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ORIGINAL RESEARCH

THE EMERGENCY LEVEL ALGORITHM USES THE NATIONAL EARLY WARNING SYSTEM (NEWS) METHOD FOR NON-REBREATHING MASK OXYGEN THERAPY PATIENTS

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ABSTRACT

The mixed gas pressure theory states that if the pressure of one gas in a gas mixture increases, the partial pressure of the other gas will decrease. Increasing the oxygen concentration in the non-rebreathing mask will reduce the partial pressure of CO2, so that it can reduce PaCO2 and maintain a high PaO2. Researchers want to know the level of emergency by looking at the effectiveness of administering O2 on hemodynamic status using the NEWS (National Early Warning System) method, where currently only O2 saturation and arterial blood gas analysis values are often used to evaluate, without any scoring, with an action algorithm according to the emergency level scoring report. This research is a quasi-experimental one-group pre-post-test design with a one-shot pretest and posttest design on all patients who have respiratory complaints with NEWS score values in the moderate and severe categories in the ICU of Dr. Hospital. Slamet Martodirjo Pamekasan. Sampling uses non-probability purposive sampling. Because the population of this study is infinite, the target sample size is 20 respondents. The emergence of patients in the ICU after receiving the second 6-hour phase of O2 NRM therapy intervention was found by most respondents (55%) in the mild category, and only 20% in the severe category. This means that the number of patients in the critical or high category is much less than after the first 2 hours of therapy, namely 65% to 20% and most of them are already in the mild category after the second 6 hours of O2 therapy. This study concludes that O2 NRM therapy has a significant effect on reducing the level of emergency for the first 2 hours and evaluation for the second 6 hours, resulting in a different emergency algorithm (reducing the level of emergency) for the two evaluation phases with different levels of emergency.

Keywords

Emergency level algorithm; Early warning system (EWS); Non-rebreathing mask oxygen

INTRODUCTION

The decreased morbidity and mortality rates of patients are influenced by high-quality intensive care. Patients in intensive care in hospitals can be stable and unstable. The patients are at risk of deteriorating clinical conditions that can increase morbidity and mortality rates. One of the efforts to improve quality related to patient safety in hospitals is the application of Early Warning Score (EWS), including in intensive care facilities (ICU). Early warning score (EWS) is an indicator used to assess the deterioration of the physiological condition of the patient, the assessment and response time to patients who come with acute illness conditions. EWS assessment is based on seven indicators of assessment of physiological response of patients consisting of respiration, systolic blood pressure, temperature, pulse rate, oxygen saturation, extra oxyge, and the level of patient awareness. Early warning scores (EWS) can be used to predict the likelihood of short-term and long-term death. Early warning scores (EWS) can be used as external predictors of patients including Length of Stay (LOS), mortality in 28 days or Net Death Rate (NDR), and HCU/ICU admission and code blue activation. Based on existing research results, the impact of EWS on patient clinical outcomes is still variable so that no overall conclusion can be drawn (Megawati, Sondari, Tambunan, 2023)

In 1997 Morgan, in the UK, was the first to develop and publish an early warning score system (EWSS) consisting of five physiological parameters that not only predict results, but also serve patients with circulatory systems and encourage nurses to identify early signs of deterioration. The Early Warning Score System (EWSS) introduced in the UK was later modified to the modified early warning scoring system (MEWSS), and the standard early warnings scoring systems (SEWSSs) developed in Scotland in 2003. In 2007, the National Institute for Health and Clinical Excellence (NICE) recommended the early warning scoring system (EWSS), which uses several parameters or evaluation systems, should be used to monitor all adult patients in hospitals to evaluate the level of patient criticism and timely escalation of care. NICE also recommends that the chosen system should measure heart rate, respiratory frequency, systolic blood pressure, level of consciousness, oxygen saturation and temperature. In 2010, the European Resuscitation Council outlined the importance of EWSS by incorporating it into the guidelines for rehabilitation and included it in the first line in the survival chain (Georgaka et al., 2012)

The worsening condition of the patient, such as a cardiac arrest, needs to be detected quickly to prevent the death toll. In Indonesia, hospital deaths rose from 69 per 1,000 population to 87 per 1000 population from 2007 to 2012 (BKKBN, BPS, Health, & International, 2013). According to the medical records of the Santa Elisabeth Medan Hospital, the number of deaths in 2018 was 570 people, while at the time of use of EWS in 2019 the number was 460 people.

Oxygen therapy (O2) is a medical intervention to prevent or treat hypoxia and maintain relative tissue oxygenation. (Purnomo, 2021). The results of the study by Agustin, Triyono, Setiyawan, & Safitri (2019) indicate that oxygenation filling can stabilize the hemodynamic status of patients characterized by decreased blood pressure, increased heart rate, and body temperature. Another study conducted by Ginting et al. (2020) found that oxygenation can affect the level of awareness of patients with moderate head injuries. Oxygen improves the circulation of oxygen to the brain, stabilizes

the blood, and reduces the level of pain. (Kurniawan, 2023).

In patients with oxygen disorder with symptoms of shortness of breath, it is important to keep PaO2 levels within normal limits. In some libraries, it is mentioned that we should keep PaO2 at a minimum of 100mmHg, even some authors give a higher value, that is, ranging between 140-160mmHg. Oxygenation can be done using nasal canul, masks or with hyperbaric chamber therapy. One measure to control the increase in blood acidity is a reduction of PaCO2 in the acute phase of acidosis. The decrease is carried out to reach PaCO2 levels of about 20-30 mmHg, which is known as hyperventilation action. This decrease in PaCO2 will lead to vasoconstriction of the brain's blood vessels and this condition will directly lead to a reduction in the rate of blood flow to the brain; as a result (indirectly) will lower the intracranial pressure. The background of this research is that in the theory of gas pressure mixture, Dalton says that if one gas pressure in the gas mixture increases then the partial pressure of the other gases will decrease, so the authors want to know whether an increase in oxygen concentration in the NonRebreathing mask will lower a partial CO2 pressure, so it can be used to lower PaCO2 whileining a high PaO2 to lower blood acidity. A nonrebreathing oxygen face mask (NRM) is a device that can deliver oxygen at a low speed but with a high concentration effect in patients who can breathe spontaneously. The NRM has a pure O2-reservoir component and a one-way breathing valve that allows the delivery of O2 concentration to the patient's height (FiO2 about 90%). Looking at the background, this study aims to find out the effectiveness of O2 administration against hemodynamic status by using indicators of success of EWS changes in patients with shortness of breath (Hendrizal, Saanin, Bachtiar, 2014).

METHOD

This penalty is a clinical trial study with a project one shoot pretest and postest. The research was conducted at Dr. Slamet Martodirjo Pamekasan Hospital, located in the HCU (High Care Unit) room. The study population is all patients with respiratory complaints with EWS scores of moderate and severe categories treated in the hospital Dr. Slamet Martodirjo Pamekasan. The sample of the study is patients all patients have respiratory grievances with scores EWS of medium and severity category treated at the ICU room receiving O2 NRM therapy. Sampling using non-probability sampling with purposive samplings because the research population cannot be counted (infinite). In the experimental study the number of target samples was 20 patients The research instrument used in the data collection is that, the researchers chose population/sample criteria using the patient's health progress report book as well as using the observation sheet, and researchers left to choose answers according to the condition of the patient based on 7 indicators of the NEWS criteria namely: temperature, systolic blood pressure, radiation, oxygen saturation, respiratory rate and state of consciousness

Data processed with Statistical Product for Service Solutions (SPSS) 17. The free variable data that is coupled in this study is numerical data. The first phase is a univariate analysis to find out the frequency distribution data of respondents, namely age, gender, diagnosis of the disease, and data score NEWS pre and post-test. For bivariate analysis to find out the difference between the two variables, intervention with post-intervention 2 hours first and 6 hours 2.

After performing the test paired T test, because the 2 variables are dependent, use interval scales, so can be known large value p is considered significant is P<0,05, and a confidence interval (CI) of 95%. In the

process of analysis, it should be noted that if the statistical test results have a value P>0,5, then the comparative analysis has no meaningful difference between the pre-intervention and post-intervention EWS values. In this study, the researchers will analyze the impact of the NRM O2 administration as part of the post-therapy reporting algorithm using the NEWS score indicator so that they can compare the score of the first 2 hours with the 6 hours of the 2nd, then study using the relevant theory and the results of the previous research, after performing the statistical test paired T test, so that in the future can be known the more accurate O2 giving strategy based on the variation of the score value of the NEWS.The protocol of this research has received an ethical certificate from the RSUD health research ethics committee Dr. Slamet Martodirjo Pamekasan with no :070/110/432.603 / KEPK/2023.

Writing materials and methods can be made sub-chapters to be more detailed and regular. Writing can be like the following Research design, Population and sample research, Materials and research tools, Collection or research stages, & Data analysis. Don't forget to include ethical clearance

RESULTS

Table of results of the statistical tests of pre and post-O2 therapy NRM on the level of illness of patients treated in the hospital's ICU room. Dr Slamet Martodirjo Pamekasan

Evaluation Phase	Average value of visibility scale NEWS		discrepancy	*Uji wilcoxon*
	Pre	Post		
	N	N	N	P
First 2 hours	10,9	7,25	3,65	0,014
6-second hours	10,9	4,9	6	0,000
Average	10,9	6,07	4,3	

Wilcoxon test with a significance level <0.05

Based on the results of the study from table 8, it can be seen that the average value of the respondent's level of alertness for the first 2 hours of evaluation of success is 7.25 with a difference of 3.65 decrease from the initial condition before intervention, i.e. 10.9. whereas the average of the responders' level of alarm for the second 6 hours evaluation is 4.9 with the difference of 6 decreases from the original condition before the intervention i. e. 10.9 The result of the analysis using different trials obtained a value of P = 0.014 < 0.05 which means that there is a significant difference between the patient's condition of alertment prior to intervention and the method of intervention for the successful evaluation phase of 2 hours. Then for the different trial at the evaluation 6 hours of the second intervention post showed a P value of 0,000<0,05, meaning that there are significant differences between the conditions of alerting before and after intervention.

DISCUSSION

The National Early Warning Score (NEWS) is an assessment instrument for identifying declines in clinical conditions and early detection of discomfort in patients in hospitals. Based on the data of the results of the study in table 4, accumulated almost entirely (95%) of the patient's NEWS rating treated in the ICU room belongs to the high category. The high value of the NEWS indicates that urgent nursing action is needed to address the status of patient's condition. Based on the results of the research, the cause of the high value of this NEWS can be from various factors, among others, the room used in this research is the intensive nursing room which is the room that becomes the reference place of the patient nurses, hospitals, and UGD with cases of injury, surgery, and post-surgery. Patients

who are in the intensive care room are usually patients in critical or emergency conditions so their NEWS ratings are usually high or moderate. The interpretation of the NEWS results is divided into three sections, namely low, medium, and high values. Low scores have scores ranging from 1 to 4 which indicate that the result is that a nurse is required to monitor changes in the patient's condition. Furthermore, the middle score has a score range of 5-6 which indicates that continuous monitoring by nurses and doctors is required and the team is prepared to cope with critical situations. If, the NEWS scores are high, the score ranges are more than 7 indicating that urgent emergency treatment is required by the doctors and nursing teams (Smith, et all, 2013). This study reinforces the results of a previous study (Sujarwo, 2020), which stated that the majority of patients treated in ICU rooms, had a moderate NEWS score of 62.9% of all respondents, suggesting that the variance of the sample seen from the NEWS score had the same characteristics across hospitals.

Based on table 5, above that the characteristics of respondents based on the level of agility after receiving NRM O2 therapy intervention for the first 2 hours obtained data that most respondents (65%) still belongs to the high category, and only 7 respondents (35%) belong to the moderate category. This means there is a decrease in the levels of agitation seen from the number of respondent from 95% respondents who have high category NEWS scores to 65% respondents, down to the medium category. The results of this study complement the results of Adelima CR Simamora, Suriani Br. Ginting (2017) found a meaningful relationship between changes in the values of PaC02 before and after oxygen therapy using Non-Rebreathing Mask (NRM) with a value of p value = 0,000(p<0,05), and meaningful relationships between the change in the value of the PAC02 which affects the occurrence of changes in pH values and and HCO3-after oxyge therapy with the use of Non-reebreathering Mask(NRM), with a p value of 0,000 (p<0.05). This study explains that the change in the value of the NEWS score as an indicator of success of oxygen therapy, is not apart from the role of high-dose O2 fraction therapy that affects the decrease in Pa CO2 in the blood so that Hb will be easier to bind O2 which will affect the saturation of O2 and respiratory rate which will also be an indikator of the evaluation of NEWS after O2 NRM therapy. The results of this study are supported by the theory submitted by Hudak & Gallo (2010) in Widiyanto & Yamin (2014) stated that increasing FiO2 (oxygen presentation given) is an easy and fast method to prevent the occurrence of tissue hypoxia, by increasing the FiO2, then also will increase the PaO2, which is a factor that is very determining oxygeen saturation in the O2 therapy high PaO2 hemoglobin carries more oxygens and at low PaO 2 hemoglobins carries less oxygen (Morton dkk, 2012).

Based on table 6, patients treated in ICUs after receiving NRM O2 therapy intervention for the second six-hour phase obtained data that the majority of respondents (55%) belonged to the mild category, and only 4 respondents (20%) were in the severe category.Hi this means that the number of patients who are categorized with a score NEWS >7 or high is much less than the first 2 hours of post-therapy, that is 65% to 20%, and the majority are already in the light category with the score NEWS < 5 after therapy O2 6 hours second. The results of this study are supported by the theory that in cases of acute coronary syndrome, oxygenation within the first 6 hours of therapy is recommended and oxygenation for more than 6 hours is clinically unfavourable. Oxygen should be given to patients with shortness of breath,

signs of heart failure, shock or oxygen saturation <95% (Mayes, P.A, 2010).

Additional value in this study is the latest research on the success rate of O2 therapy NRM seen with more prameter, which represents the vital signs, hemodynamic system and the level of awareness present in the score NEWS, so will produce a strict, complete and practical monitoring system in assessing the clinical condition of patients post-therapy O2, during this frequently used evaluation only O2 saturation and arterial blood gas analysis values without the presence of scoring with the action algorithm according to the report scoring level of irritability. This study revealed from the results of Wilcoxon statistical trials that there is a defining influence of therapy O2 NRM on the decrease in irritability for the first 2 hours with a P value of 0.046 and the second evaluation of 6 hours with the value of P 0.00. The results of this study strengthen the results of F. Musafirah (2021) study which stated nursing care management in patients with mild head injury in the administration of nasal oxygen canul with head up position 30° during the first 2 hours there was an increase in oxyge saturation from 94% to 97% and a decrease in respiratory rate from 32x/min to 22x/ min. To look at the algorithm of change in the level of agility from the first two hours to 6 hours to the two post-NRM O2 therapy, the statistical test results with Mann-Whitney showed there was a significant difference between the two phases of evaluation of different agility levels with a value of P 0.00. These results reinforce previous studies with a simpler indicator of assessment that administration of O2 using a nasal canula 4 lpm periodically in patients with bronchial asthma, can increase O2 saturation levels with increased oxygen saturation by the 6th hour, achieving a 100% result (Krisdiyanto, Agustin, dan Wijaya, 2014)

The advantage of this other study is the use of NEWS which is more focused on monitoring the disturbance of vital signs of a combination of parameters with levels of awareness that are rarely used as a scoring evaluation tool in high care rooms or intensive care units. This is in line with an observational study in the hospital dorm room in the United States showing that one in five patients who are being treated have a life mark disorder and more than 50% of cases of such a lifemark disorder are not noticed by the nursing team (Subhan, 2017). Smith (2014) found that early warning systems, mostly using vital sign abnormalities to predict the occurrence of cardiac arrest and death within 48 hours of measurement. In general, patients with good EWS scores are unlikely to suffer a heart attack or sudden death, while patients with higher scores have a higher rate of deterioration.

CONCLUSIONS

This study found two conclusions that: 1) There was a significant influence of NRM O2 therapy on the decrease in the level of agility for the first 2 hours with a P value of 0.046 and the second 6 hour evaluation with a p value of 0.00; 2) Algorithm changes in the rate of agitation from the first two hours to 6 hours to the two post-NRM O2-therapy, the results of the statistical tests showed a significant difference (decreased agility rate) from the two phases of the evaluation of the different level of Agility with a value of P: 0.00

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