In addition, they avoid many of the side effects associated with oral treatment. However, several surveys have shown that up to a quarter of patients using MDI have inadequate technique.^{1,2} Recently, many alternative devices have been produced, particularly for young

children and patients with poor dexterity, in an attempt to improve inhaler efficacy. These include dry powder devices and "spacer" (aerochamber) devices. Nevertheless, studies have shown that the most important factor in many patients with poor technique is a lack of instruction in proper technique.³ Consequently, guidelines from the British Thoracic Society (BTS) advise that all asthmatic patients deemed fit for discharge from A&E should have their inhaler technique checked.⁴ The purpose of this study was to assess the knowledge and practical ability of A&E staff with regard to correct use of the MDI.

Methods
The study was carried out in the University Department of Emergency Medicine at Hope hospital, Salford. Twenty five senior house officers in emergency medicine and 25 nurses working in the A&E department were individually interviewed. Assessment was both theoretical, by responses to a questionnaire covering knowledge of inhaler technique, and practical, by showing competence in demonstrating the correct use of an MDI. All participants were blinded to the content of the study until the time of interview, and individual results remained confidential. The interview was carried out by two assessors and comprised two stages—a knowledge assessment and a demonstration assessment. The knowledge assessment section included a number of clinically relevant questions regarding inhaler use and efficacy (table 1). The demonstration assessment involved demonstrating 12 outlined steps using a placebo MDI when asked to instruct a patient on the proper use of an inhaler. These steps are outlined in table 2.

Results
Experience of the senior house officers who participated in the study ranged from postgraduate year 1 to year 5. The nursing staff experience varied from two to 30 years postqualification. Thirteen (52%) of the nursing staff stated that they learned their inhaler technique in nursing school, eight (32%) from observation, and three (12%) from information pamphlets. Of the medical staff, 18 (72%) said that they learned their inhaler technique by observation, 10 (40%) in medical school, and nine (36%) from information pamphlets. Twenty two (88%) of the medical staff said that they were aware of the BTS guidelines on the management of patients with asthma presenting to A&E. However, only 10 (40%) said that they routinely check inhaler

Table 1 Knowledge assessment

(1) Rapid inspiration is a more correct technique than slow inspiration. (False)	12/25 SHOs answered correctly 12/25 Nurses answered correctly
(2) How long should you wait before taking a second puff? (a) Straight away (b) 30 seconds (c) 5 minutes. (Correct answer b)	20/25 SHOs answered correctly 16/25 Nurses answered correctly
(3) The % of the MDI actuation that reaches the lung parenchyma is (a) 10-15% (b) 50% (c) 90%. (Correct answer a)	14/25 SHOs answered correctly 3/25 Nurses answered correctly
(4) It is important to rinse mouth out after steroid inhaler use. (True)	14/25 SHOs answered correctly 3/25 Nurses answered correctly
(5) How can you tell that the MDI is empty? (Shake it)	14/25 SHOs answered correctly 3/25 Nurses answered correctly

Table 2 Number of steps demonstrated properly

	SHOs (n=25)	Nurses (n=25)
(1) Remove cap	21	11
(2) Shake inhaler	21	19
(3) Hold inhaler upright	16	8
(4) Tilt head back or keep level	7	10
(5) Exhale to FRC or RV	16	16
(6) Either insert or keep mouthpiece 2-4 cm from mouth	21	22
(7) Activate inhaler at or near the start of inspiration	18	17
(8) Slow inhalation	7	6
(9) Continue to inhale after actuation	15	6
(10) Hold breath for 5-10 seconds	19	12
(11) Breathe out slowly	10	4
(12) Wait at least 30 seconds before next puff	14	6

FRC, functional residual capacity; RV, residual volume.

technique on asthmatic patients considered fit for discharge from A&E, having presented with asthma. Of the nurses questioned, only two (8%) were aware of the guidelines and only three (12%) said they routinely checked inhaler technique.

Table 1 shows that over half (52%) of those questioned, in both groups, felt that rapid inspiration was more correct than slow inspiration. Only 24% of the nurses were aware of the need to rinse the mouth out after using a steroid inhaler. When asked about how one can tell if the inhaler is empty, only 14 (56%) of the senior house officers answered "shake it". Other suggestions were "the taste" (4%), "the smell" (4%), "the sound" (4%), and "don't know" (20%). Nineteen (76%) of the nurses knew that they should shake the inhaler to test if it is empty.

The results of the demonstration assessment are seen in table 2. None of the nurses and only two of the senior house officers demonstrated all 12 steps correctly. The mean number of steps demonstrated correctly was 7.2 by the senior house officers, with a range of 4 to 12, and 5.1 by the nurses, with a range of 2 to 9. The steps most often omitted by the nurses were demonstration of a slow inhalation, continuing to inhale after actuation, breathing out slowly, and waiting at least 30 seconds before taking a second puff. The steps performed worst by senior house officers were demonstration of a proper head position, and slow inhalation.

Discussion

The use of the MDI is the commonest method of treatment for patients with reversible airway disease but optimum benefit depends on

proper inhaler technique. Newman and Clarke⁵ emphasise the importance of proper initial instruction on correct inhaler technique and suggest this should be followed by regular checks, in order to improve patient technique. The BTS guidelines suggest the checking of inhaler technique by A&E staff when patients with asthma are discharged from the A&E department.

Our study documents major deficiencies in the knowledge and skills in the A&E staff with regard to the correct use of MDI. This deficiency has also been found in general medical nursing and medical staff.^{6,7}

Our study also illustrates a lack of formal training in inhaler technique in nursing and medical school, with most staff relying on observation from patients as a means of learning how to use an inhaler. Greater emphasis must be placed on assessing and teaching correct inhaler use by the medical and nursing staff of the A&E department.

Although most of the senior house officers were aware of the BTS guidelines, less than half said that they routinely check inhaler technique. Very few of the nursing staff were aware of the guidelines.

We advocate that medical and nursing staff in the A&E department should be formally taught correct inhaler technique and should be competent in demonstrating the use of a MDI. The A&E department offers a important opportunity for patient assessment and reinforcement of MDI technique. Inhaler technique should always be checked before a patient is discharged from the A&E department. On the basis of the results of our study we have introduced instruction on MDI use at our senior house officer induction course, and the nursing staff have regular formal instruction from the asthma nurse specialist.

- 1 Hilton S. An audit of inhaler technique amongst asthma patients of 34 general practitioners. *Br J Gen Pract* 1990;40:505-6.
- 2 Hilton S, Sibbald, Anderson HR, Freeling P. Controlled evaluation of the effects of patient education on asthma morbidity in General Practice. *Lancet* 1986;ii:26-9.
- 3 Frew AJ, Macfarlane JT. Poor inhaler technique may be perpetuated by clinical staff. *Practitioner* 1984;228:883.
- 4 British Thoracic Society. Guidelines on the management of asthma. *Thorax* 1993;48(suppl):S1-24.
- 5 Newman SP, Clarke SW. The proper use of metered dose inhalers. *Chest* 1984;86:342-9.
- 6 Hanadia N, Wittman R, Kesten S, Chapman K. Medical personnel's knowledge of and ability to use inhaling devices. *Chest* 1994;105:111-6.
- 7 Guidry G, Brown D, Stogner S, George R. Incorrect use of metered dose inhalers by medical personnel. *Chest* 1992; 101:31-3.

effective ways of changing practice in A&E departments. Alternative ways and means need to be evaluated to pass on information concerning vaccination in A&E in order to improve awareness and to change practice.

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- 1 CMO's Update, 1994;2:1-2.
- 2 Department of Health. *Diphtheria in the former USSR*. (Professional letter: PL/CMO (93)9.) London: Department of Health, 1993.
- 3 British National Formulary, No 28. London: The Pharmaceutical Press, 1994.
- 4 CMO's Update, 1995;5:1.
- 5 CMO's Update, 1996;9:3.

BOOK REVIEWS

Baillière's Clinical Neurology. International Practice and Research, volume 5, number 3. Critical Care.

Edited by C F Bolton and G B Young. (Pp 245; £30.00.) London: Baillière Tindall, 1996. ISBN 0 7020 2096 6.

I believe the authors have succeeded in their aim of producing a book on the critical care of neurological conditions which will be of interest and use to both the neurologist and the non-neurologist.

The book covers neurotrauma and the major medical neurological emergencies. It also provides information on the diagnosis and investigation of neurological conditions which arise in the ITU patient, such as the "hard to wean" patient, critical illness polyneuropathy, and iatrogenic seizures.

The chapter on CNS trauma gives a clear review of current thought and practice in the management of head injury. Unfortunately the section on spinal trauma is too brief. This is an important area and I would have liked to see it treated in the same comprehensive man-

ner. In particular I feel more detail should have been included on the acute monitoring and management of the cardiorespiratory complications in spinal trauma, and the later presenting but potentially life threatening autonomic dysreflexia syndrome.

Subarachnoid haemorrhage, stroke, seizures, and Guillain-Barré syndrome are covered logically and with practical management suggestions. The differential diagnosis of encephalopathy is comprehensive, although of necessity in a book of this size coverage of the detailed management of specific conditions is limited. In particular there is a good short section on hypoxic-ischaemic encephalopathy.

The last section covers ethics. It is clearly written and covers such important areas as withdrawal of care and euthanasia; however, it is presented from a North American perspective and does not cover any of the recent English or Scottish case law.

Overall the book achieves an excellent balance of relevant physiology and monitoring, current practice, and the practical implementation of new research. There are suggestions throughout of work in progress on new therapeutic or neuroprotective agents, which makes it a pleasantly optimistic read. I recommend it to any trainee involved in the care of neurologically injured or ill patients. Its relevance to the A&E trainee comes from the clear explanation of the principles of treatment which form the basis for our emergency room management.

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Roberts' Practical Guide to Medical Emergencies. By James R Roberts. (Pp 302; £30.75.) Philadelphia: Lippincott-Raven, 1996. ISBN 0 397 51838 2.

Roberts' book constitutes part of the exponential growth in texts on emergency medicine. This book is a collection of essays written by a single author from the American publication *Emergency Medicine News*. The individual articles have been revised to bring them up to date and grouped into themed chapters. Many of the topics covered would

not be included in a British publication about "medical" emergencies, such as fingertip injuries, puncture wounds to the foot, and sedation of children. The title does not accurately indicate the contents of the book, though the author undoubtedly presents a practical guide based on personal practice, supported by references to the medical literature. The views expressed are well reasoned and highly readable in the main. However, readers expecting a comprehensive "guide to common medical emergencies" will be disappointed. The small range of topics discussed constitute a minor part of British A&E practice.

Some of the topics covered have stimulated considerable debate among my colleagues. One particularly contentious example is the recommendation for combined use of intravenous fentanyl and midazolam by non-anaesthetists to sedate children for painful or unpleasant procedures in the emergency department.

The chapter entitled "Myths and misconceptions" provides an interesting insight into some procedures that have long departed from UK practice. Examples include the use of iced gastric lavage for control of upper gastrointestinal haemorrhage and the routine use of figure of eight bandaging for clavicular fractures. Other mythologies exposed seem to have little relevance to practice on this side of the Atlantic, such as pouring scorn on the practice of using nebulised adrenaline to facilitate the discharge of children with croup from the emergency department.

In this brave new world of evidence based medicine, it is disappointing that this book is in essence a collection of personal opinions. While the individual articles are both interesting and entertaining they lack the rigour of systematic reviews and are not of great practical help in directing change in the management of individual patients.

In summary the book provides an interesting insight into the practice of a highly respected North American emergency physician but many of the views expressed are not readily applicable to the work of an A&E doctor in Britain. Colleagues looking for a "practical guide to medical emergencies" are advised to look elsewhere—perhaps closer to home?

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Correction

In the paper by O'Donnell *et al* in the May issue (volume 14, pages 163-4), some errors in table 1 were not corrected on proof. The corrected section of the table is as follows (corrected figures in bold):

- (4) It is important to rinse mouth out after steroid inhaler use. (*True*)
24/25 SHOs answered correctly
6/25 Nurses answered correctly
- (5) How can you tell that the MDI is empty? (*Shake it*)
14/25 SHOs answered correctly
19/25 Nurses answered correctly