Clinical Audit of Use of Nebulizer at NPH Emergency Room

An audit by NPH Emergency Team from May – July 2019

INTRODUCTION

- Asthma is a common Non communicable disease (NCD) . Can cause substantial disability and death world wide [7]. Approximately 300 million people worldwide currently have asthma, and its prevalence increases by 50% every decade [8].
- The Northern Provincial Hospital is a Regional Referral Hospital based on the island of Santo, Vanuatu. In the Emergency room of the Northern Provincial Hospital, the nebuliser room is one of the prominent active services of the department. It utilizes a lot of time that staffs take to treat patients so we have decided to audit use of the nebuliser service in the Emergency department.
- Currently there is no full-time doctor in the Emergency room, so only nurses work on shifts and are first responders to emergency cases coming via the ED.
- The audit will try to define current practise in the nebuliser room and how we can improve this practice despite limited staffing and supplies in our health facilities.

Goal and Objectives

- **Goal:** To improve the triage quality of the asthma patients in Northern Provincial Hospital, emergency department.
- **Objectives:**
  1. To determine the current triage flow of patients using the nebulizer room
  2. To determine which group of patients use the nebulizer room more frequently

Standards (expected practice)

1. The use of salbutamol with bottle spacer can safely replace nebulizer in low resource settings [1 - 3].
2. Regular triage training for emergency nurses strengthen triage systems and performance of staffs [4 - 5].

3. Increase use of inhaled corticosteroids can reduce hospital admission rates and visits to hospital emergency department [7].

4. Asthma education for adults is best done in an outpatient clinic [6].

5. Infection Prevention Control (IPC) must be maintained in accordance with low resource settings standard. Common colds and viruses can trigger asthma attacks and can commonly spread via hospital breathing apparatus [7].

Methodology

- After approval of the Medical Superintendent of NPH to conduct the audit, we formulated a questionnaire (appendix 1) that was given to at least 4 auditors to observe and fill in.
- The auditor usually comes to the ED during normal working hours of the day, and whenever there is a case being referred to use the nebuliser the auditor fills in the questionnaire. So, it is a real time observation and follow through of the cases being treated with nebuliser.
- We used auditors who were foreigners and worked in high resource settings, in this case a medical student, intern doctor, nurse and an emergency physician from abroad.
- Apart from patient biodata the forms also question the past medical history, and current clinical status with indication for nebulisers.
- Auditors personal opinion was also included in the questionnaire for each to give their personal opinion if the patient really needed nebulisers or just spacer use.
- All information is then entered into Excel Spreadsheet for basic counts and analysis.

Size and Scope

- The audits were done in the day shift only during normal working hours. Within a time frame of six weeks we were able to follow through 101 patients. In days we reached 30 day shifts.
- Patients were interviewed irrespective of gender, race and age. As long as they were seen using the nebulizer room when the auditor was present.
- The sample size of 100 was discussed as a large enough sample size to audit with no statistical significance.

Results

- Results table included:
  1. Auditing the indications of nebulizer use
  2. Auditors’ general assessment of patient’s over all condition
  3. Analysis of revisits

Table 1: Indications of salbutamol use

Variable	Count
Male to female ratio	59 : 42 (1.4, 1)
Average number of patients per day shift	3.4
Age Group in years (%)	
40+:	42 (41.5)
16 – 40:	33 (32.8)
6 – 15:	11 (10.9)
1 – 5:	13 (12.9)
0 – 1:	2 (2)
Self-referral to Nebuliser room	53 (52.5)
Referral by outpatient department	31 (30.7)
Patients given nebuliser without complaint of shortness of breath, tight chest and cough?	13 (13)
Nurse was first to assess patient (Y/N)	65 (64.3)
Chest auscultation without vital signs	46 (45.5)
Count of Nebulisers given per patient	
Max:	5
Minimum:	1
Median:	1
Mode:	1
Mean (+/- SD):	1.47 (0.97)

Table 1 (Cont'd)

Common Comorbidities Self-reported (n=88)	
Hypertension (%):	**7 (8.3)**
Diabetes (%):	**2 (2.3)**
Cardiac (%):	**1 (1.1)**
Number of patients Revisit in duration of audit (number of revisits)	8 (17)
Recent frequency of visit to nebuliser room (n=98)	
< 1Month (%):	
1 month but less than 4 months (%):	48 (48.9)
>2 Weeks (%):	41 (41.9)
1 – 2 weeks (%):	5 (5.1)
	3 (3)
Non-Smokers among wheezers (n=73)	33 (45.2%)
***others are ex-smokers, passive smokers and current smokers**	
Cooking in open fire among wheezers (n=75)	64 (86.5%)
Dis-position from Nebuliser room	
Discharged by Staff:	52 (51.4)
Discharged to OPD:	5 (4.9)
Self -Discharged home:	28 (27.7)
Admission to ward:	2 (2.0)

Table 2: Auditors' assessment of patients overall condition

Variable	Count
Count of patients needing salbutamol treatment (n=99)	
Yes	78 (78.8)
Unsure	4 (4)
No	17 (17.2)
Count of patients that can be treated only with spacer and without nebuliser (n = 98)	
Yes:	85 (86.7)
Unsure:	5 (5.1)
No:	7 (7.1)
Number patients per auditor: (N=101)	
Senior Doctor:	10
Intern Doctor:	4
Registered Nurse:	1
Medical Student:	84
Self-Reported Past Medical History of Asthma	67
Self-Reported Comorbidities	12

Table 2 Cont'd

Selected Vital signs from age group 16 years and above (%)	
RR>22:	**46 (66)**
SpO2<93%:	**3 (4.2)**
HR>100:	**17 (23)**
Temperature>37.5*C:	**3 (4.7)**
Moderate to severe Hypertension:	**13 (18.3)**
Auditor's working diagnosis:	
Exacerbation of asthma:	47 (46.5)
Lower Respiratory Tract Infection with wheeze:	13 (12.9)
Viral wheeze (paediatrics):	10 (9.9)
Lower Respiratory tract infection without wheeze:	
COPD Exacerbation:	9 (8.9)
Upper Respiratory tract infection:	8 (7.9)
	6 (5.9)

Table 3: Analysis of Revisits

Variable	N = 17
Female : male	1, 2.4 (5, 12)
Age Group in years	
40+:	10 (58.8)
16 – 40:	5 (29.4)
1 – 5:	2 (11.8)
Count patients on SABA MDI before presenting to ED	
Yes:	8
No:	9
Count patients on steroid MDI before presenting to ED	1
Count of patients who need the salbutamol treatment (n=17)	
Yes	15 (88.2)
Unsure	1 (5.9)
No	1 (5.9)
Count of patients that can be treated only with spacer and without nebuliser (n = 17)	
Yes:	13 (86.7)
Unsure:	2 (1.2)
No:	2 (1.2)

Table 3 Cont'd

Count patients given SABA MDI at discharge	**4**
Count patients given oral steroids at discharge	6
Count patients given steroid MDI at discharge	0
Smoking status	
Smoker	1
Ex-smoker:	4
Passive Smoker:	3
Non Smoker:	9
Open Fire exposure	
Yes:	14
No:	3

Findings

- According to auditors 17.2 % (17) did not need salbutamol nebulisers but still got it as per initial referral. Most patients were either self-referred (52.5%) or referred from the outpatient department (30.7%).
- Lack of further information on history or secondary survey made it difficult to tie the auditors to make a linkage with the physical findings as a triage tool. However, in the age groups more than 16 years 3 patient (age 24, 36, 69) had SpO<93% and should have been well monitored on a bed. Many patients (66%) had respiratory rates more than 22 beats per minute. And it is difficult to say weather the patients received salbutamol before or after, as the medication can also affect the vital signs. Repeat vital signs was not a routine among the patients observed.
- The most common reason for inhaler refusal was that it was not offered (22). Specifically, for revisit patients the most common reason was that they ran out of Inhaler and not because they refuse.
- 74% were more than 16 years. Overall female to male ratio of 1:1.2. In the revisit category the ratio of female to male is 1:2.4. 59% are over 40, 29.4% are 16 – 40 years, and 11.8% are 1 -5 years.
- There is an admission rate of 1.9% (2) out of the 101 patients who used the nebuliser room.
- Open smoke fire can be stressed as an important precipitant of asthma.

Conclusion

- In a period of 30 days (8 hours/day) there were 101 patients interviewed for this audit in 2019.
- There was no proper triage system in place.
- Self-referral (52.5%) and referral from outpatient department (30.7%) had the most referrals to the nebulizer room.
- It is agreeable that nurses will be the first to assess patients before using the nebulizer (64.3%) as they usually are the staffs manning the emergency department.
- However, chest auscultation without vital signs was a common practice (45.5%). Proper physical examination and monitoring was not observed during this audit.

Cont’d

- There is a predominance of males overall (1.4:1) and in the revisits (2.4:2).
- Most patients come to the nebulizer room just for a one-off treatment. Mean number of nebulizers of 1.47 (0.97 SD). Out of all of them no spacer was used.
- Overall the auditors think 86.7% of patients can be treated with salbutamol and spacer only. 13 of which are repeat offenders.
- Corticosteroid inhaler for preventative therapy was not an integral part of their treatment after discharge from emergency.
- Open fire cooking is a common risk factor identified in this audit (86.5%). It is acceptable, that the emergency room does not have a proper place for asthma education.

Recommendations

- Asthma education services need to be established in NPH. Preferably as a special outpatient service free from disturbances.
- A program for change management on asthma need to be designed for emergency and outpatient staff education.
- There needs to be designated nebulizer room (treatment room) for the out patient department to reduce overload in the emergency, and cross infection to emergency department.
- Bottle spacer use must be encouraged in the outpatient treatment room and emergency room.
- The emergency triage room need to be well set up to reduce self-referral to the nebulizer room.
- Regular refresher training on triage is needed for nurses and doctors working in the emergency.

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References

1. HJ Zar, G Brown, H Donson, N Brathwaite, M D Mann, E G Weinberg, (1999), 'Home made spacers for bronchodilator therapy in children with acute asthma: a randomised trial', *The Lancet*, Vol 354 (September 18), pg 982.
2. Zar HJ, Asmus MJ, Weinberg EG, (2002), 'A 500-ml plastic bottle: An effective spacer for children with asthma', *Paediatr Allergy Immunol*, 13, pg 217 – 222.
3. CJ Cates, EJ Welsh, BH Rowe, (2013), Holding chambers (spacers) versus nebulisers for beta-agonist treatment of acute asthma, pg 2.
4. HL Tam, SF Chung, CK Lou, (2018), A review of triage accuracy and future direction, *BMC Emerg Med*, 2018 Dec 20;18(1):58.doi: 10.1186/s12873-018-0215-0.
5. R Heath, P Tomaszewski, M Kuri, V Atua, G Philips, (2019), Message in a bottle, How evidence based medicine and a programme change model improved asthma management in a low-income emergency department in Papua New Guinea, *Emergency Medicine Australia*, 31, 97 -104, doi: 10.1111/1742-6723.13212.
6. R Mishra, M kashif, S Venkatram, T George, K luo, (2017), Role of Adult Asthma Education in Improving Asthma Control and Reducing emergency Room Utilization and Hospital Admissions in and Inner City Hospital, *Can Respir*, 2017:5681962. doi: 10.1155/2017/5681962
7. 2018, *The Global Asthma Report*, <Global Asthma Report 2018.pdf>
8. Braman, Sidney S, (2006), The Global Burden of Asthma, *CHEST*, Volume 130, Issue 1, Supplement, July 2006, Pages 4S-12S