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British Journal of Nursing submission

Compliance of health care professionals with national guidelines in regard to oxygen therapy: A literature review.

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### **Abstract**

One of the major causes of critical illness in the UK is the deterioration of respiratory function British Thoracic Society (BTS, 2008). The administration of supplemental

oxygen therapy, although often lifesaving, can also have serious consequences if administered inappropriately.

A literature review was carried out to establish whether oxygen therapy was prescribed and administered in acute care in accordance with both National Guidelines and Local Policy. Following the above review of the literature the four common themes of prescribing, monitoring, administration and equipment were identified with regard to the inappropriate administration and management of supplemental oxygen therapy.

Findings from the review of the literature suggest that an educational programme ranging from pre-registration curriculum content to the practical experiences of junior doctors, with regard to oxygen management would be appropriate.

As a result of findings from the literature review the authors suggest that the current practice of healthcare practitioners should undergo a planned timetable of audit in order to improve the prescription, administration and monitoring of supplemental oxygen therapy in order to benefit patient outcomes.

Key Words: Oxygen management; Guidelines and audit; Patient assessment; Education programmes.

### **Key Points**

- National evidence based guidelines produced by the British Thoracic Society and local policies exist to support good practice with regard to the prescription and administration of supplementary oxygen. Lack of adherence to these guidelines and policies can contribute to poor patient outcomes and ultimately death.

- Evidence from the literature supports the suspicion that compliance to these guidelines and policies is inconsistent, in that oxygen is not being prescribed and administered appropriately. Management and interpretation of vital signs are significant to the timely use of appropriate oxygen therapy.
- A planned timetable of audit to highlight areas of good practice and identify areas of concern is essential to ensuring adherence to both national guidelines and local policies.
- Educational programmes for all staff involved with the administration of oxygen therapy are necessary to ensure an understanding of the issues around oxygen.

## **Introduction**

National guidelines and local policies exist with regard to the prescription and administration of supplemental oxygen therapy. The aim of this paper is to examine whether the prescription of and administration of supplemental oxygen therapy complies

with both national guidelines and local policy. Current guidelines recommend that pulse oximetry should be available in all areas where emergency oxygen is used. Oxygen saturations should be monitored in all acutely ill patients and the inspired concentration of oxygen should be recorded alongside the oximetry result, pulse, temperature, blood pressure and respirations on the observation chart. A further recommendation is that all patients should have their oxygen saturations observed for at least five minutes after commencing supplemental oxygen therapy (BTS, 2008). This paper examines issues around the prescription of supplemental oxygen therapy, the current situation in practice and its effects upon patient care and outcomes. It identifies areas, which may need intervention and the reasons for this. The mismanagement of supplemental oxygen therapy can lead to patient deterioration or contribute towards

death by inappropriate prescribing, monitoring and administration National Patient Safety Agency (NPSA, 2009). How effectively supplemental oxygen is prescribed and administered should be a matter of concern for all health care professionals. The authors support the development of a specific clinical competency to provide clarity and clear definitions of roles and responsibilities in regards to oxygen therapy. The existing programme of audit should be further developed to monitor compliance, identify best practice and highlight potential areas for improvement.

The element vital for the sustenance of life is oxygen (Booker, 2008). Oxygen is a colourless and odourless gas used to treat or prevent a diminished amount of oxygen in the tissues of the body (hypoxia) (McGloin, 2008). Since the discovery of the potential of oxygen to sustain life it has been administered with only regard for

its benefits and little regard for any potential detrimental effects it may have (Knight et al, 2011), Oxygen therapy is often lifesaving but its administration can also have serious consequences (Knight et al, 2011). Under use of oxygen exposes those patients already critically ill to the risk of organ damage from hypoxia. Overuse of oxygen can also be harmful to those patients who are vulnerable those who have COPD for example (NPSA, 2009). One of the major causes of critical illness in the UK is the deterioration of respiratory function as in COPD (BTS, 2008). The BTS (2008) conclude that measurements of blood oxygen saturation are “the fifth vital sign” – in addition to the four traditional measurements of temperature, pulse, respirations and blood pressure. The guidelines do not cover the use of supplemental oxygen therapy in high dependency or intensive care environments (BTS, 2008).



## **Barriers to effective Oxygen Delivery**

Recent developments following the introduction of the BTS (2008) guidelines include changes to the Resuscitation Council Guidelines (2010) and Local Health Authorities and Private Healthcare Groups updating their existing policy and competency documents for the administration of supplemental oxygen. Hence the prescription and administration of supplemental oxygen therapy should be reflected as standard practice directed by evidence based criteria. The NPSA (2009) released a rapid response report stating there is potential for serious harm and even death if oxygen is not administered and managed appropriately. Four common themes were identified in the report following a review of 281 incidents relating to

the inappropriate administration and management of oxygen:

- **Prescribing: - Failure to or wrongly prescribed**
- **Monitoring: - Patients not monitored or abnormal blood oxygen saturations not acted upon**
- **Administration: - Incorrect flow rates / inadvertent disconnection of supply**
- **Equipment: - Faulty / missing**

### **Search Strategy**

A thorough and systematic review was conducted utilising the electronic databases of Cinahl/Medline, Royal College of Nursing (RCN), Cochrane, RCN British Nursing Index (BNI), Google Scholar PDF, RCN Internurse British Journal of Nursing (BJN) and

Summon. Key search terms include, early warning scores, oxygen, observation charts, drug charts, prescription, post-operative, surgery and general anaesthesia. The search was limited within the range of Jan 2009 to Dec 2012, full text articles, peer reviewed, English language, and the subject of nursing. Due to time constraints the search was so defined to include the most up to date literature available. It was felt that this would capture the most relevant data dated after the introduction of the guidelines (BTS, 2008). Lacey (2006) stressed that researchers using limits should do so with caution to ensure that relevant data is not omitted. A significant number of the 1878 articles returned by the initial search were duplicated due to the number of search engines utilised. After exclusion of these duplications and reviewing the title and abstract, ten

articles most relevant to the study were selected for review.

### **Education of Health Care Professionals**

The review of the literature included both guidelines and opinion pieces. In the findings and recommendations of all the articles the need for an educational programme to be developed is highlighted and shown as follows. This ranged from pre-registration education curriculum content (Oliver, 2010) to that of junior doctors educational and practical experiences (Medford, et al, 2009). Recognised national training courses such as the ALERT (Acute Life Threatening Events Recognition and Treatment) were recommended as educational programmes that all staff involved with the delivery of oxygen and the use of early warning scores should attend (Morris & Davies, 2010) and (Preston & Flynn, 2010).

Preston & Flynn (2010) suggested the re-introduction of clinical teaching staff, which was supported by Oliver (2010), who not only suggests that pre-registration education should address this issue but also that post-registration refresher courses should be mandatory. Khachi et al (2010) advocate a specific educational programme in their research study whereas Higginson, et al (2010) suggests that a continuing programme of education would be beneficial.

### **Guideline development**

There is some evidence that clinical guidelines can directly influence an improvement in patient care (Aveyard & Sharpe, 2009).

Ludikhuize, et al (2012) identify the development of guidelines locally as a recommendation for improving the practice of oxygen delivery. This is supported by (Oliver, 2010) who identifies the development of local

policy as being crucial and (Powrie & Smith, 2010) who also suggest that existing policy should be re-developed. They identified clinical updates and competencies as an appropriate area for potential development and change in clinical practice.

Clinical guidelines are a way of realising consistent nursing practice that is evidence-based and directing safe delivery of care by competent practitioners to individual patients.

### **Audit**

As a measure of attainment, maintenance and improvement of existing clinical standards of practice Medford et al (2009) and Morris & Davis (2010) both suggest that a timetable of audit should be implemented.

Audit is the tool whereby it can be measured whether or not supplemental oxygen therapy is being prescribed

and administered in accordance with both national guidelines and local policy.

Carrying out audit can identify and highlight changes in current clinical practice that may not be evidence-based Aveyard & Sharpe (2009). Clinical audit is the tool used to measure the gap between what should ideally be done in practice and what is actually carried out in reality. The aim is to identify good practice and highlight those areas in need of some improvement Morris & Davies (2010).

### **Prescription of Oxygen**

The inclusion of two papers from Australia, Elliott & Coventry (2012) and Wong & Elliott (2009) and one from Holland, Ludikhuize, et al (2012) highlights the fact that it is an international concern that supplemental oxygen therapy is not being either prescribed or

administered in accordance with either local policy or national guidelines.

Medford et al (2009) discuss in some detail the prescription of supplemental oxygen therapy and the rationale for its administration prior to being prescribed.

The rationale being that to withhold the delivery of oxygen therapy whilst waiting for a written prescription could have detrimental effects for the individual patient untimely death for example.

Where medication has been prescribed within a range of dosages it is acceptable for registrants to titrate dosages according to patient response and symptom control and to administer within the prescribed range Nursing & Midwifery Council (2010). Healthcare assistants are not registrants but the NMC (2010) acknowledges that oxygen is not a prescription only drug but advocates that



it should be prescribed and if administered to a patient should be accurately documented.

Standing orders for supplemental oxygen therapy are one potential solution (Wong & Elliott, 2009). This would mean that the healthcare professional would be able to legitimately administer supplemental oxygen therapy but would have to provide evidence that they were competent to do so. In the UK there is no legal definition for Standing Orders and the term does not exist in any medicines legislation (NMC, 2010).

A patient group directive (PGD) is a specific written instruction for the administration of a licensed named medicine to specific groups of patients, for example according to a local policy definition those whose oxygen saturations are recordable at < 88% on room air, who may not be individually identified before requiring

treatment (NMC, 2010). The provision of a PGD may be a solution for the healthcare professional to administer supplemental oxygen therapy legitimately NMC (2010). However the PGD must also be correctly prescribed and the trained healthcare professional will still have to supervise the actions of the healthcare assistant.

### **Assessment of Vital Signs**

Six out of the ten papers reviewed analysed the assessment of vital signs, measurement of those vital signs (including the numerical EWS) and the monitoring of those signs for any changes (Higginson et al, 2010), (Elliott & Coventry, 2012), (Ludikhuizen et al, 2012), (Morris & Davis, 2010), and (Preston & Flynn, 2010). Higginson, et al (2010) state it is important that the nurse continually monitor the effectiveness of oxygen delivery by recording pulse oximetry readings whilst (Elliott & Coventry, 2012) point out that to rely upon

technology alone for taking observations may be detrimental to patient care - there are other clues to the patient's condition that may not be identified such as a deterioration in a patient's mental state or confusion. Ludikhuizen et al (2012) provided data to show that the lack of documentation of vital signs may hamper the ability to recognise patients at risk of deterioration. The recording of vital signs may show a pattern or trend, which may identify those patients at risk of becoming acutely ill earlier. This again depends upon the training and experience of the healthcare professional interpreting the findings and acting upon them.

The literature also showed that healthcare staff needed to know which observations to undertake and how to interpret the findings (Oliver, 2010). In all ten research-papers there were variations in the frequency, type and recording of observations undertaken by practitioners

and as such physiological indicators of clinical deterioration are often missed, misinterpreted or mismanaged (Ludikhuize et al, 2012).

Morris & Davies (2010) discovered that a selection of different scoring systems were in use with little supporting evidence of reliability, validity and efficacy. Similarly further studies highlighted that incomplete sets of clinical observations were being recorded (Elliott & Coventry, 2012), (Ludikhuize, et al, 2012) and (Preston & Flynn, 2010). Preston & Flynn (2010) and Elliott & Coventry (2012) found that the health professionals who measured observations were consistently selective of the data they recorded and there was also evidence of a process of selection with regard to some of the data they reported on. When abnormal observations were recorded (Morris & Davies, 2010) reported that responses ranged from increased frequency of

observations to summoning immediate medical assistance. Preston & Flynn (2010) stated that the presence of respiratory dysfunction is an established precursor to adverse clinical events and that this may often occur many hours before other physiological indicators become apparent. They also identified that although the respiratory rate is a sensitive indicator of clinical deterioration it is the one observation that is poorly performed in acute care. This is supported by similar findings by (Ludikhuize, et al, 2012), (Morris & Davies, 2010), (Oliver, 2010) and (Elliott & Coventry, 2012). Preston & Flynn (2010) also stated that a further essential observation in the process of assessing patients for signs of clinical deterioration in acute care is that of blood oxygen saturation levels which can be monitored using non-invasive pulse oximetry. Oliver (2010) and Morris & Davies (2010) support the

recommendation that pulse oximetry should not be used in isolation but as part of the full respiratory assessment of the patient.

The suggestion that the recording of clinical observations was a task delegated to unqualified healthcare staff, such as students in training and healthcare assistants, was raised by (Elliott & Coventry, 2012) and (Preston & Flynn, 2010). The concern was raised that these tasks are unsupervised by qualified staff and implies that the detection of and action upon abnormal vital signs may be compromised. The interpretation of vital signs is a complex process, which is enabled by the clinical judgement of the qualified healthcare professional. A single vital sign should not be looked at in isolation but as part of the whole with regard to the individual patients clinical state. Abnormal indicators are the trigger to a full assessment using a

systematic approach (A B C D E assessment). Close supervision of unqualified staff doing observations in acute care should remain a priority. The trained nurse remains accountable for her own actions. However, when delegating responsibilities to others who are not trained she remains accountable for their acts and/or omissions.

## **DISCUSSION**

Oxygen is a drug and should be regarded as such. The administration of an inappropriate concentration of oxygen can have serious or fatal consequences (British National Formulary, (BNF), 2013). This supports the requirement for a completed prescription to be in place when it is administered to protect the individual healthcare professional.

Healthcare practitioners should be able to recognise and assess the symptoms of respiratory dysfunction, for example increased respiratory rate, decreasing oxygen saturations, poor colour, cyanosis, confusion, altered mental state and initiate effective and appropriate interventions promptly thereby improving outcomes for the patient (Moore, 2007).

Patients in hospital today are more ill than they were in the past (Elliott & Coventry, 2012). Those who were considered to be too ill to undergo surgery are undergoing treatment and surgical procedures themselves have become more complex (Elliott & Coventry, 2012). The patient population in itself has become more complex and difficult to care for. Existing medical conditions, diabetes for example, may influence and have an effect upon the patient's journey. The progressive effect of all these things is basically that



nurses in general are caring for patients who would previously have been cared for in a high dependency area or intensive care unit. The patient benefits from the care of a highly trained professional to achieve a successful outcome. Patient outcomes can also be influenced by skill-mix, nurse-patient ratios and bed occupancy.

The traditional vital signs of temperature, pulse, respirations and blood pressure may be insufficient to detect clinical changes in these patients who have more complex care needs. The EWS is a systematic scoring system aimed to identify those patients at risk of clinical deterioration. However, before nurses can recognise an acute change in a patient's physiology vital signs must be recorded accurately (Elliott & Coventry, 2012). An accurate baseline measurement of all the patients' vital signs on admission should always include oxygen

saturations. The baseline measurement of vital signs enables the healthcare professional to determine more accurately a potentially threatening change in the condition of the patient by the change in their vital signs.

The measurement of vital signs is still perceived as being a basic or skill-based task as opposed to a knowledge-based one. This may result in the measurement and assessment of vital signs being delegated to less qualified or less experienced nursing staff (Elliott & Coventry, 2012). It remains the responsibility of the trained nurse to supervise the measurement and assessment of vital signs in order to initiate the appropriate interventions should they be required. The trained nurse is ultimately responsible for the delivery of care to that patient and therefore accountable. Clinical workloads, skill-mix and nurse-patient ratios all have an effect upon the measurement

and assessment of vital signs, interpretation of findings and prompt relevant interventions (Elliott & Coventry, 2012).

Ludikhuize et al (2012) recommend that individual healthcare areas should provide guidelines to focus upon the measurement and documentation of vital signs to identify those patients at risk of clinical deterioration and prevent the occurrence of an adverse event.

Morris & Davies (2010) identified in their study that incomplete sets of physiological observations were being carried out on patients and that it was primarily the recording of the respiratory rate and oxygen saturations that were omitted. This was despite the fact that respiratory rate and adequacy of oxygenation are the most important physiological indicators of deterioration of the patient.

A familiar national picture is that of a reduction in the numbers of qualified nurses in clinical areas resulting in fewer nurses available to record observations or to monitor those carried out by healthcare assistants (Oliver, 2010). This would suggest that standards are not being followed with regard to the frequency of the recording of observations and also which individual observations were carried out (Oliver, 2010).

Although nurses are able to identify abnormalities within the observation data they record many remain reluctant to initiate an appropriate medical intervention (Preston & Flynn, 2010). Individual patient assessment promotes safety as opposed to the recording of observations as a routine procedure although the recording of those observations has become a task commonly delegated to the healthcare assistant or student nurse again placing patient safety at risk (Preston & Flynn, 2010). Nurses

have been shown to be selective of both the data they have recorded and the data that they have reported on, both of which actions are potentially detrimental to the patient's care (Preston & Flynn, 2010).

## **CONCLUSION**

Intuitive decision making in the assessment of risk may not be as accurate as supported decision-making (Thompson, et al, 2007). Published guidelines for oxygen administration should be based on sound research evidence (Wong & Elliott, 2009). However, BTS (2008) has limited evidence due to the ethical dilemma of undertaking studies in those patients who depend on supplemental oxygen therapy (Powrie & Smith, 2010). The main ethical concern is the inability to request consent to withhold potentially life-saving

therapy. This will always have an effect upon the reliability of any study undertaken. It does however, strengthen the rationale for baseline assessment, continuous monitoring of oxygen saturations by pulse oximetry and titration of supplemental oxygen therapy.

That many adverse events could have been prevented if hypoxaemia had been treated earlier is commonly reported in the literature (Wong & Elliott, 2009).

Therefore the ability of the nurse to observe and interpret manifestations of oxygen deficiency and administer supplemental oxygen accordingly can potentially save lives.

Monitoring can identify potential problems to which the administration of supplemental oxygen therapy provides only a short-term solution until any underlying cause can

be determined and treated accordingly (Wong & Elliott, 2009).

Much of the published literature states that supplemental oxygen therapy should only be administered if prescribed (Wong & Elliott, 2009), although this could result in a worse outcome for the individual requiring oxygen. Although risks associated with the administration of supplemental oxygen therapy do exist the risks posed are far greater not to administer it should the patient require it. Oxygen should be administered if there is a clear clinical indication such as cyanosis, decreasing oxygen saturations or tachypnoea. Patient outcome is determined by clinical and physiological assessment.

Nurses who administer supplemental oxygen therapy should remember to strive for outcomes that maximise

the effectiveness of the therapy and minimise any potential complications of oxygen therapy (Knight et al, 2011). Good oxygen management is identifying the need for oxygen therapy and how much to use to achieve the desired target oxygen saturations for the individual patient NPSA (2009). The development of this philosophy has the potential to benefit patient outcomes. Simple things, done well, make a huge impact in healthcare Royal College of Physicians (2012).

Conflict of interest: None.

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