A Quality Improvement Cycle for Acute Bronchospasm in Primary Health Care: Mitchell's Plain Community Health Centre, Cape Town.

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Declaration:

I, the undersigned, hereby declare that the work contained in this assignment is my original work and that I have not previously submitted it, in its entirety or in part, at any university for a degree.

Signature: …….. Date: ……..

Acknowledgements:

There are a number of people I would like to thank for their assistance, support and encouragement during this project,

To my husband, my biggest supporter, thank you for standing by me through my darkest days and always believing in me

To my sons, Thiyagan and Theolan, none of this would be worthwhile if it was not for the both of you

To my mum, for all the sacrifices, love and support, you are an inspiration

To my sister, for a love, that only sisters' share

To my 'family' in Chronic Club B, Room 5, where the world's problems are resolved

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Lastly to all the staff at Mitchells Plain CHC, especially the trauma and reception staff, your efforts may not always be acknowledged, but are highly appreciated.

' *Aum Namasivaayaa'*

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Abbreviations:

PEFR- Peak expiratory flow rate

MDI- Metered dose inhaler

CHC- Community Health Centre

CXR- chest x-ray

ECG- electrocardiogram

B_2 agonist - Beta 2 agonist

DALYs - disability-adjusted life years

DOH- Department of Health

QIC- Quality improvement cycle

#MPCHC- Mitchell's Plain Community Health Centre

SATS – South African Triage Score

Abstract

Introduction:

Asthma affects over 300 million people worldwide and is the sixth highest cause of morbidity and mortality in South Africa. Mitchell's Plain is a large suburb in Cape Town, with a population of approximately 320 000 people. A previous study in 2006 indicated that 15.7% of patients that presented to Mitchell's Plain Community Health Care casualty were for an acute exacerbation of asthma and 7.8% of total deaths were from acute asthma. There was generally poor adherence to the national guidelines with respect to the management of an acute asthma exacerbation.

Aim and Objectives:

This study aimed to assess and improve the quality of management of acute bronchospasm at Mitchell's Plain CHC. Objectives included assessing the current management, comparing it to the national guidelines and implementing strategies to improve care.

Method:

The study methodology was that of an audit cycle. Eligible patients were identified from the casualty admissions register. A total of 351 patients' records were reviewed and compared to criteria based on the national guidelines. The initial findings were presented to the casualty staff that critically reflected; planned and implemented change. Intervention strategies involved raising awareness about the asthma guidelines, the audit tool and the South African Triage Score. A re-audit was performed after 6 months.

Results:

The baseline audit revealed that there was poor documentation of assessment of patients. Only 73% had a pulse rate documented, 70% had respiratory rate documented, 69% had blood pressure documented, 64% had temperature documented and 62% had pulse oximetry documented. Only 8% had peak expiratory flow rate (PEFR) before nebulisation and 9% had PEFR post nebulisation documented. Supplemental oxygen was documented in 6%. B_2 agonists was administered in 73% via saline nebulisation and 45% had Ipratropium Bromide nebulisation. Oral steroids were documented in 47% and intravenous steroids in 21%. The results of the re-audit showed improvement in the clinical assessment criteria of the patients triaged using the audit tool and SATS stationery with 3 of the 5 target standards being met. However, there was no improvement in the management of the acute bronchospasm as set out in the guidelines.

Conclusion:

The quality of care of the management of acute bronchospasm at Mitchell's Plain CHC was found to be below the standard set out in the guidelines. There was improvement in the assessment of patients following awareness of the guidelines, but not in the management of

acute bronchospasm. A number of factors could have contributed to this i.e. utilisation of junior doctors and locum doctors after-hours and general clinician inertia. These issues should be addressed and audits done on a regular (6 monthly) basis.

1. Study Title

A Quality Improvement Cycle for Acute bronchospasm at Mitchell's Plain Community Health Centre, Cape Town.

2. Introduction and Literature review:

Asthma is a chronic inflammatory condition of the airways, which is usually allergic in origin, and is characterized by hyper-responsive airways that constrict easily in response to a wide range of stimuli.[1] Asthma affects over 300 million people worldwide and is the sixth highest cause of morbidity and mortality in South Africa,[2] and is the second most important chronic disease after HIV/AIDS.[3] It knows no prejudice, affecting people from all social, cultural and ethnic backgrounds unlike tuberculosis, which one would expect to encounter in less privileged societies, and coronary artery disease, which is a disease of affluence.[4]

Asthma has become more common in both children and adults around the world in recent decades.[1]The increase in the prevalence of asthma has been associated with an increase in atopic sensitization and is paralleled by similar increases in other allergic disorders such as eczema and rhinitis.[5] The prevalence of recent wheeze in adults is reported as 14.4% in males and 17.6% in females, with a self reported prevalence of 3.7% and 3.8% respectively.[3] In the Western Cape the prevalence of asthma among children aged 3-14 years was 14.4%, slightly above the global average of 13.7%.[3] With the projected increase in the proportion of the world's population that is urban from 45% to 59% in 2025, there is likely to be a marked increase in the number of asthmatics worldwide over the next two decades. It is estimated that there may be an additional 100 million persons with asthma by 2025.[5]

District health services in the Western Cape Province serves 5 million people, of whom 80% are uninsured and depend on the public sector.[3] Worldwide; asthmatics have restricted access to basic medications and medical care essential to treat their medical condition. [3]Access to essential drugs for asthma, including inhaled steroids, is better in South Africa than in other sub-Saharan countries.[3]Increasing the economic wealth and improving the distribution of resources are important priorities in the move to improving health care globally.[3]

The number of disability-adjusted life years (DALYs) lost worldwide has been estimated to be currently about 15 million per year.[3]Worldwide; asthma accounts for around 1% of all DALYs lost, which reflects the high prevalence and severity of asthma. The number of DALYs lost due to asthma is similar to that for diabetes, or cirrhosis of the liver, or schizophrenia.[5]

The burden of asthma worldwide is such, that it warrants recognition as a priority disorder in government health strategies.[5] Emphasis should be placed on improving the care of disadvantaged groups with high morbidity, including certain racial groups and those who are poorly educated, live in large cities, or are poor.[5]Resources are also needed to address preventable factors, such as air pollution, that trigger exacerbations of asthma.[5] It is estimated that asthma accounts for approximately 1 in every 250 deaths worldwide.[5]Many of these deaths are preventable, and are often the result of suboptimal long-term medical care and delay in obtaining help during the final attack.[5]

There are numerous barriers to reducing the burden of asthma, these can be generic, examples of which are poverty, poor education or infrastructure, environmental factors such as pollution, smoking, low public health priority due to the increased burden of tuberculosis and pneumonia in the face of HIV, or the inherent barriers in the organization of health care services in terms of;

- Geography
- Type of professional responding
- Education and training systems
- Public and private care
- Tendency of care to be "acute" rather than "routine"[5]

Asthma was the 25th leading cause of disability-adjusted life years (DALYs) lost worldwide in 2001.[5]

The true prevalence of asthma is difficult to determine due to the lack of a single objective diagnostic test, different methods of classification of the condition, differing interpretation of symptoms in different countries, as well as the uncertain influence of increasing public and professional awareness of asthma.

The prevalence of asthma is higher in Southern Africa than in many other regions in Africa.[6] Asthma is considerably more common in urban compared with rural areas. For example, in Zimbabwe the prevalence of exercise-induced asthma is 25 times higher in urban compared with rural communities, where asthma is rare.[6]There is a major preventable burden of asthma in the region due to under-recognition and under treatment, which are both in part related to limited access to health care. Asthma is a common cause of admission to hospital in the region, particularly in children. In the case of South Africa, asthma is the third most common cause of hospital admission in children, after pneumonia and gastroenteritis. In South Africa the number of admissions to hospital for asthma has increased markedly over the last few decades, with the greatest increase occurring among infants.[5]This suggests that the burden of severe asthma has increased markedly during this period.[6]

In Southern Africa, mining-related diseases such as pneumoconiosis remain the leading occupational respiratory diseases, but occupational asthma is becoming increasingly prevalent as non-mining industrialization expands.[6] Occupational asthma now represents the second most frequently reported occupational respiratory disease. The Surveillance of Work-related and Occupational Respiratory Diseases in South Africa (SORDSA) represents a good model for use in other countries to provide useful information on which to base prevention activities. Ethnic factors and socioeconomic status have only a modest effect on asthma prevalence but a large effect on asthma hospitalization and mortality rates. Improving the overall socioeconomic status of communities in the region represents a priority if the burden of disease, including that due to asthma, is to be reduced. The combination of changes in health services designed to improve access to and quality of asthma management and education in South Africa, and a national education program based on locally adapted guidelines, represents a good model for other countries in Africa to follow. The locally adapted guidelines, including those developed for children; provide a simple and practical approach applicable to local circumstances.[6]

Despite progressive reductions over the last few decades, asthma mortality remains high within the region. For example, in South Africa among 5- to 34-year-olds the asthma mortality rate has decreased by 0.13 deaths per 100,000 per year over recent decades;

however at 1.5 it still represents a relatively high rate by international standards and is associated with the fifth-highest case fatality rate in the world.[6] Asthma mortality rates are disproportionately higher in certain racial groups within the region. In South Africa the rates are highest amongst people of mixed race, followed by blacks and then whites. The majority of asthma deaths in the region occur outside hospitals. Poor availability of health care, poor transport and emergency services, and inadequate home management of acute asthma are recognized as important contributing factors.[6]

Chronic obstructive pulmonary disease (COPD) is an important cause of death and disability in both developed and developing countries. It is becoming more common and accounts for significant and increasing utilization of health care resources with attendant increases in health care expenditure. Cigarette smoking remains the major cause of COPD, but in Africa and Asia domestic biomass fuel use and tuberculosis are important additional causes.[7] COPD is a disease state resulting predominantly from smoking tobacco, and is characterized by airflow obstruction, which is generally progressive and is only partially reversible.[7]
COPD is often diagnosed late because patients lack symptoms in the early stages of the disease despite the presence of moderate decreases in pulmonary function. The primary risk factor for COPD is cigarette smoking. However in South Africa, important contributory factors are tuberculosis, industrial and mining dust exposures, and domestic use of biomass fuels.[7] As a result of these additional factors, the prevalence of COPD is higher in poorer communities (Table 1).[7] It is not yet clear what impact HIV infection and its attendant pulmonary complications have on the pathogenesis and prevalence of COPD in South Africa. Estimates of the global all-age incidence of COPD are that it affects 9/1000 males and 7.3/1000 females.[7] It seldom presents clinically before the 5th decade, but incidence increases in successive decades and up to 50% of smokers over the age of 65 years are affected.[7] Incidence also varies widely between different regions and countries of the world, according to local cigarette smoking habits and domestic and socio-economic circumstances. It is more common in males than in females, but morbidity among women has increased sharply in many countries, in parallel with an increase in the number of women smokers. Morbidity and mortality increases with severity of disease, age and co-morbidity. The diagnosis of COPD should be considered in any patient with chronic dyspnoea and/or chronic cough (with or without sputum production), a smoking history of more than 10 pack years, and/or other risk factors for COPD (Table 1), particularly if there is no other apparent cause for these symptoms (e.g. cardiac failure).[7] One pack-year equals 20 cigarettes per day, or 15g of pipe tobacco per day, for one year. In South Africa, more than one risk factor is commonly found.[7]

Table 1: Risk factors for the development of COPD in South Africa[7]

Cigarette smoking
Pulmonary tuberculosis
Harmful exposures in mining and industry
Smoking of marijuana
Alpha-1 protease inhibitor deficiency (rare)
Childhood lung infections

An asthma exacerbation may be defined for practical purposes as a progressive (usually) or abrupt worsening of asthma symptoms with increase use of bronchodilators (rescue medication) with progressively decreasing response and/or a decrease in pulmonary function as measured by PEFR or spirometry.[8]

The best strategy for the management of acute exacerbations of asthma is early recognition and intervention, before attacks become severe and potential life-threatening. Detailed investigations into the circumstances surrounding fatal asthma have frequently revealed failures on the part of both patients and clinicians to recognize the severity of the disease and to intensify treatment appropriately.[9]

In the management of an acute exacerbation the basic principles are: [8-9]

1- Assess and classify the severity of the attack.

- On presentation, a brief history and physical examination should be done immediately with simultaneous initiation of treatment.
- The examination should assess for any other medical causes, such as pneumonia, pneumothorax, congestive cardiac failure etc. which often mimic the symptoms of an acute exacerbation of asthma.
- Objective functional assessments such as baseline PEFR and arterial oxygen saturation measurement by pulse oximetry, before initiation of treatment, should be routine.[8]
- PEFR measurement is preferred in emergency units and in primary health care as it is widely available, affordable, easy to use and safe. A baseline PEFR should be done before initiation of treatment, but may not always be possible in patients that are severely distressed.
- Acute exacerbations are classified into mild, moderate or severe based on signs, symptoms and other relevant investigations. (Annexure A)

2- Management of an acute exacerbation is done in a stepwise treatment approach, the mainstay of which is to; (Annexure B)

- prevent worsening
- improve symptoms by relieving airflow obstruction
- treat hypoxia via administration of oxygen either by facemask or nasal cannula with the aim of maintaining saturation above 92%. Patients with COPD need supplemental oxygen to be administered cautiously, starting at 24% by nasal cannula, so as to prevent carbon dioxide narcosis and worsening of their symptoms.

**B*$_2$ *agonists;*
-short acting inhaled B_2 agonists are generally used. B_2 agonists act by stimulating the B_2 receptors in the airway.
-they can be administered either by oxygen driven nebulization (preferred) or by metered dose inhalation via large volume spacer.
-clinical improvement can be assessed against an increase in PEF of >60% of predicted or >60% of previous best.

**Glucocorticoids;*
- Current guidelines recommend the use of glucocorticoids routinely for the treatment of acute asthma.
- It can be administered in oral form, prednisone, at a dose of 0.5mg/kg or intravenously hydrocortisone, at a dose of 100-200mg, if patient is vomiting or unable to swallow.

**Anticholinergics;*
-Inhaled ipratropium bromide is the only anticholinergic agent used in the treatment of acute asthma and is reserved as a second line bronchodilator for severe acute asthma.

**Magnesium sulphate ($MgSO_4$);*
-It is thought that $MgSO_4$ acts by inhibiting smooth muscle contraction, decreasing histamine release from mast cells and inhibits acetylcholine release hence resulting in bronchodilation.
-It is used intravenously as a 1-2g infusion over 20 minutes.

**Aminophylline;*
- Is no longer recommended in primary care setting due to its narrow therapeutic range and side effect profile, cardiac arrhythmias, convulsions, hypotension and coma.

**Miscellaneous treatment;*
- Antibiotics are not routinely recommended and should only be given if there are signs of an infection

3- Assessment of response to treatment;
- Measurement of respiratory rate, pulse rate, PEFR and arterial oxygen saturation should be made at 15-30 minute intervals until a clear response to treatment is noted.[8]
- Measurement of the change in PEFR in response to initial therapy is one of the best ways to assess response to treatment (PEFR at 30 minutes) is the most important predictor of outcome and indication for hospitalization.

3. Aims and objectives of the study

Aim:
The aim of this study was to assess the management of acute bronchospasm and to improve the clinical team's awareness of and adherence to the national treatment guidelines at Mitchell's Plain Community Health Centre (CHC), Cape Town, Western Cape.

Objectives:
1. To assess the current assessment and management of patients, presenting with acute bronchospasm.
2. To plan and implement changes to improve the assessment and management for such patients.
3. To assess if these changes are associated with a measurable improvement in the assessment and management.
4. To make recommendations/ necessary changes to the Department of Health's current audit tool for chronic diseases, with regards to acute bronchospasm, and interventions that may improve the quality of care at the CHC.

4. Study design, methodology, sampling and data analysis

Study Design:

The medical/clinical audit (Quality Improvement Cycle) is a well known tool used for assessing performance against established standards, and implementing appropriate change, as needed, to meet these standards. Continuous quality improvement is an important aspect of clinical governance. It involves both the critical application of research evidence and the formal evaluation of that application in the form of an audit.

The study design will follow the usual steps of the QIC:

- Form a team to perform the audit that includes the key people involved in the topic at the local level.
- Set target standards made up of evidence-based criteria and locally relevant performance levels.
- Collect data to measure these target standards and compare actual performance to desired performance.
- Plan and make changes to improve the quality of care.
- Re-assess performance to determine if the quality of care has improved.

Setting:

Mitchell's Plain CHC operates in the Mitchells Plain Health District of the Metro region under the Department of Health, Western Cape government. Mitchell's Plain is a large area in Cape Town and according to the City of Cape Town 2011 Census, Mitchell's Plain has a population of 310 485, 48.6% of which are male and 51.4% female. The population is predominantly coloured, 91%, with an unemployment rate of 24.1%. 35% of those aged 20 years and older have completed Grade 12 or higher, 76% of the labour force are aged between 15-64 years and are employed. 38% of households have a monthly income of R3200.00 or less, 95% of all households live in formal dwellings.

Due to the influx of migrant workers, people seeking better prospects, a number of informal settlements have sprung up in and around the Mitchell's Plain area; many of them drain to Mitchell's Plain CHC after-hour services.

Mitchell's Plain CHC is staffed by a facility manager, one family physician, 5 medical officers, 2 intern doctors, 4 community service doctors, 4 clinical nurse practitioners, and an array of nursing staff. The CHC has a functional 24-hour casualty unit, 4-5 oxygen tanks are available, with two ECG machines in the facility, there is also a radiographer (who operates one X- ray machine) available during working hours, and after hours on Friday, as well as Saturday and Sunday.

Patients who present with acute bronchospasm are seen in 'trauma'. There is currently an" *Evidence-based local acute asthma guideline of 2007*", (Annexure B), available at Mitchell's Plain CHC. There is a physiotherapist as well as a social worker available on-site, however they are not involved with the management of asthma.
Medications currently available for the treatment of acute bronchospasm include, B_2- agonists (Salbutamol) and anticholinergic (Ipratropium bromide), by inhalation or by aerosol, steroids (oral prednisone or intravenous hydrocortisone), Magnesium sulphate ($MgSO_4$) and antibiotics.

Methods

1. *Create an Audit Team*

   The clinical audit team at Mitchell's Plain CHC consisted of the researcher and family physician in-charge as well as representatives from the pharmacy, nursing staff and reception. Permission was obtained from the facility manager of Mitchell's Plain CHC to conduct the audit. The study was conducted between January 2012 and June 2012 and re-audited January 2013 to June 2013.

2. Create a disease register

The researcher created a disease register for patients with acute bronchospasm by identifying potential patients that were triaged according to the SATS with 'tight chest'; cough; shortness of breath and wheeze. This information was obtained from the trauma register. The diagnosis was then confirmed by examining the medical records. A total of 351 patients were identified for the initial study period. In the initial audit 102 folders were identified following systematic randomisation, however 26 folders had to be excluded i.e. 4 patients did not respond after their initial nebulisation, 13 were for other medical reasons (Annexure D) and 9 folders could not be located (Figure 1). In the re-audit; 249 folders were identified and there were 39 exclusions, i.e.10 did not respond after the initial nebulisation, 16 were for other medical reasons; (Annexure D) and 10 folders could not be located.

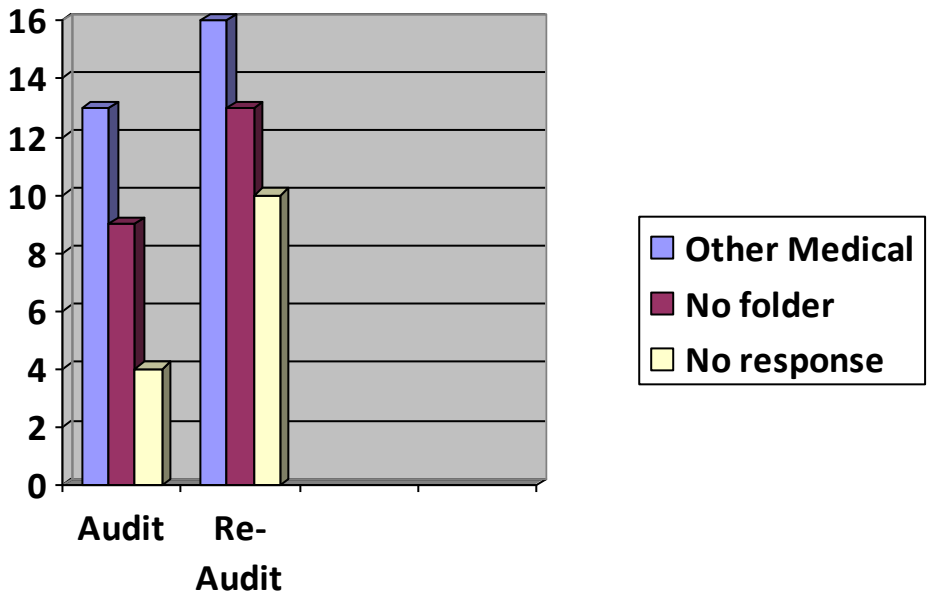

Figure 1: Folders excluded in the initial audit and the re-audit.

3. Formulating target standards

Target standards set were based on the recommended criteria of the national guidelines (Table 2) with input from the audit team. Initially only the criteria were agreed upon and performance levels were only defined after the baseline audit.

Table 2: Criteria for assessing quality of care;

Structural (Present on the day of audit)	Process	Outcome
Functional BP monitor, pulse oximeter, thermometer. Oxygen cylinders Peak Flow meters with disposable mouthpieces Disposable nebulisation units for both adults and paediatrics. Facemasks- various Medication in stock (Inhaled corticosteroids, oral steroids, anticholinergics, MgSo4, MDI's with spacers Functional X-Ray machine Emergency equipment(for intubation)	% of patients with severity of asthma documented *% of patients with recording of*; -respiratory rate -temperature -blood pressure -pulse oximetry *Management: (documentation of)* -facemask O2 -B2 agonist via spacer -B2 agonist via neb -Ipratropium Bromide neb -corticosteroids- oral -corticosteroids-IV *% of patients with the following investigations done;* -PEF before neb -PEF after neb -CXR if indicated -ECG *Other Management*	% of patients requiring referral to secondary/tertiary level Number of acute deaths from *tight chest* in a known asthmatic/COPD patient

4. Data collection

Identification of patients with acute bronchospasm was done retrospectively using the 'trauma" register, and a disease register was created with the criteria; tight chest, wheeze, shortness of breath and cough. Some of the patients listed did not have a diagnosis of acute bronchospasm once the file was examined and were excluded. (Figure 1, Annexure D). The data collection was done by the researcher using a standardised data collection form for each folder examined. (Annexure C)

5. Analyzing the data and comparing results to target standards

An independent consultant was used for analysis of the data. Data from the audit was analysed using simple frequencies/percentages.

6. Planning Change
The results of the analysis were presented to the audit team, as well as to health care providers from the Mitchells Plain CHC. A discussion with input from these key role-players was then conducted as to what changes could realistically be implemented.

7. Implementation of change
Once the team had been briefed, a plan of action was collectively decided upon. A period of approximately six months was given for the changes to be implemented.

8. Reflecting on results
Steps 4-6 were repeated, at the end of six months, and the data obtained at that point was a reflection of current practice after the initial intervention. Analysis assessed any significant changes in the criteria. Results were discussed with the health care providers and further changes planned, such as ensuring that a working saturation probe was always available in the triage room, all criteria were completed as per SATS requirements, PEF was done during routine chronic care and documented in patients clinic card and folders for quick and easy reference on presentation of an acute exacerbation, the audit tool to be added to the routine SATS form. A list of recommendations was compiled, including practical steps to address areas of concern.

Ethical considerations and reporting of results

Ethical approval was obtained from the Health Research Ethics Committee of the University of Cape Town (Reference number, 431/2010). Permission was obtained from the Facility Manager and the Family Physician in-charge of Mitchell's Plain Community Health Centre. A waiver of informed consent was granted for collection of data retrospectively from medical records.

5. Results

The structural criteria were assessed by the researcher walking through the emergency unit and observing the items listed. All the items were available; however a paediatric BP cuff was the only exception.
In the initial audit, a total of 76 patients were identified with acute bronchospasm, the mean age was 47 years and there were 39 (43.8%) females and 50 (56.2%) males. Table 3 shows data from the baseline audit.

Table 3: Data from baseline audit

Process	n	%
% of patients with severity of exacerbation documented in medical records	1	1.3%
% of patients with recording of;		
#respiratory rate	70	92
#temperature	64	84
#Blood pressure	69	90
#pulse oximetry	62	81
#pulse	73	96
Management :		
#facemask o2	6	8
#B2 agonist via spacer	4	5
#B2 agonist via nebuliser	65	85
#Ipratropium bromide	4	5
#corticosteroids-oral	42	55
#corticosteroids-IV	19	25
% of patients with these investigations done;		
#PEF before nebulisation	8	10
#PEF after nebulisation	9	11
#CXR if indicated	9	11
#ECG	0	0
Other treatment modalities;		
#Antibiotics	14	18
#MgSO4	10	13
#Aminophylline	2	3
Outcomes		
Referred	1	1.3
Number of acute deaths from in a known asthmatic/COPD patient	0	0

The initial audit highlighted the following;

The SATS sheet was not completed in accordance with the guidelines, an important parameter; pulse oximetry was only documented in 81% of folders assessed. In the documented initial therapy for acute bronchospasm, oxygen forms the first part of treatment. From the data obtained, it is very difficult to comment on oxygen therapy specifically, as most patients received oxygen driven nebulisations and limitations with poor documentation of oxygen initiation also came into play. PEFR which is important to assess response to

treatment was only performed on 10% of folders assessed, even though this is not part of the SATS document, it forms part of the guidelines. Of the patients managed, 85% received a nebulised short-acting B_2 agonist, and only 5% received Ipratropium Bromide. It is unclear from the documentation if Ipratropium Bromide was used solely as an initial nebulisation, added to Salbutamol during initial nebulisation or as recommended by the guidelines.

In terms of steroid therapy, prednisone and hydrocortisone were administered as initial steroid therapy. Prednisone was administered in 55% of cases. According to the 2013 SAMJ guidelines, oxygen, B_2 agonists and steroids are usually administered concurrently to achieve the most rapid resolution of the attack and prevent relapse[11]. However, according to the 2008 Standard treatment Guidelines, of bronchospasm after the initial nebulisation is not adequately reversed then oral prednisone is administered and thus prednisone might not have been required in all cases described above. Due to poor documentation, it is difficult to comment on why prednisone was not administered in most cases. Furthermore, hydrocortisone therapy was given in 25% of cases, very few cases demonstrated clear documentation for the indication of hydrocortisone and this leaves one to assume that hydrocortisone was administered inappropriately, but in truth one cannot be sure.

Plan and implement changes to improve quality of care for acute bronchospasm;

The initial audit findings were presented to the health care providers at Mitchell's Plain Community Health Centre. At this meeting not all the role/key players were in attendance as;
#trauma is 'managed' by community service doctors that rotate through the facility every 6 months. At the time of the meeting post initial audit, these doctors were no longer part of the staff compliment.
#not all the Clinical Nurse Practitioners that attended the meeting work in the trauma unit and those that do, do not see patients triaged 'orange' according to the SATS, beyond their scope of practise.

#Mitchells Plain CHC is heavily reliant on 'locum' doctors that moonlight in the facility after hours. For many of them it is not their primary function and many of them work in other specialised fields, so they were not in attendance.

The attending staff members that was inclusive of the trauma sister and the family physician, agreed to focus on improving the following key areas;

*the clinical assessment of the patients- use of triage tool and audit tool
*proper documentation of process
*educate the locum doctors with regard to protocol

Changes that were implemented:

- at triage, each patient that presented with a tight chest, cough, wheezing or shortness of breath were triaged according to the SATS and emphasis was placed on pulse oximetry as this was important to the initial management.(Annexure B)
- the audit form was attached to the SATS form to enable the health care provider to follow the step-wise management as set out in the guidelines handed to them and placed on the nebulisation room wall.
- Prior to nebulisation each patient was expected to have PEFR done as well as after nebulisation to assess response to treatment.
- All essential drugs, inhalants and other requirements essential to the management of patients as set out in the protocol were available and in stock.

The changes agreed to, were improvement of the triaging of the patients, by providing trauma nursing staff with triage training according to the SATS guidelines. The trauma manager was tasked with ensuring that all necessary equipment and medication was in stock and in good working order. The researcher was tasked with explaining the audit tool and guidelines to the health care providers. Performance levels for the process criteria related to the clinical assessment were decided upon by those in attendance and are shown in Table 4. Performance levels were not agreed upon for any other criteria.

Implementation was done over a 6 month period and responsibility was taken on by the sister in charge of trauma; the researcher and the doctors working in the trauma unit. A printed guideline was set up in the asthma room and a typed sheet guiding the protocol, (Annexure D) was placed in each medical record of patients that presented with shortness of breath, wheeze, tight chest or cough.

The post intervention audit consisted of 249 folders with 39 exclusions, (Annexure D). The total number of folders that were reviewed was n=210. The mean age was 46 years and there were 131 (55.9%) females and 104 (44.1%) males.

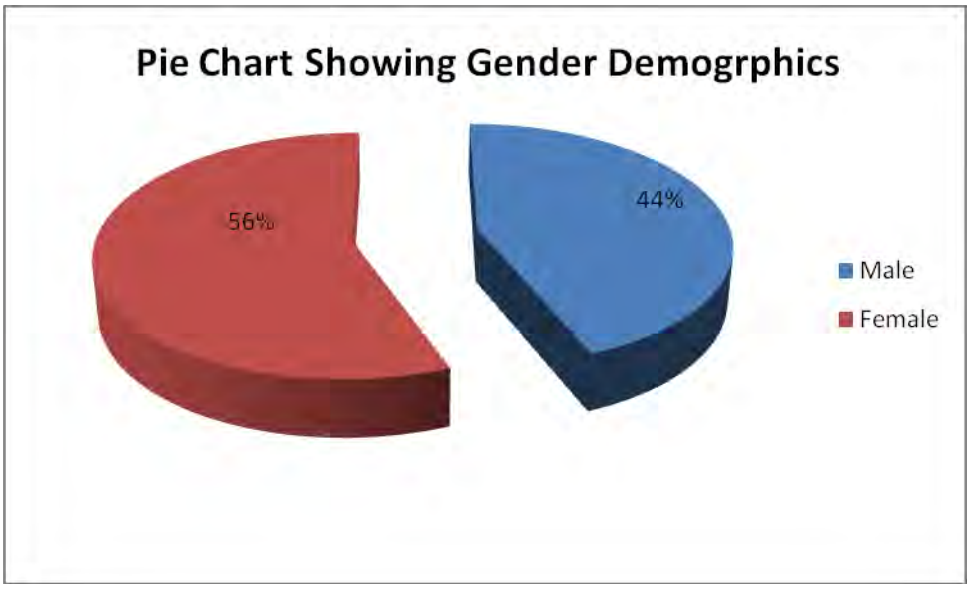

Figure 2: Gender Demographics

Table 4: Results of the re-audit and shows improvement in the clinical assessment criteria:

Process	Target standard	Baseline	Re-audit (n)	%	*p*-value
% of patients with severity of exacerbation documented	*50%*	1%	0	0	-
% of patients with recording of;					
#respiratory rate	80%	79	201	96	0.1774
#pulse	80%	73	204	97	0.0305
#pulse oximetry	80%	70	180	86	0.2014
#temperature	80%	72	183	87	0.0306
#Blood pressure	80%	77	190	90	0.5353
Management;					
#facemask o2	30%	6.74	16	8	1.000
#B2 agonists-via spacer	30%	4.49	15	7	0.0607
-via nebulisation	80%	73.0	191	91	0.1260
#Ipratropium bromide	30%	4.49	8	4	0.7423
#corticosteroids-oral	70%	47.2	104	49	0.7077
Intravenous	30%	21.3	46	22	0.7566
% of patients with the following investigations;					
#PEF before nebulisation	30%	9	18	8	0.0654
#PEF after nebulisation	30%	10	12	6	0.1280
#CCXR if indicated	n/a	-	-	-	
#ECG if indicated	n/a	-	-	-	
Other treatment;					
#Antibiotic		58	2	1	
#MgSO4		42	0	0	
#Aminophylline		8	0	0	
Outcomes					
Referred					
Deaths					

6. Discussion

1. Key findings of the study

The management of acute bronchospasm at Mitchell's Plain CHC was below standard and had room for improvement. The clinical assessment of patients were incomplete despite the SATS tool being available and easily accessible for different age groups, the history taking and examination was inconsistent and severely lacking. Investigations essential to assessing response to treatment were not performed despite it being highlighted at the initial audit.

Background history with regards to smoking and inhaler technique were not assessed and/or corrected if the need arose. Pharmacological management was inconsistent between the different health care providers despite a printed protocol being provided.

As a result of the quality improvement cycle, a number of essential parameters were brought to the fore, the triage system had markedly improved, with patients being colour coded correctly and receiving attention timeously. Most of the target standards were met. Changes are still necessary in providing care, according to the 'Guidelines for the management of acute asthma', as the improvements proposed after the initial audit were not statistically significant and this can be brought about by re-addressing all the stakeholders.

With the high turnover of trauma staff at Mitchell's Plain CHC, the commitment to care of doctors, to improve care, was limited due to the perception that there is inadequate staff to service the population of Mitchell's Plain. Also, ignorance and arrogance may have played a role, a number of locum doctors are registrars or super-specialists in their respective fields and moonlight at Mitchell's Plain CHC and they are resistant to change, in terms of their training and knowledge.

There is also the belief that patients should be held accountable for their own health and well being, because despite adequate health promotion and prevention patients are not willing to be accountable for their own health and well being.

The phenomenon of clinical inertia may also have contributed to the feedback received. Clinical inertia is defined as lack of treatment intensification in a patient, not at evidence based goals for care.[14] It is a major factor that contributes to inadequate chronic disease management in patients with chronic diseases.[14]

Despite the wide promulgation of clinical practise guidelines, it has had limited effect on changing physicians behaviour,[9] and this can be attributed to the following barriers;

#lack of awareness of appropriate guidelines-due to speciality backgrounds of some of the doctors
#lack of familiarity with guidelines, due to lack of training
#lack of agreement- provincial variation in management and pharmacotherapy
#inertia of previous practise; the old adage; 'old habits die hard' and resistance to change to more updated practice.

There may also have been issues pertaining to the non-presence of the researcher. The family medicine rotation at its inception was not very structured, it was not always possible to be present at facility where research was carried out and very often the researcher had to depend on the good grace of fellow colleagues and the Family Physician to ensure that protocol and guidelines were adhered to.

In terms of revising the audit tool for future use, I would recommend;

the inclusion of the PEFR predicted or personal best of the patient should be documented and easily accessible in the medical records for a quick reference and assessment of response to treatment. It should form part of the annual assessment in the chronic disease management.
#Doctors may have recourse to their own clinical judgement when it comes to lifestyle modification as to what intervention is appropriate at the time of the consult, an example would be , in a patient who does not smoke, it is inappropriate to advise them to stop smoking. The inclusion of lifestyle modification criteria as separate entities might result in seemingly sub-standard audit results in that field of assessment.

Medical records did not indicate the severity of the *acute bronchospasm* and the intervention and response to the treatment, so whether Ipratropium bromide, oral or intravenous steroids were given in the correct sequence as indicated in the guideline, is uncertain.
More accurate and detailed documentation is needed, not only for patient management but also for medico-legal purposes.

The outcomes should remain unchanged.

Continuing professional development programs in primary health care should focus on the acute management of bronchospasm and attempt to improve the competency of all health care providers. A separate study could be performed with health care providers, especially new community service doctors and locum doctors with other interests, to assess the adequacy of their knowledge with regard to guidelines and policy pertaining to the management of acute bronchospasm, this was however not a part of this quality improvement cycle.

Family physicians and clinical managers should be made aware of the potential resistance to change experienced by staff when implementing quality improvement plans. This could be attributed to a survival mentality amongst the clinicians and inertia to take on new tasks. Further studies could explore this phenomenon and look at ways of creating an organisational culture more conducive to change and learning. Attention should also be directed to engaging staff in a process of critical reflection and to giving feedback in a way that encourages change.

2. Comparison of findings to the literature:

Clinical practise guidelines are" systematically developed statements to assist practitioners and patients decisions about appropriate health care for specific clinical circumstances.[12]
Their successful implementation should improve quality of care by decreasing inappropriate variation and expediting the application of effective advances to everyday practise.[12].
The current guidelines for the management of acute asthma are easily tailored to a primary health care environment. It is comprehensive, easily adapted to different levels of care and user friendly. Doctors and relevant staff were presented with the proposed guidelines after the

initial audit. The initial audit may have yielded poor results due to the health care providers not having adequate exposure (locum doctors), or lack of relevant experience in utilizing the guidelines.

There were no local published data regarding the quality of care of managing acute bronchospasm in primary health care.

A study regarding the Quality of Asthma care: Western Cape Province, South Africa [3], assessed patients with chronic asthma within all six districts of the Western Cape, and concluded that, the availability of medication and prescription of inhaled steroids is reasonable, yet control is poor. Health workers do not adequately distinguish asthma from COPD, do not assess control by questions or PEF, do not adequately demonstrate or assess the inhaler technique, and have no systematic approach on resources for patient education[3].

Table 5: Results of asthma audit in the Western Cape Province.[3]

Criteria	Target	W Cape Province
Structure		
Consulting rooms with (%):		
A functional PEFR meter	90	53.6
A reference chart for the PEFR	90	59.5
A published asthma guideline	90	78.6
A spacer for demonstration and education	90	55.4
Placebo inhalers for demonstration and education	90	32.7
Printed patient education material	90	57.7
Facilities with (%)		
A member of staff with ongoing responsibility for asthma	90	41.7
Provision for group health education on asthma	90	35.4
Patient education materials in all languages	90	29.2
A height measure	90	97.9
A spacer in the emergency room	90	72.9
A nebuliser in the emergency room	90	100
Oxygen in the emergency room	90	95.8
A PEF meter in the emergency room	90	66.0
Medication in stock on day of audit	90	81.0
Medication in stock over previous month	90	79.5
Process		
Patients with a consistent diagnosis of asthma (%)	95	80.0
Routine visits with an assessment of asthma control (%)	80	11.5
Patients with written self-management plan (%)	80	11.2
Routine visits where the PEFR was recorded (%)	80	23.2
Patients with an assessment of inhaler/spacer technique (%)	95	14.0
Patients with record of smoking status (%)	95	30.7
Controller/reliever ratio	>0.5	0.6

Outcomes		
Patients who are totally/well controlled (%)	70	31.5
Patients who can explain the difference between reliever and controller (%)	80	60.8
Proportion of all visits for asthma emergencies/exacerbations	<10	16.3
Patients who have been hospitalised (%)	<5	17.6

A study conducted to assess the "Perceptions, impact and management of asthma in South Africa: a patient questionnaire study conducted in South Africa; concluded that, the need for asthma control has been under-recognised and poorly attended in South Africa.[4] The Asthma Education Programme of South Africa now has a clear mandate to upgrade education of both doctors and patients.[4] The mere publication of asthma guidelines is now recognised as being insufficient to address this problem.[4]
A similar conclusion can be reached in this study, despite provision of the asthma guideline and the availability of all drugs and equipment, the health care provider's knowledge of the acute management of bronchospasm was not assessed.

In a summary, comparison of 5 current guidelines for asthma management, it was concluded that though asthma guidelines may not be perfect, they are the best vehicle to assist primary care physicians to provide the best possible asthma care.[15]

In the article, Managing Asthma in Primary Care: Putting New Guideline Recommendations into Context[16], evidence continues to show that, for a substantial number of patients, asthma control is inadequate.[16] The article goes on to explain that, "Physicians have a tendency to underestimate the prevalence of asthma symptoms and to overestimate the degree to which their patients' asthma is controlled.[16] Physicians may also have an inadequate understanding of disease aetiology or may not communicate well with patients, and these problems make it difficult to establish a pharmaco-therapeutic regimen that the patient is willing to follow.[16]

The use of guideline based treatment strategies has been shown to favourably affect asthma outcomes, but there has also been increasing recognition that previous guidelines were not adequately followed and did not lead to acceptable levels of asthma control.[16]

3. Limitations of the study design / methods

Limitations of the study related to:

A) Trauma register

- There were numerous entries in the trauma register with patient details but no diagnosis documented, there many cases of bronchospasm may have been missed.
- Illegible handwriting posed a major problem. An example is the inability to distinguish between words such as 'asthma' and 'assault."
- Vague diagnosis was also a problem in some instances. An example would be an entry of 'SOB'(shortness of breath). This was only included if the subsequent management illustrated a 'Neb' (nebulisation). In cases where no management was documented, the folder was excluded.

The above factors could have influenced the number of patients that were illegible for the study.

B) Folders reviewed

- There were a number of folders that were requested but not obtained, 9 in the initial audit group and 11 in the post-audit group, which could have affected the number of cases that were entered into the study.
- There were cases that were initially diagnosed as 'tight chest, cough, wheeze or SOB' but were found on examination not to have acute bronchospasm.
- Temporary folders that were issued, either due to original folders not being found or computers off-line, at the time of presentation were not available when requested.
- Scrutiny of some of the folders demonstrated that admission notes were 'missing' and therefore could not be used in the study.
- Failure of correct and adequate documentation by doctors was a significant limitation.

The researcher was not on-site during the re-audit, due to the nature of the family medicine rotation. This could have influenced staff, in the use of the audit tool and in following the guidelines issued.
Mitchell's Plain CHC is reliant on community service doctors that work on a six monthly rotation and locum doctors that moonlight at Mitchell's Plain after hours, due to these factors the same staff were not present at the presentation of the initial audit findings. This, together with the absence of the researcher could influence the final results.

Although Mitchell's Plain CHC is fairly typical of health centres in the Western Cape there is variation in staffing levels, organisation of care and competency of staff between the various health care centres. The quality of care therefore may not be exactly generalizable to all other health care centres. However the quality of care is unlikely to differ vastly and one can anticipate that the quality of care will be similar at most other health care centres.

7. Conclusion

The current quality of care of acute bronchospasm at Mitchell's Plain CHC is below standard and there is room for improvement. Due to the large staff turnover there were inconsistencies in the management and guidelines were not always followed, this could be due to the way in which the feedback was disseminated. Nevertheless critical reflection led to improvement in the triage system and in some areas of management. Recommendations are made regarding future audits.

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Annexure A

SAMJ, March 2013, Vol 103, No.3, Guideline for the management of acute asthma in adults: 2013 update

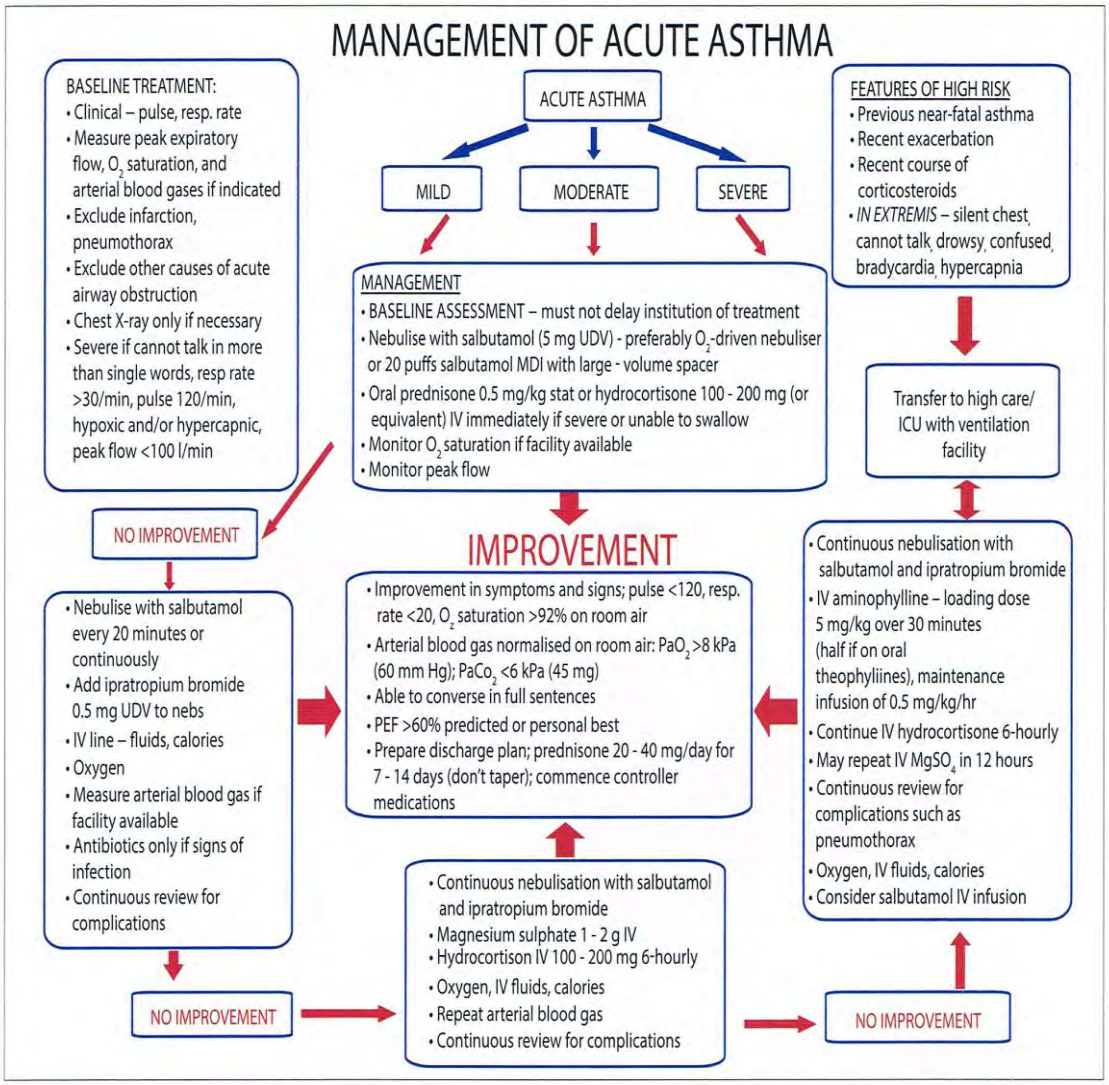
Severity of acute asthma (exacerbations)*

	Mild	Moderate	Severe	Respiratory arrest imminent
Breathless	Walking	Talking	At rest	
	Can lie down	Prefer sitting	Hunched forward	
Talks in	Sentences	Phrases	Words	
Alertness	May be agitated	Usually agitated	Usually agitated	Drowsy or confused
Respiratory rate	Increased	Increased	Often >30/min	Silent chest
Accessory muscles and suprasternal retractions	Usually not	Usually	Usually	Paradoxical thoraco-abdominal movement
Wheeze	Moderate	Loud	Usually loud	Absence of wheeze
Pulse rate (/min)	<100	100 - 120	>120	Bradycardia
Pulsus paradoxus	Absent <10 mmHg	May be present <20 mmHg	20 - 40 mmHg	Absence implies respiratory muscle fatigue
PEF after initial bronchodilator, % predicted or % personal best	>80%	Approx. 60 - 80%	<60% of predicted or personal best (<100 l/min adults) OR Response lasts <2 hours	
PaO_2 (breathing room air)	Normal	>60 mmHg (8 kPa)	<60 mmHg (8 kPa)	
	Test not usually necessary		cyanosis	
AND/OR				
$PaCO_2$	<45 mmHg (6 kPa)	<45 mmHg (6 kPa)	>45 mmHg (6 kPa)	
SaO_2 % (on room air)	>95%	91 - 95%	<90%	

*The presence of several parameters, but not necessarily all, indicates the general classification of the exacerbation.
PaO_2 = arterial blood oxygen partial pressure; $PaCO_2$ = arterial blood carbon dioxide partial pressure; SaO_2% = arterial oxygen saturation.

Annexure B

SAMJ, March 2013, Vol. 103, No.3, Guideline for the management of acute asthma in adults: 2013 update



Algorithm for the management of acute asthma.

Annexure C

Adult Acute Bronchospasm Management Checklist Done = ☑

Patient Name:

Folder #:

DOB: Sex:

1) Patient Triaged ☐

2) Baseline Investigations:
   PEFR ☐ SATS ☐ ABG ☐

3) Initial Management:
   - O_2 Driven Short Acting B_2 Agonist (SABA) Neb ☐ (NOT BAS Neb)
   - Prednisone/Hydrocortisone ☐

4) History & Examination:
   Symptoms ☐ Comorbid Illnesses ☐ Current meds/usage ☐ Smoking ☐

   High risk factors ☐

   High Risk: Recent admission/emergency care for Bronchospasm
   Frequent emergency care attendance Recent use of corticosteroids
   Non-adherence/excessive use of B_2 Agonist MDI

   Examination ☐

   Risks/Complications (Pneumothorax/Lobar Collapse/LRTI) ☐ What?.....

5) Assessment of Response to Rx: (Repeat above baseline investigation/s)
   PEFR ☐ SATS ☐ ABG ☐

6) Step-up Management: (with assessment of response to Rx after 30 mins in each case)
   a) Ipratroprium Bromide ☐
   b) $MgSO_4$ ☐

7) Miscellaneous Management:
- Chest X-ray if indication (?LRTI/Pneumo/Collapse) ☐
- Antibiotics (Augmentin/Amoxil/Doxycycline) if indication (?LRTI +- COPD) ☐

8) Discharge Meds: **Prednisone (7-14 days)** ☐

9) Review of Patient Knowledge/Understanding (Asthma/COPD, adherence, MDI technique, triggers, smoking) ☐

10) Follow-up at Clinic/OPD for reassessment & management ☐

Annexure D

The FREQ Procedure
Group=Audit

Reason_Incomplete_Category	Reason_Incomplete_Explanation	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Indeterminate	Did not respond for review after initial nebulisation	4	15.38	4	15.38
Medical	ANAPHYLAXIS	1	3.85	5	19.23
Medical	ANXIETY ATTACK	1	3.85	6	23.08
Medical	CCF	6	23.08	12	46.15
Medical	LRTI	3	11.54	15	57.69
Medical	PULMONARY OEDEMA	1	3.85	16	61.54
Medical	SPONTANEOUS PNEUMOTHORAX	1	3.85	17	65.38
Non-Medical	Clerical Error	9	34.62	26	100.00

Group=Re-Audit

Reason_Incomplete_Category	Reason_Incomplete_Explanation	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Indeterminate	Did not respond for review after initial nebulisation	10	25.64	10	25.64
Medical	ACUTE MI	1	2.56	11	28.21
Medical	Adrenaline Neb	1	2.56	12	30.77
Medical	CCF	2	5.13	14	35.90
Medical	DRUG ABUSER WITHDRAWAL	1	2.56	15	38.46
Medical	DYSPEPSIA	1	2.56	16	41.03
Medical	PANIC ATTACK	1	2.56	17	43.59
Medical	PERFORATED PEPTIC ULCER	1	2.56	18	46.15
Medical	POST INTERCOSTAL DRAIN	1	2.56	19	48.72
Medical	PTB ON TREATMENT	2	5.13	21	53.85
Medical	PULMONARY EMBOLUS	1	2.56	22	56.41
Medical	PULMONARY OEDEMA	1	2.56	23	58.97
Medical	spontaneous pneumothorax	1	2.56	24	61.54