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Respiratory clinical guidelines inform ward-based nurses' clinical skills and knowledge required for evidence-based care

Respiratory clinical guidelines provide clinicians with evidence-based guidance for practice. Clinical guidelines also provide an opportunity to identify the knowledge and technical and non-technical skills required by respiratory ward-based registered nurses. The aim of this review was to use a systematic process to establish the core technical and non-technical skills and knowledge identified in evidence-based clinical guidelines that enable the care of hospitalised adult respiratory patients.

17 guidelines were identified in our systematic review. The quality assessment demonstrated variability in these guidelines. Common core knowledge and technical and non-technical skills were identified. These include pathophysiology, understanding of physiological measurements and monitoring, education, counselling, and ward and patient management.

The knowledge and skills extracted from respiratory clinical guidelines may inform a curriculum for ward-based respiratory nursing to ensure optimal care of adult patients.



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Knowledge and skills identified in clinical guidelines provide a foundation for a curriculum for respiratory nurses <http://ow.ly/w6TE30105Ya>

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Introduction

Respiratory medical conditions contribute to significant levels of physical, social and economic burden experienced by patients and their families [1, 2]. Many patients with respiratory diseases may have episodes of worsening disease due to a variety of causes such as infection or responses to allergens [1]. Often these episodes require patients to be hospitalised and received ward-based

therapy and care to the standard that is advocated in clinical guidelines and statements.

Evidence-based guidelines and statements for various respiratory conditions are recommended to health professionals as a summary of the evidence for treatment and therapies to ensure optimal patient outcomes. At an acute hospital ward level, clinical guidelines and statements could underpin the core clinical knowledge and skills required by registered nurses to deliver best



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practice in specialised respiratory wards. There is substantial evidence from across Europe that degree level education and staffing levels that incorporate staff-patient ratios are associated with a reduction in mortality [3]. From a specialist ward perspective, there has been limited attention given to the expectations in terms of knowledge and skills of registered nurses who provide care to respiratory patients and are not in advanced practice roles such as clinical nurse specialists and clinical nurse consultants.

Health professional societies have used consensus methodology to map clinical knowledge and skills as a process to develop ongoing educational and training activities [4]. It should be noted that the teaching and learning philosophy is not often derived during the consensus of core knowledge and skills that form a curriculum [4]. Consensus for such clinical training curriculums is often gained through expert opinion using surveys and modified Delphi methods such as e-Delphi [5]. An alternative approach to consensus by experts is the examination of evidence-based respiratory clinical guidelines to ascertain the knowledge and skills required for ward-based registered nurses to be able to deliver optimal care, which may not have been considered to date.

This review reports the exploration of evidence based-respiratory clinical guidelines as a frame of reference for the essential clinical skills and knowledge required at ward level to ensure registered nurses are adequately prepared to provide the highest level of clinical care to adult patients. The aim of the review was to use a systematic process to establish the core technical and non-technical skills and knowledge espoused in respiratory evidence-based clinical guidelines that enable the care of hospitalised respiratory adult patients.

Methods

The review's objective was to identify key clinically relevant technical and non-technical skills and knowledge within evidence-based respiratory clinical guidelines. Clinical guidelines that reflect the most common respiratory conditions and specific clinical therapies associated with the care of ward-based adult patients were identified. These guidelines comprise asthma, chronic obstructive pulmonary disease (COPD), tuberculosis, lung cancer, pneumonia, influenza, smoking cessation, pulmonary rehabilitation and oxygen therapy.

Search strategy

A systematic search of respiratory clinical guidelines for acute hospital ward-based care was performed in accordance with the preferred reporting items for systematic reviews and

meta-analyses (PRISMA) [6]. An *a priori* protocol was developed and implemented reflecting PRISMA guidance. From July 2015 to May 2016 we searched the Cochrane Library, MEDLINE, PubMed, CINAHL and Embase electronic databases. In addition, we searched the National Institute of Clinical Excellence (UK), British Thoracic Society, Thoracic Society of Australia and New Zealand, European Respiratory Society, American Thoracic Society, and the Asian Pacific Society of Respiriology websites for clinical guidelines relevant to the common respiratory conditions treated in acute hospitals and the use of specific disease-related therapies. The search terms guideline, asthma, chronic obstructive pulmonary disease, community acquired pneumonia, lung cancer, influenza, oxygen therapy, smoking cessation and pulmonary rehabilitation were combined and examples of abbreviations used include guide*, COPD, pneumon*, O₂* oxygen, flu* influenza, pul* rehab*, smok* quit. Search limits included clinical guidelines published in the English language and the publication date was restricted to the past 7 years.

Eligibility criteria

Published evidence-based clinical guidelines that reflect the most common respiratory conditions and related therapies associated with ward-based respiratory patients' care were identified. Statements, local guidelines and clinical protocols that had or had not been published as an evidence-based document were excluded.

Systematic review selection and data extraction

Both authors independently reviewed clinical guideline titles associated with hospitalised adult respiratory patients' care prior to the full guideline being obtained. Any disagreements were discussed until consensus for inclusion or exclusion was achieved. Data were extracted from each guideline and any duplicate data noted.

Evidence-based clinical guideline quality assessment

The Appraisal of Guidelines for Research and Evaluation (AGREE) version two [7] was utilised to assess the overall quality of the published evidence-based clinical guidelines. The AGREE II instrument has 23 items in six domains that relate to the quality of a guideline. These domains comprised scope and purpose, stakeholder involvement, rigour of development, clarity of presentation, applicability and editorial independence. Each guideline was assessed in each of the six domains and a summary was tabulated (table 1).

Table 1 Assessment of the guidelines in each of the six domains of the AGREE II instrument

Guideline	Domain 1: scope and purpose	Domain 2: stakeholder involvement	Domain 3: rigour of development	Domain 4: clarity of presentation	Domain 5: applicability	Domain 6: editorial independence	Total
National Institute of Health and Care Excellence (NICE)							
Smoking: acute, maternity and mental health services [8]	19	16	47	17	23	12	134
Asthma quality standard [9]	19	10	17	19	16	5	86
Chronic obstructive pulmonary disease in over 16s: diagnosis and management [10]	14	14	43	17	14	7	109
Lung cancer: diagnosis and management [11]	17	18	45	18	19	14	131
Pneumonia in adults: diagnosis and management [12]	11	19	51	18	24	13	136
Tuberculosis: guidelines [13]	20	19	51	19	24	13	146
British Thoracic Society (BTS)							
Pulmonary rehabilitation in adults [14]	17	12	39	19	17	6	110
Asthma guideline [15]	13	15	44	19	19	9	119
Pandemic flu: clinical management of patients with influenza-like illness during an influenza pandemic [16]	13	8	13	19	12	4	69
Emergency oxygen use in adult patients [17]	19	16	44	19	23	12	133
European Respiratory Society (ERS)							
International ERS/ATS guidelines on definition, evaluation and treatment of severe asthma [18]	This is a combined guideline						
American Thoracic Society (ATS)							
International ERS/ATS guidelines on definition, evaluation and treatment of severe asthma [18]	16	12	44	19	14	13	118
Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia [19]	13	3	28	16	12	7	79
Infectious Diseases Society of America/ATS consensus guidelines on the management of community-acquired pneumonia in adults [20]	13	8	33	15	13	10	92
Thoracic Society of Australia and New Zealand (TSANZ)							
Summary of the Australasian Society for Infectious Disease and the TSANZ guidelines: treatment and prevention of H1N1 influenza 09 (human swine flu) with antiviral agents [21]	7	1	12	17	6	7	50
TSANZ oxygen guidelines for acute oxygen use in adults: “swimming between the flags” [22]	17	10	34	16	13	6	96
Australian Asthma Handbook [23]	18	19	44	21	23	12	137
The COPD-X plan: Australian and New Zealand Guidelines for the management of chronic obstructive pulmonary disease [24]	13	20	33	21	17	6	110

Data synthesis

Both authors confirmed the inclusion of technical and non-technical skills and knowledge specific information, displayed in table 2.

Results

The total number of relevant respiratory clinical guideline citations retrieved was 10 from the database and electronic searches. A further 19 respiratory clinical guidelines and statements were identified on respiratory society's websites. Duplicate clinical guidelines were removed and the 21 full versions of respiratory clinical guidelines were retrieved. Eligibility criteria were applied and four were considered ineligible leaving 18 respiratory clinical guidelines (figure 1) to be included in the analyses of clinical technical and non-technical skills and respiratory specific knowledge.

Overview of included respiratory clinical guidelines

18 respiratory clinical guidelines for adult care were identified and one guideline referred to two societies, ERS/ATS guidelines for severe asthma resulting in 17 guidelines. Of the 17 guidelines, the clinical diseases and therapies covered were asthma [9, 15, 18, 23], COPD [10, 24], lung cancer [11], pneumonia [12, 19, 20], tuberculosis [13], influenza [16, 21], pulmonary rehabilitation [14], oxygen therapy [17, 22], and smoking cessation [8].

Quality assessment of guidelines

Quality assessment was carried out using the AGREE II criteria, which include 23 items in six domains with a seven point rating scale for each item (table 1). The highest rating score of 161 was not achieved for any of the guidelines in this review. The tuberculosis guideline from NICE achieved a rating of 146.

Guideline-based knowledge

The guideline-based knowledge is summarised in table 2. The core areas of knowledge within these guidelines pertain to understanding the disease and associated pathophysiology along with physiological changes, awareness of the physiological measurements for monitoring patient health status, and disease treatment associated pharmacological and non-pharmacological interventions.

Technical skills

There were common technical skills identified in the majority of guidelines. These skills included

assessing the physiological status of the patient through pulse oximetry, respiratory rate, heart rate, lung function using spirometry and peak flow tools, oxygen delivery devices, arterial blood gases, sputum assessment, and administration of intravenous and drug therapy.

Non-technical skills

The non-technical skills relate to the delivery of care planning and education support. Therefore the core areas in the guidelines reviewed that are patient focused involve: understanding teaching and learning techniques; counselling patients to change behaviour; and organisational and management skills for the delivery of care. In addition to patient related non-technical skills, this review found that professional development of ward-based nurses may include training associated with the implementation of new respiratory monitoring equipment and new standards for practice in clinical guidelines.

Discussion

This review of respiratory clinical guidelines identified 17 guidelines on respiratory conditions that form the majority of patient care in respiratory wards. There were several core areas of knowledge, technical topics and non-technical subjects that were common to many of the guidelines. The use of the AGREE II criteria demonstrates that within the guidelines associated with respiratory conditions there was variability in quality. This variability may be due to extensive evidence being distilled to provide more easily accessible and readable information for clinicians who use this guidance in their everyday clinical practice.

In terms of respiratory knowledge, core knowledge was found across several clinical guidelines. These knowledge areas comprise pathophysiology, treatments and interventions, and understanding of health status measurement. Technical skills contained within these guidelines were respiratory and haemodynamic monitoring, delivery of respiratory based interventions, and administration of intravenous and other therapies. The core non-technical skills that were identified included several key topics, of which some were patient focused and others pertained to nursing staff professional development.

This respiratory knowledge and skills could be the basis for education and skill development training for ward-based nurses to reduce any inconsistencies in the delivery of bedside care to the patient. Of equal importance is the maintenance of ward-based nurses' ability to carry out technical and non-technical skills through regular opportunities to update their knowledge of the latest evidence associated with their ward-based practice.

Table 2 Technical and non-technical skills and knowledge specific information required for each respiratory condition

	Technical skills	Non-technical skills	Knowledge
Asthma	Carry out: SpO ₂ (arterial saturation) Respiratory rate Heart rate and pulse assessment Administration of steroids Accessory muscle use assessment ABG Spirometry and reversibility testing Blood collection for blood testing Breathing exercise programmes Chest auscultation Sputum collection including sputum induction Skin testing Weight monitoring FeNO testing Monitor: PEF FEV ₁ PaO ₂ PaCO ₂ FVC	Education: Training patient on inhaler technique Asthma education and support PEF recording with written PEF and symptoms based PAAP Comorbid issues Good asthma control during pregnancy Provide: Personal action plans Asthma control questionnaire Mini AQLQ Support: Organise GP follow up On-going clinical support <i>via</i> follow-up <i>Via</i> self-management plan and personal action plan	Understand: Types of asthma severity Different clinical values for adults and children Coexistence of atopic disease Spirometry Comorbidities and contributing factors Allergens Chest radiographs How an inhaler works Understand pharmacology of: Steroids Bronchodilators Oxygen
	Administer: Oxygen therapy Bronchodilators <i>i.v.</i> fluids Monoclonal antibodies		
COPD	Carry out: SpO ₂ ABG Calorie and food intake Weight measurement Breathing exercises Monitor: FEV ₁ Noninvasive ventilation Invasive ventilation PaO ₂ PaCO ₂ Administer: Oxygen therapy Bronchodilator administration Steroid administration	Education: Training patient on oral and inhaled therapies Inhaler technique To promote better self-management Education for maintenance regime Instructions for therapy Provide: Care plan and management plans Nutritional plan Intervention implementation Support: Ensure 2 week follow-up is booked in SGRQ Post-discharge plan	Understand: Palliative treatment and management Weight loss and muscle loss in end stage COPD How to treat weight loss, muscle loss and bone mineral density loss <i>via</i> diet and nutritional supplementation Depression and anxiety Invasive and noninvasive ventilation Understand pharmacology of: Corticosteroids Bronchodilators Oxygen therapy

Continued

Table 2 *Continued*

	Technical skills	Non-technical skills	Knowledge
Lung cancer	Carry out: Weight measurement Calorie and food intake Sleep monitoring Wound management Air leak management (ventilation)	Education: Disease education Support: Follow-up appointment booked Give protocol driven follow-up Contact given for a lung cancer nurse Ensure: Documents, personal information, consent and allergies are filled out Good communication skills with patient	Understand: Different types of cancer Communication needs and methods Pre- and post-surgery needs Anxiety and depression BMI Caloric requirements Understand pharmacology of: Radiotherapy and management Chemotherapy and management Opioids
	Monitor: TlCO FEV1 V'O ₂ Administer: Opioid drug administration Carry out: Respiratory rate Blood pressure Blood testing SpO ₂ Sputum culture collection Urinary collection and testing Mental test/mental status Swallowing assessment Secretion collection Blood collection for blood test Monitor: PaO ₂ FiO ₂ Temperature positive pressure ventilation Noninvasive ventilation Invasive ventilation Administer: Antibiotics Administer: NRT including licensed nicotine-containing products	Education: Oral hygiene skills Provide: Communication on discharge about how symptoms should improve in a timeframe	Understand: Blood test result interpretation CRB-65 score and CURB-65 score Mental test scores and how to administer Urine antigen testing Swallowing assessment Local microbial pathogens if hospital acquired pneumonia Importance of oral hygiene Microbiology Difference between viral and bacterial pneumonia Noninvasive and invasive ventilation Understand antibiotic resistance issues Understand pharmacology of: Antibiotic therapy and antibiotic resistance issues
Smoking cessation		Education: Pharmacotherapies and non-pharmacotherapies Provide: Information for behavioural support Brief intervention on smoking cessation Support: Ensure patient receives referral for smoking cessation Ensure access/referral to non-pharmacotherapies including counselling Ensure: Equipment understanding	Understand: Smoking cessation with regards to respiratory conditions Anxiety and depression Behavioural changes when a patient stops smoking Understand pharmacology of: NRT and other licensed nicotine-containing products Understand pharmacotherapies and non-pharmacotherapies

Continued

Table 2 *Continued*

	Technical skills	Non-technical skills	Knowledge
Influenza	<p>Carry out:</p> <ul style="list-style-type: none"> Temperature Respiratory rate Blood pressure ECG Blood collection for blood test Nose and throat swab Urine collection and testing Sputum collection Tracheal/endotracheal aspirate sample Pulse oximetry Mental status assessment Fluid chart monitoring Glasgow coma scale Chest assessment Infection control procedure <p>Monitor and/or perform:</p> <ul style="list-style-type: none"> PaO_2 Inspired oxygen concentration <p>Administer:</p> <ul style="list-style-type: none"> Oxygen therapy Antibiotics Antivirals 	<p>Education:</p> <ul style="list-style-type: none"> Medication, smoking and lifestyle advice Illness, treatments and treatment schedule <p>Provide:</p> <ul style="list-style-type: none"> Action plan in event of relapse of symptoms <p>Support:</p> <ul style="list-style-type: none"> Ensure patient is aware that 6 week follow-up is required <p>Ensure:</p> <ul style="list-style-type: none"> Nurse carries out assessment of the likelihood of influenza 	<p>Understand:</p> <ul style="list-style-type: none"> Symptoms and complications CRB-65 score Difference between bacterial and viral infections Dietary and fluid needs Signs and septicaemia Components of chest assessment in assessing respiratory distress Infection control procedures Understand pharmacology of: <ul style="list-style-type: none"> Antibiotic therapy and antibiotic resistance issues Understand antiviral drugs including side-effects
Oxygen therapy	<p>Carry out:</p> <ul style="list-style-type: none"> Pulse oximetry Respiratory rate Heart rate Blood pressure ABG Earlobe blood gases Positioning of patient <p>Monitor:</p> <ul style="list-style-type: none"> Inspired oxygen concentration Noninvasive ventilation FiO_2 PaO_2 <p>Administer:</p> <ul style="list-style-type: none"> Oxygen administration Bronchodilator administration 	<p>Education:</p> <ul style="list-style-type: none"> On need for oxygen to assist compliance 	<p>Understand:</p> <ul style="list-style-type: none"> Oxygen transfer Oxygen delivery equipment National early warning score How to monitor oxygen saturation range When and how to reduce oxygen in a stable patient Difference between hypoxaemia and breathlessness Posture positioning Target SpO_2 and how to maintain Oxygen carrying capacity of the blood Adverse effects Drug and oxygen administration chart Recording of SpO_2 and delivery system on chart Oxygen prescription Understand pharmacology of: <ul style="list-style-type: none"> Oxygen therapy Drug treatments

Continued

Table 2 *Continued*

	Technical skills	Non-technical skills	Knowledge
TB	Carry out: Sputum and secretion sample collection Aerosol-generating procedures including, sputum induction and nebuliser treatment Sample collection from various sites of mycobacterial disease Blood testing Skin testing Administer: Drug treatments Neonatal BCG vaccination	Education: Communicate on discharge the symptoms of TB and contact details for a relapse Education on factors of adherence including management of TB Medication education Provide: Education booklet on discharge Referral to support groups Ensure: Nurse carries out risk assessment for treatment adherence Transportation and correct identification of samples	Understand: Mantoux testing Clinical testing tools Infection control Directly observed therapy Drug-resistant TB More at risk groups for TB Clinical features of TB and HIV Microbiology background and how antibiotics work TB transmission Hospital policy Non-compliance and strategies to improve compliance Personal protective equipment Understand pharmacology of: Neonatal BCG vaccination Drug treatments
PR	Perform: MRC dyspnoea scale Administer: Oxygen therapy	Provide: Ensure patient has access to or is booked into a PR programme Encouragement	Understand: Pulmonary programmes and what is involved Physiological and sociological impact of PR MRC dyspnoea scale Oxygen therapy in PR context Assessment and outcome measures and techniques Role of PR in integrated care of patients with chronic respiratory disease Delivery of PR Benefits of PR

TB: tuberculosis; PR: pulmonary rehabilitation; SpO₂: arterial oxygen saturation measured by pulse oximetry; ABC: arterial blood gases; FeNO: exhaled nitric oxide fraction; PEF: peak expiratory flow; FEV₁: forced expiratory volume in 1 s; PaO₂: arterial oxygen tension; PaCO₂: arterial carbon dioxide tension; FVC: forced vital capacity; PAAP: personalised asthma action plan; AQLQ: Asthma Quality of Life Questionnaire; GP: general practitioner; SGRQ: St George's Respiratory Questionnaire; TLCO: transfer factor of the lung for carbon monoxide; V'O₂: oxygen uptake; BMI: body mass index; FiO₂: inspiratory oxygen fraction; CRB-65: confusion, respiratory rate ≥ 30 breaths·min⁻¹, blood pressure < 90 mmHg (systolic) or ≤ 60 mmHg (diastolic), age ≥ 65 years; CURB-65: confusion, urea > 7 mmol·L⁻¹, respiratory rate ≥ 30 breaths·min⁻¹, blood pressure < 90 mmHg (systolic) or ≤ 60 mmHg (diastolic), age ≥ 65 years; NRT: nicotine replacement therapy; BCG bacille Calmette-Guérin; MRC: Medical Research Council.

A limitation of this review is that respiratory patients often have a number of comorbid conditions and they may require additional therapies such as noninvasive ventilation. These additional medical conditions, such as heart failure, sleep apnoea and diabetes along with symptom clusters such as breathlessness, pain and fatigue, may need to be mapped across the domains of knowledge, technical and non-technical skills to ensure comprehensive clinical care is available to adult respiratory patients. Another limitation of this review is that some guidelines may be either under review or were not identified during our search. Using the process outlined in this review, additional information from new guidelines could be mapped in a similar way in terms of respiratory practice knowledge and skills. A replication of this mapping process may be used for nurses who provide care for paediatric respiratory patients as a way to highlight their speciality ward-based knowledge and skills that represent their professional practice.

While international guidance for respiratory conditions aims ultimately to provide the best available evidence, various countries will have a different scope of practice for different disciplines. The information in this review needs to be considered in terms of each countries nurses' industrial award change to conditions of employment and registered nurses scope of ward-level practice.

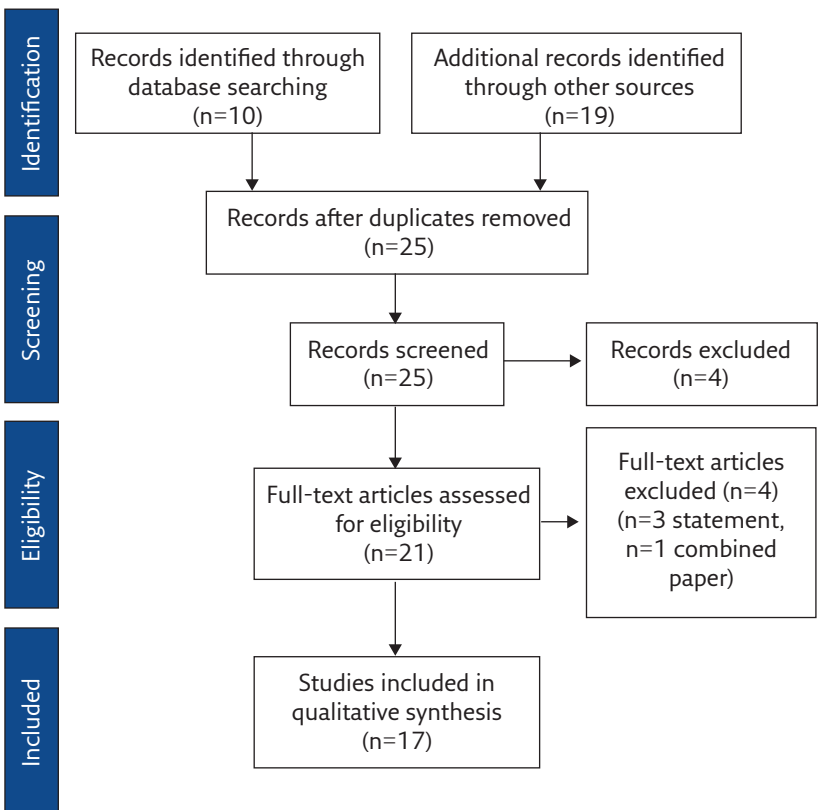


Figure 1 The process of selection of respiratory clinical guidelines performed in accordance with the PRISMA statement [6]. Adapted from [6].

Conclusion

This review sought to outline the knowledge, technical and non-technical skills required to delivery optimal respiratory evidence-based guideline care. The core knowledge required by nurses spanned several guidelines and consisted of disease pathophysiology and pharmacological and non-pharmaceutical interventions. The technical skills promoted within these guidelines were respiratory and haemodynamic monitoring,

delivery of respiratory based interventions and administration of intravenous therapy. In addition the non-technical skills were applicable to both patient-focused care and ward-based nursing staff professional development. While a limitation of this review may be that some guidelines were not identified, this process provides a foundation for building a professional curriculum to support the education and development of respiratory ward-based nurses to ensure the delivery of optimal patient care.

Conflict of interest

None declared.

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