Assessing the rate and factors associated with unscheduled return visits to a medical paediatric emergency department in a resource-limited setting

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Declaration

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own original work, that I am the authorship owner thereof (unless to the extent explicitly otherwise stated) and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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Date:

ASSESSING THE RATE AND FACTORS ASSOCIATED WITH UNSCHEDULED RETURN VISITS TO A MEDICAL PAEDIATRIC EMERGENCY DEPARTMENT IN A RESOURCE LIMITED SETTING

Abstract

Background:
An unscheduled return visit is defined as a patient presenting to the emergency department (ED) within 72 hours after being discharged, with the same primary complaint. It is commonly assumed that patients who returned shortly after discharge were misdiagnosed or mismanaged. Unscheduled return visits are used as an indicator of quality of care in the ED's. Studies to determine rates of unscheduled return visits in paediatric EDs have been conducted in developed countries with well-resourced health care systems; unexpected return visit rates varied between 2-5.2% in these studies. No such study has been conducted in South Africa.

Objective:
The purpose of this study was to determine the rate of returning patients to a paediatric emergency department within 72 hours after discharge, the factors associated with unexpected return visits and the outcome of these patients. The following factors were hypothesised to be potentially affecting return visits rate: age of patient, nutritional status, HIV status, triage category, predisposing medical condition, time of day of initial visit, income level of parents/caregiver and diagnosis at initial visit. Time of year was also noted to identify seasonal influences on patient returns.

Method:
This was a retrospective case control study. This study was done in a paediatric emergency department within an academic hospital in a resource limited setting, observing the rate of returning paediatric patients within 72 hours of discharge over a period of one year. Cases for the study were obtained from the hospitals data base system (Clinicom). Cases were defined as patients who returned unscheduled to the emergency department within 72 hours of being discharged. Scheduled returning patients, patients participating in research studies and those with surgical conditions were excluded from the study. Controls were selected using a simple random sampling excel tool and were matched for month of presentation only. All patient information was accessed from medical files which are stored on a web database system. All data was then entered onto a Microsoft excel spread sheet and analysed with assistance of a biostatistician.

Results:
The rate of returning patients in our setting was 1.07%. One-hundred fifty-eight patients out of a total of 14827 patients seen in our ED department returned unscheduled. We found that returning patients were of a younger age than controls and with every 1-month increase in age, there was a 0.6% decrease in the odds of returning. Weight-for-age within normal limits was found in >80% in both groups. Being underweight-for-age was associated with an increased risk of returning ($p=0.003$), as was having a predisposing medical condition ($p= 0.027$). There was no difference found in gender, HIV status or income category of parents. Day of week and time of day did not contribute as a factor for returning. The grade of doctor seeing the patient did impact the risk of returning as more patients who returned were seen by inexperienced doctors (interns). Returning patients had a higher percentage of orange vs green triage categories. No specific diagnoses were found to be associated with returning patients. Seven percent of the returning patients were associated with an adverse event.

Conclusion:
The rate of returns in our setting is lower than rates found in countries with well-resourced health care settings. This may be influenced by the short stay unit which is linked to our emergency department and the possibility of patients returning to another health care facility. Poor nutritional status, having a predisposing medical condition, being referred from a general practitioner, having a triage category of orange (vs green) and being seen by an inexperienced doctor, are associated with increased risk of return.

Opsomming

Agtergrond:
'n Ongeskeduleerde terugkoms word gedefinieer as 'n pasiënt wat binne 72 uur na ontslag vanuit die Noodeenheid met dieselfde probleem na die noodeenheid terugkeer. Dit word algemeen aanvaar dat pasiënte wat kort na ontslag terugkeer waarskynlik verkeerd gediagnoseer of verkeerd behandel is. Ongeskeduleerde terugkomste word as n aanwyser van die kwaliteit van sorg in die noodeenheid gebruik. Verskeie studies is in ontwikkelde lande met goed toegeruste gesondheidsorg gedoen om die persentasie ongeskeduleerde terugkomste in pediatriese noodeenhede te bepaal. Die persentasie ongeskeduleerde terugkomste het gewissel tussen 2 – 5.2% in hierdie studies. Daar is nog nie voorheen sulke studies in Suid-Afrika gedoen nie.

Doel:
Die doel van hierdie studie was om die aantal ongeskeduleerde terugkomste binne 72 uur na ontslag vanuit ons pediatriese noodeenheid, die faktore geassosieer met hierdie ongeskeduleerde terugkomste en die uitkomste van hierdie pasiënte te bepaal. Die volgende faktore word gehipotetiseer om die aantal ongeskeduleerde terugkomste te beinvloed: ouderdom van die pasiënt, voedingtoestand van die pasiënt, HIV status, triage (sorterings)-telling, die aanwesigheid van 'n vorige mediese probleem, die tyd van die dag en dag van die week van die oorsponklike besoek, die inkomste van die ouers of die oppasser en die diagnose tydens die oorspronklike besoek. Die tyd van die jaar is ook in ag geneem om die seisoensinvloed op terugkomste te bepaal.

Metode:
Hierdie retrospektiewe gevalskontrole studie is in die pediatriese noodeenheid van 'n akademiese hospitaal in 'n hulpbron-beperkte omgewing uitgevoer. Ondersoek is ingestel na die aantal pediatriese pasiënte wat binne 72 uur na ontslag na die pediatriese noodeenheid terugkeer oor 'n tydperk van een jaar. 'n Geval is beskryf as 'n pasiënt wat binne 72 uur na ontslag ongeskeduleerd terugkeer na die pediatriese noodeenheid. Pasiënte wat geskeduleer was om terug te kom, pasiënte wat deelgeneem het aan navorsingstudies en pasiënte met chirurgiese probleme was van hierdie studie uitgesluit. Die kontrolegroep was ewekansig geselekteer deur 'n eenvoudige Excel ewekansige steekproefprogram wat kontrole pasiënte identifiseer het volgens die maand van presentering. Alle pasiëntinligting is uit die mediese lêers verkry wat op 'n web-gebaseerde databasis gestoor word. Alle pasiëntinligting wat verkry is, is op 'n Microsoft Excel sigblad gelaai en daarna met die hulp van 'n biostatikus geanaliseer.

Resultate
Die persentasie ongeskeduleerde terugkomste in ons pediatriese noodeenheid was 1.07%. Eenhonderd-ag-en-vyftig uit n totaal van 14872 pasiënte het ongeskeduleerd terugekom. Ons bevindinge dui daarop dat pasiënte wat terugkom jonger was as die kontroles en dat met elke maand wat 'n pasiënt ouer raak, was daar 0.6% minder kans dat die pasiënt sou terugkom. Wangevoede pasiënte (p=0.003) en pasiënte met vorige mediese probleme (p=0.027) het 'n hoër risiko van terugkomste gehad. Daar was geen verskil tussen gevalle en kontroles met betrekking tot geslag, HIV status of inkomste van die ouers/oppasser nie. Die dag van die week of tyd van die dag het ook nie 'n verskil aan die ongeskeduleerde terugkomste gemaak nie. Die ervaring van die dokters deur wie die pasiënte gesien is, het wel 'n verskil gemaak aan die terugkomste; pasiënte wat gesien is deur n onervare dokter (intern) het 'n hoër risiko gehad om terug te kom. Met betrekking tot triage/sortering-telling het pasiënte met 'n sortering van oranje meer dikwels teruggekom as pasiënte wat as groen gesorteer was. Daar was geen spesiefieke diagnoses wat met terugkomste geassosieer was nie. Sewe persent van die ongeskeduleerde terugkomste was as gevolg van 'n nadelige gebeurtenis.

Samevatting:
Die hoeveelheid terugkomste in ons omgewing is laer as wat gerapporteer is in ander (ontwikkeldende) lande. Moontlike redes hiervoor is die beskikbaarheid van ‘n oornag waarnemingseenheid wat gekoppel is aan die pediatriese noodeenheid, die beperkte geografiese gebied van die studie en die moontlikheid dat pasiënte terugkeer na ‘n ander gesondheidsfasiliteit. Wanvoeding, die teenwordigheid van n vorige mediese probleem, pasiënte wat verwys is deur ‘n algemene praktisyn, ‘n sorteringstelling van oranje (eerder as groen) en pasiënte wat gesien is deur onervare dokters, was faktore geassosieer met ‘n hoër waarskynlikheid van ongeskeduleerde terugkomste.

Acknowledgement

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Table of Contents

List of Figures

List of Tables

Definitions/glossary of terms

1. **Nutritional status**: Nutritional status in children is based on anthropometric measurements for body weight and stature (height or length). Differences in a child's height or weight from the mean of the reference population can be calculated in terms of the standard deviation (z-score) above or below the mean. In this study we focussed on body weight relative to age and classified them according to Z-scores: overweight for age (+2 SD), underweight (−2 SD) and severely underweight (−3 SD).

2. **South African Triage Score (SATS):** A colour-based triage system that categorises patients into one of four acuity categories based on the presenting complaint, clinical signs and vital signs: The colours prioritise the order of care. Emergency (red), very urgent (orange), urgent (yellow) and non-urgent (green).

3. **Income categories:** Parents of paediatric patients are categorised according to their ability to pay for health services. The category is determined by the income of the family unit. H1 = 0 – R50000 family income per year. H2 = R50000 – R100000 family income per year. H3 = >R100000 family income per year.

4. **Unscheduled return visit**: Patients who returned to the emergency department, unscheduled, within 72 hours following discharge.

5. **Short stay observation unit (SSOU):** A clinical area in the emergency department where patients are cohorted for observational care for a maximum of 2 days.

6. **Predisposing medical problem/Chronic illness:** A medical condition that makes a patient more susceptible to an acute illness or a health problem that has been present for more than 3 months and could last longer than 3 months, which affects the child's normal activities and requires recurrent hospitalisation, home care, and/or extensive medical care. Examples are asthma, cerebral palsy, HIV/AIDS, cystic fibrosis, congenital heart lesions, epilepsy and prematurity.

7. **Clinicom:** A hospital information system which keeps records of patients treated in medical facilities. It also manages outpatient visits and includes an electronic outpatient appointment booking system.

8. **Enterprise content manager (ECM):** A web content management system which converts paper documents (patient notes) to electronic files. All patient information can be accessed via ECM and is password controlled for each clinician.

Chapter 1: Introduction

Background

Unscheduled return visits are the unplanned and unanticipated re-attendance of a patient that had recently attended the emergency department. Patients returning to the emergency department, having been seen and assessed a few days prior, may be due to mistakes or failures of the health system, such as incorrect diagnoses, incorrect management decisions, inadequate discharge counselling or wrong treatment given. Unscheduled returns may also be due to natural progression of disease. Returning patients can lead to overcrowding of the emergency department, an already burdened area in the healthcare system.

Rationale for study

The purpose of this research study was to determine the rate of unscheduled return visits to a paediatric emergency department (PED) within 72 hours after discharge, as well as to investigate the factors associated with unscheduled return visits and the outcome of these patients. Similar studies have been conducted in developed countries with well-resourced healthcare systems. However, I could find no similar study in South Africa, a low to middle-income country with significant resource limitations.

Theory and hypothesis

In this study, the following factors were hypothesised to potentially affect return visits within 72 hours: age of patient, nutritional status (based on weight for age), presence of a predisposing/chronic medical condition, triage category on initial visit, the income category of parents/caregiver, diagnosis at initial visit, time of day (working hours vs. after hours), day of week (weekday vs. weekend day), time of year, and the experience of the doctor assessing the patient.

Setting and methodology

The study was done at Tygerberg Hospital, an academic hospital including a paediatric department in a resource-limited setting. A case control study design was used to investigate unscheduled return visits to the Paediatric Emergency Department (PED) over a period of one year, from January 2014 until December 2014. Patients who returned unscheduled within 72 hours after discharge, were compared to a randomly selected control group of patients that did not return unscheduled. Each factor hypothesized was analysed individually to determine whether it was significant. Results from this study can identify improvements needed in the PED to limit return visits, and in so doing, improve the quality of the PED and other PED's in a similar setting.

Conclusion

In summary, this study was done to determine the rate of unscheduled return visits to a paediatric emergency department within 72 hours, in a setting where resources are limited. The factors associated with these return visits as well as the outcomes of these patient were evaluated.

Chapter 2: Literature review and significance:

An online search was conducted using PubMed, Google Scholar, and the Stellenbosch University library search tool (SUNsearch). The search included key terms such as “return visits”, “unscheduled returns”, “72 hour returns/revisits”, “emergency department/unit” or “paediatric/pediatric emergency department/unit”, “quality performance tools” and “quality control”. Due to paucity of recent studies, articles used were dated from 1990 – 2017. Return rates of paediatric PED were observed from each relevant study. Studies which looked at factors associated with return visits and interventions to limit these returns were focussed on. Majority of studies published were done in high income countries where staffing and resources are not scarce.

Emergency departments are critical in medicine. It is usually the first place where patients are seen and assessed. Based on these assessments, the appropriate management plan is made. This may be resuscitation, admission for treatment, observation or further investigations, or discharge with or without medication. To provide the best possible care for patients, performance and quality of care measures should be in place. The Institute of Medicine’s (IOM) “Crossing the Quality Chasm”-report recommends 6 domains for improvement in quality of health systems: safety, effectiveness, patient centeredness, timeliness, efficiency and equitable care[1]. Individual performance measures may be assigned to more than one domain. Another formulation to measure quality of care is Donabedian’s structure-process-outcome framework[2]. Although many performance measures in adult and paediatric emergency departments focus on condition-specific indicators (for example, in adults: acute myocardial infarction, pneumonia, and asthma[3]; and in children,: asthma, fever, urinary tract infection, otitis media and pneumonia[4]), general measures are needed to focus on the emergency department system as a whole. The Children’s Health Corporation of America focusses on 2 emergency department measures, namely: ‘Left without being seen’ and ‘length of emergency department stay for discharged patients’[4]. A systematic review showed that unscheduled return visits are fourth of the top 25% of highlighted performance measures included in the literature[5]. Other commonly studied performance measures included total length of stay, left without being seen, clinical assessment on arrival, unintended incidents, morbidity/mortality and patient satisfaction[5].

An unscheduled return visit is defined as a patient presenting to the emergency unit within 72 hours after being discharged[6], with the same primary complaint. It is commonly assumed that patients who returned shortly after discharge were misdiagnosed or mismanaged[7].

There are studies that suggest that 72-hour returns are not a good indicator of quality in the emergency department, stating that patients who returned used fewer resources, were not more severely ill and did not have a higher mortality or hospital admission rates than patients without a previous visit[8]. De Piero et al. suggests that other processes should be developed to objectively measure quality of care, as > 90% of return visits in their study were due to progression of illness[9].

Despite conflicting opinions, return visit rates are still used as a benchmarking tool for quality of care provided by emergency departments[10, 11] and is a necessary task to improve and maintain a high standard of service. A study done in New Jersey, USA, showed missed diagnosis rates of 11% in repeat visits compared to only 1.4% in single visits[12].

Previous studies indicate that return visit rates vary between population groups, health insurance vs. public health schemes, and various hospital settings. Return visit rates for emergency departments vary widely between different studies in different countries: In a study from Taiwan a rate of 5.7% in adults[13] and 6.4% in children[14] were reported. The paediatric study was done in urban Taipei and included 6 branches of regional hospitals. In paediatric studies in the USA, rates varied from 2.2 – 3.5%[10,15]. Zimmerman et al. did a study in New Jersey and looked at return visits within 14 days, 72 hours and 48 hours. The return rates were 5.6%, 3% and 2.4% respectively. In Philadelphia, Alessandrini et al. found 48-hour return rates of 2.7% and Ali et al. found a 72-hour return visit rate of 2.8% in a study done in Virginia. In a paediatric tertiary hospital in Toronto Canada a 72-hour return rate of 5% was found[16] and a 72-hour return visit rate of 3% was found in a teaching hospital in Lithuania[17]. A district hospital in the UK had 72-hour return rates of 2%[18].

A rate of <1% has been proposed as acceptable[6], but this is not widely agreed upon and not reported in further studies. A study done in Vancouver, Canada which was published in 2017 involved multiple PEDs covering a large geographical area[19]. The return visit rate of this study was 8.7 %, suggesting that the return visit rate increases when a larger geographical area is studied. However, this study used patients returning within one week, which could also explain the higher return rate.

The above mentioned countries are countries with high income economies. There are limited paediatric studies which are done in countries of low- and middle-income economies.

In previous studies, factors shown to contribute to return visits included younger patients (<6 years)[15,16], patients with a chronic illness[7], patients triaged with a higher acuity status[7,16], patients referred from general practitioners[17], patients seen during working hours[17] and patients seen during the week rather than over weekends[14,17]. Although some studies suggest that improved discharge instructions and education will decrease the return visits[7,20], a prospective study in the US showed that patients still return for repeat evaluation despite adequate education on discharge[10]. Winter months have been shown to increase the number of returning patients in Canada and the US[15,16], but in Taiwan summer months were associated with more returns[14]. Public insurance has been shown to be a risk factor in return visits[7,12]. Language has been postulated to result in return visits. A study in the US has shown that Spanish-speaking patients were more likely to return compared to English-speaking patients[21]. No data were found on nutritional status or HIV status as risk factors for return visits.

Reasons for return visits in paediatric patients have been attributed mainly to progression of disease, and to a lesser extent, poor parent/patient education on discharge, misdiagnosis and incorrect treatment by the attending doctor[9,15,16]. Goldman et al. found that patients receiving a follow-up call after discharge were more likely to return compared to those that did not receive a follow-up call[22]. Returning patients can cause overcrowding of the emergency department (an already overburdened area in medicine), which could increase the waiting time for all patients in the ED[23].

It is clear from previous studies that return rates vary considerably, and factors associated with returning patients differ for each health system and each country. As this had not yet been studied in South Africa, this study was important to review our return rates and factors that are associated with returning patients in our setting. If these are related to modifiable factors in the emergency department, we can conclude that return visits are a necessary quality of care indicator and adjustments to improve the emergency department can be made.

Chapter 3: Methods

Setting:

Tygerberg Hospital (TBH) is an academic referral hospital in Cape Town, Western Cape Province of South Africa. TBH's Paediatric department serves approximately a third to half of the province's children at tertiary level; it cares for about 250000 children in its outpatient department annually and admits around 16000 sick children per year. Approximately 15000 children are seen in the PED per year. Attached to the PED is a short-stay observation unit (SSOU) where patients can be observed from 6 – 48 hours before deciding if they are stable to be discharged or if they require admission to a paediatric ward. The SSOU admits about 4500 patients annually.

Study design:

A retrospective case control study was done for the period of 1 January 2014 through 31 December 2014. The outcome (cases) were the unscheduled returning patients within 72 hours. The controls were randomly selected patients matched to month of presentation who did not return. Admission and discharge dates of all patients attending the PED during the study period were accessed through Clinicom, an electronic database of hospital patients. An excel calculation was used to identify those patients who were seen in the PED, discharged and returned within 72 hours.

All children identified as patients who returned within 72 hours after discharge were retrieved, their files analysed and data collected.

Study population:

We included all patients seen in the PED with medical complaints. Surgical patients were not included in the study as these patients are seen by a separate group of doctors and not by the doctors working in the PED. The PED does not see children with acute trauma. The study included patients who were seen in the PED and discharged as well as patients who were seen and admitted to the SSOU (for less than 2 days) before discharge.

Patients who were scheduled to return to hospital were not included in this study (this included patients who were participating in studies). Patients who were seen and admitted to a paediatric ward on initial presentation were also excluded from the study.

Data collection:

Patient notes were obtained from ECM (Enterprise Content Manager), an online database which houses all patient clinical notes (scanned patient file data). ECM is easily accessible to clinicians and is password controlled for each individual clinician.

The following variables from the unscheduled returning patients (cases) as well as the controls were entered onto a data capture form. (Appendix 1)

1. Patient demographics – age, gender, weight, human immunodeficiency virus (HIV) status, predisposing/chronic illness and income status of parent or caregiver.

2. Details of initial visit – time, day and month of presentation, referral source, triage category, grade of doctor attending to patient, whether or not the patient was discussed with a more senior doctor, whether or not the patient was admitted to the short stay ward and the discharge diagnosis/symptom. An inexperienced doctor was regarded as an intern (first two years after qualification as medical doctor) while more experienced doctors included medical officers, paediatric registrars and consultants. If a patient was discussed with a more senior doctor, the more senior doctor was considered a doctor graded higher than the doctor who initially saw the patient.

3. The outcome of patients who returned after 72 hours. The day of week, time of day, triage category, whether they were admitted or discharged and if there was a negative health consequence related to the return were documented. Reasons for return (if included in the patient's notes) were reviewed.

Data/statistical analysis:
All data were entered on an excel spreadsheet for further analysis. Patient identifiers were removed and this spreadsheet was kept on a personal computer which was password protected.

Continuous variables were checked for normality of distribution using standard skewness statistics and graphical display. If variables were found to be not normally distributed, non-parametric tests were used to compare groups and medians and inter-quartile ranges were used to summarise these variables. Cases and controls were compared using Pearson's chi square tests for categorical variables. Contingency tables were made and 2 sided asymptotic significance was calculated for each variable. Mann Whitney tests were used to compare medians between cases and controls for non-normally distributed variables such as age (months). Multivariable logistic regression was conducted using odds ratios to better analyse variables associated with return visits. The level of statistical significance was set at p=0.05.

Ethics considerations:
The study was approved by the Health Research Ethics Committee of Stellenbosch University (S15/05/111).

Chapter 4: Results

A total number of 14827 patients attended the PED during the study period. Three hundred and fifty nine patients were identified as patients who returned within 72 hours. Of the 359 patients who returned, 158 cases were identified as patients who returned unscheduled to the PED within 72 hours. The remaining 201 patients were excluded from the study as these were patients who were scheduled to return, patients participating in research studies and patients with surgical or trauma related complaints. An equal number of controls were then randomly selected, matched to month of presentation.

Return rates were calculated by dividing 158 by the sample size 14827 with a confidence interval of 95%. The return rate was calculated as 1.07 % (95% CI 0.91 – 1.25).

April was the busiest month of 2014 in our PED with a total of 1417 patients seen (Figure 1). Most of the returning patients also occurred during the month of April (Figure 2).

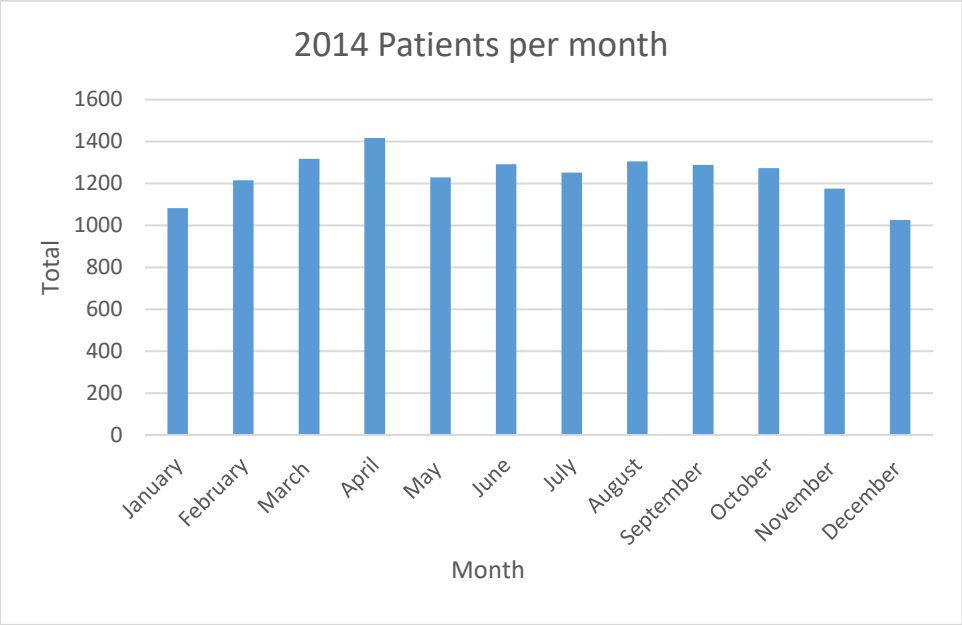

Figure 1: Total number of patient visits to the PED per month in 2014.

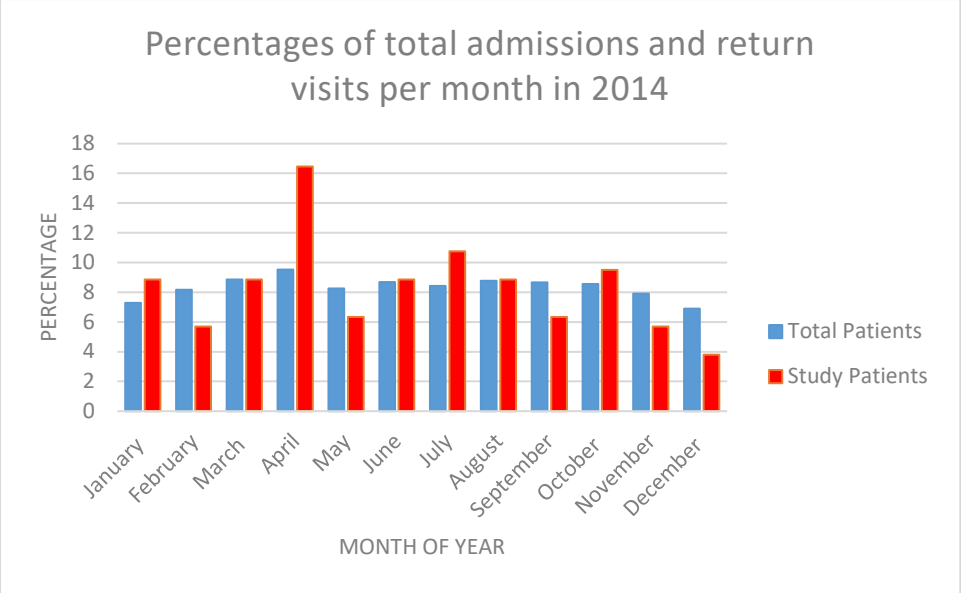

Figure 2: The percentages of the total number of patients seen per month and of return visits per month in 2014.

The average percentage of the returning patients per total patients per month was 1%. In April, the busiest month, the percentage returning was 1.8 %. From this we can deduce that there are more returning patients in the busier months, relative to the average number of patients returning per month.

The median age of the cases was 13.5 months, (IQR 4 – 30 months), while the median age of the controls was 31.5 months, (IQR 8 – 63 months). Return visits occurred more frequently in the months of April, July and October with 16.5%, 10.8% and 9.5% of all return visits respectively (Figure 2). Of the patients that returned, 88 (55.7%) were male and 70 (44.3%) were female. HIV status was only documented in 67 (42.4%), of whom 1 (0.6%) was positive and 66 (42%) negative. Of the cases, 135 (85.4%) had a normal weight-for-age, whereas 145 (91.8%) controls had a normal weight-for-age. The majority of the controls and cases came from households of lower income level (table 1).

Table 1: Comparison between cases and controls at initial visit

Variable	Cases	Controls	p – value
Age:			0.079
Median (IQR)	13.5 (4 - 30)	21.5 (8-63)	
< 1 year n (%)	75 (47)	59 (37.3)	
1 - 5 years	62 (39.2)	59 (37.3)	
5 - 12 years	19 (12)	39 (25)	
> 12 years	2 (1.3)	1 (0.6)	
Gender:			0.31
Male	88 (55.7)	78 (49.4)	
Female	70 (44.3)	80 (50.6)	
HIV status:			0.28
Unexposed	56 (35)	66 (42)	
Positive	1 (0.6)	2 (1.3)	
Exposed but negative	10 (6.3)	15 (9.5)	

Variable	Cases	Controls	p – value
Not documented	91 (57.6)	75 (47.5)	
Nutrition:			0.003
Normal (Weight-for-Age)	135 (85.4)	145 (91.8)	
Malnutrition	20 (12.7)	5 (3.2)	
Unknown	3 (1.9)	8 (5)	
Income category:			0.7
H1	130 (82.3)	133 (84.2)	
H2	20 (12.7)	18 (11.4)	
H3	8 (5)	6 (3.8)	
Foreigner	0	1 (0.6)	
Predisposing condition/Chronic illness:			0.027
Present	30 (19)	16 (10.1)	
Absent	128 (81)	141 (89.2)	
Unknown	0	1 (0.6)	
Day of initial visit:			0.073
Weekday	125 (79.2)	137 (86.8)	
Weekend	33 (20.9)	21 (13.3)	
Time of initial visit:			0.15
08h00 - 15h59	81 (51.3)	97 (61.4)	
16h00 - 07:59	68 (43)	60 (40)	
Unknown	9 (5.7)	1 (0.6)	
Referral source:			0.003
Clinic	81 (51.3)	112 (70.9)	
General practitioner	25 (15.8)	15 (9.5)	
Other (home/hospital)	20 (12.7)	16 (10.1)	
Unknown	32 (20.2)	15 (9.5)	
Triage category:			0.002
Green	60 (38)	90 (57)	
Yellow	42 (26.6)	36 (22.8)	
Orange	47 (29.7)	27 (14.1)	
Red	1 (0.6)	5 (3.2)	
Unknown	8 (5)	0	
Grade of doctor:			0.03
Inexperienced	65 (41.1)	45 (28.5)	
Experienced	77 (48.7)	100 (63.3)	
Unknown	16 (10.1)	13 (8.2)	
Discussed with senior:			0.09
Yes	52 (32.9)	37 (23.4)	
Not documented	73 (46.2)	88 (55.7)	
Not applicable	33 (20.9)	33 (20.9)	
Short stay ward:			0.9
Admitted	45 (28.5)	44 (27.8)	
Discharged	113 (71.5)	114 (72.2)	
Diagnosis:			0.068
Upper respiratory tract infection	36 (22.8)	31 (19.6)	
Lower respiratory tract infection	37 (23.4)	27 (17.1)	
Acute gastroenteritis	26 (16.5)	18 (11.4)	
Other	59 (37.3)	82 (51.9)	

In this study 3.2% of cases were neonates (less than 1 month of age). Majority of the cases were between 1 month – 1 year of age (43.7%) and between 1 year – 5 years of age (39.2%). Controls similarly had 3.2% of neonates. One month – 1 year and 1 year – 5 years were also of the majority in

the controls with 32.9% and 38% respectively. There was no statistical significant difference in age between cases and controls. However with logistic regression analysis, we found that every one month increase in age resulted in a 0.6% decrease in risk of returning, p=0.08. (table 2).

The majority of the cases were male, while females were marginally more than males in the controls.

There was no significant difference with regards to HIV status between the cases and controls. It was observed however, that the HIV status was not documented in the majority of the cases (57.6%) and almost half of the controls (47.5%).

There was statistically significant (p=0.018) more underweight for age children in the cases when compared to the controls. The percentage of malnourished children in the cases were: moderately underweight for age – 5.7%, severely underweight for age – 3.8% and obese – 3.2%. In the controls these values were 1.9%, 0.6% and 0.6% respectively. Eight of the controls and 3 of the cases did not have any weight recorded.

There was no significant difference in the income category of the households between the cases and controls.

Patients with a predisposing condition/chronic illness were more likely to return than patients without a chronic illness (p = 0.027). A third of the patients in our study with a predisposing medical illness were ex-premature infants. Chronic conditions encountered in this study included cerebral palsy, epilepsy, Sturge-Weber syndrome, hydrocephalus, leukoencephalopathy, chronic lung disease, asthma, acyanotic heart lesions, cardiac arrhythmias, HIV infection, eczema, juvenile idiopathic arthritis, structural renal abnormalities, chronic constipation and rare genetic syndromes.

Even though more cases were seen on the weekends when compared to controls, this result was not statistically significant (p=0.5). A higher percentage (43%) of cases were seen during after-hours when compared to the controls (38%).

More cases were referred from general practitioners (GPs) compared to controls, which had more referrals from primary health care (PHC) clinics. This difference was statistically significant (p=0.003).

When comparing the triage categories of the two groups, the controls had majority green triage categories (57%). In the cases, the combined yellow, orange and red categories (56.9%) were greater than the green triage category (38%). The difference between the cases and controls was statistically significant (p=0.002). With multivariable analysis and after adjusting for confounding, it was found that orange vs green triage category was associated with an almost 2 fold increase in risk of returning (p=0.05). See Table 2.

There was a significant difference found between the grade of doctor which examined and treated the patient between the cases and controls (p=0.03). In the cases, majority were seen by interns (41.1%), whereas in the controls majority were seen by medical officers (39.2%). Other doctors seeing patients in the PED include paediatric registrars, consultants and emergency medicine registrars. These were in the minority.

Fifty two (32.9%) of the cases were discussed with a senior doctor compared to only 37 (23.4%) in controls. This was however not statistically significant. In the majority of the files of both the cases and control, it was not documented whether the patient had been discussed or not.

Whether or not patients were admitted to the short stay unit, did not influence the return of patients.

Table 2: Logistic regression analysis of risk factors for return visit

		Sig.	OR	95% C.I.for OR	
				Lower	Upper
Step 4[a]	Age in months	.080	.994	.987	1.001
	Nutritional_categorised	.028			
	Nutritional_categorised (abnormal)	.016	3.704	1.273	10.774
	Nutritional categorised (missing)	.294	.466	.112	1.943
	Triage category	.167			
	Triage category (yellow vs green)	.181	1.511	.825	2.767
	Triage category (orange vs green)	.055	1.902	.987	3.666
	Triage category (red vs green)	.214	.243	.026	2.260
	Triage category (missing)	.999	1579819265.062	.000	.
	Predisposing/Chronic illness	.198			
	Predisposing/Chronic illness (present vs absent)	.072	1.997	.941	4.239
	Predisposing/Chronic illness (missing)	1.000	.000	.000	.
	Doctor	.099			
	Doctor (inexperienced vs experienced)	.032	1.780	1.052	3.011
	Doctor (missing)	.647	1.248	.484	3.223
	Referral source_categorised	.057			
	Referral source_categorised(GP vs clinic)	.024	2.371	1.118	5.032
	Referral source_categorised(Other vs clinic)	.243	1.597	.728	3.501
	Referral source_categorised(missing)	.072	1.981	.940	4.176
	Constant	.010	.491		

After adjustment for confounding, age was associated with returning (every one month increase in age resulted in a 0.6% decrease in risk of returning, p=0.08). Abnormal vs normal nutritional status was associated with a 3.7 times higher risk of returning (p=0.016). Triage category - orange vs green category resulted in an almost 2 fold increase in risk of returning (p=0.055). Presence of a predisposing/chronic illness (OR =2, p=0.072), having an inexperienced doctor (OR = 1.78, p=0.032), and being referred by a GP rather than a clinic (OR = 2.37, p=0.024) were all independently associated with returning.

In both the controls and the cases, the most common illnesses which patients presented with were upper respiratory tract infections, lower respiratory tract infections and acute gastroenteritis (see figure 3). No statistical difference was noted between the two groups with regard to discharge diagnosis. Other complaints included rash, seizures, headache, vomiting, constipation, other gastrointestinal complaints, failure to thrive, accidental poisoning, urinary tract infection, hepatitis, infection other, musculoskeletal inflammation, ophthalmological complaint, cardiac lesion, lymphadenopathy, neonatal specific problem and miscellaneous paediatric problem.

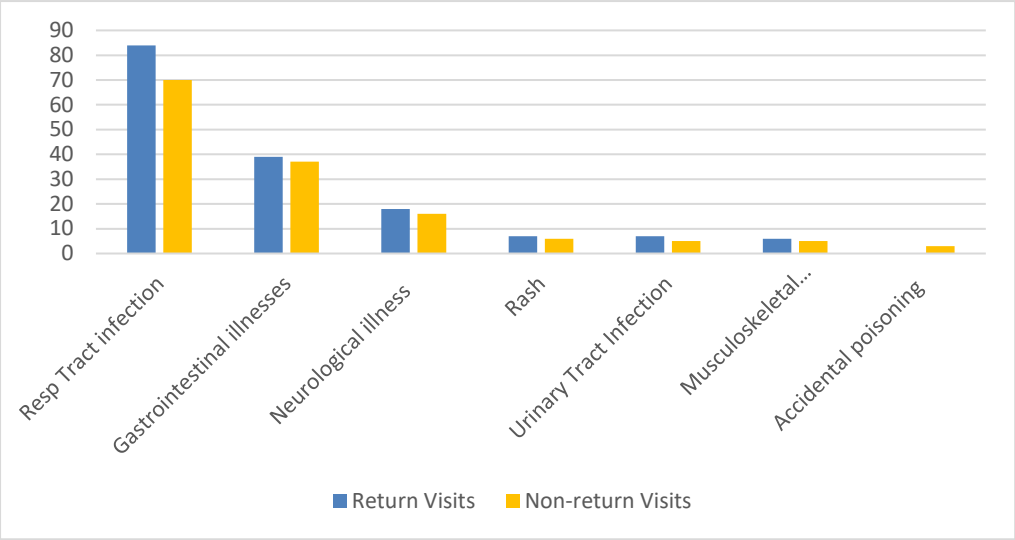

Figure 3: Discharge diagnosis of return and non-return visits

Reviewing the outcomes of those who returned, the majority returned on weekdays (79%) as opposed to weekends; 52.5 % returned before 4pm. Of the return visits, 60.8% came directly from home and 18.4% were referred from the local clinic.

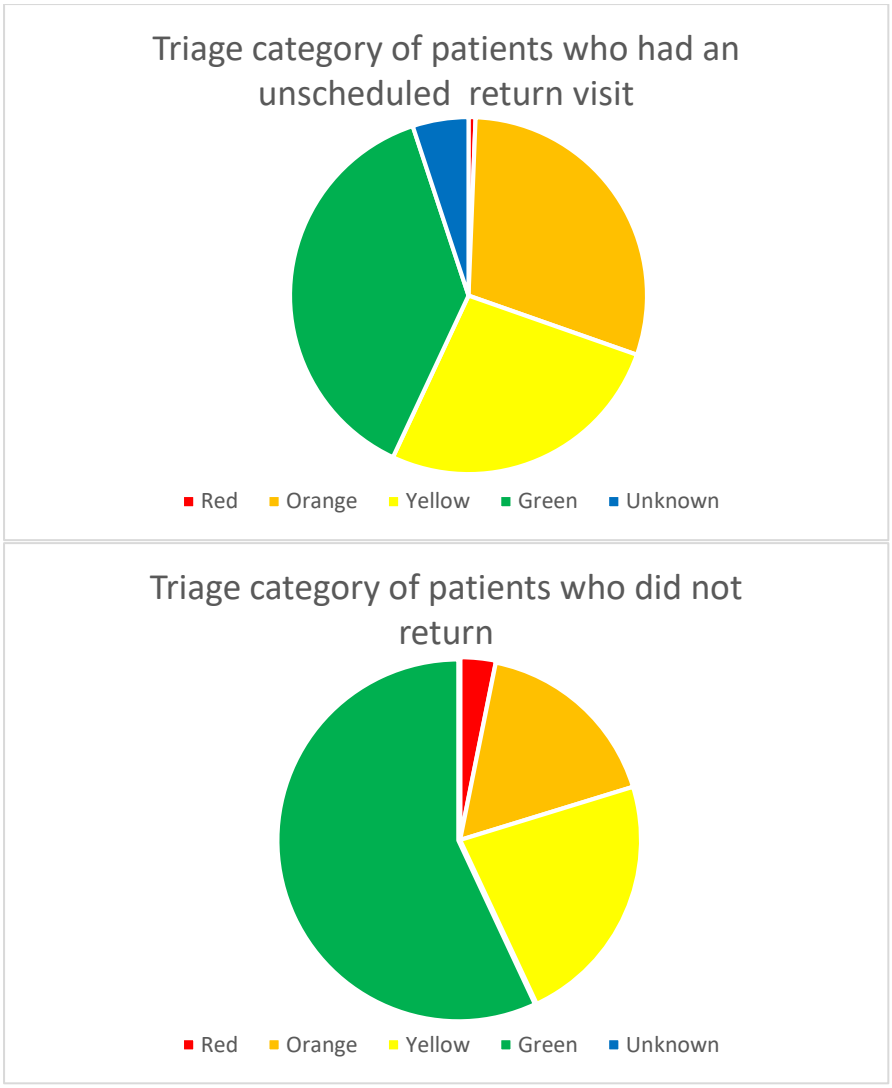

Figure 4: Triage category of the initial visits of patients with an unscheduled return visit (top) compared to triage category of control group without return visits (bottom)

The triage categories on return of the cases were 40.5% green, 24.1% yellow, 30.4% orange and 3.2% red.

Half of those that returned, returned because of disease progression, 37 % returned because they saw no improvement in the condition of the patient, 8.2% had developed new symptoms unrelated to initial visit and only 1 patient (0.6%) was misdiagnosed.

Seven percent of returning patients experienced a negative health consequence on their return. This included a prolonged hospital stay of more than 7 days, ICU admission, circulatory shock, electrolyte imbalances, apnoea or the need for surgical intervention. Of the 11 that experienced a negative health consequence, 8 (73%) was under the age of 1 year, 8 (73%) were triaged orange at initial visit and 3 (27%) were triaged yellow. Seven (63%) were seen by an intern. All except 1 (who was underweight for age) had a normal weight for age.

Chapter 5: Discussion

Return visits occur in all emergency departments. It may be an indication of poor patient management and may result in adverse events.

The rate of return visits are used as a measure of the quality of an emergency department. Thus every emergency department should aim to have a low return rate. One would assume that because our study was done in a low- to middle-income country in a setting with limited resources, our return rates would be higher than those documented in the literature. The 72-hour return rate in this study was, however, only 1.07%, which is lower than other reports. Possible reasons for a lower return rate include:

1) The size of the study population and geographical area. This study was done in a single tertiary hospital in the Western Cape. Studies have shown that if the geographical area of the study population is increased, return visits also increase[19].

2) The short-stay observation unit (SSOU) linked to the PED. A short stay unit helps doctors manage patients who need only a brief period of admission. A SSOU also reassures the parent that their child is in a safe place, should anything go wrong. SSOU have been shown to decrease inpatient admissions[24,25] (thus decreasing medical costs) as well as decrease the rate of unscheduled returns within 72 hours[26].

3) Scheduled follow up. Many patients seen, especially those in whom the diagnosis is uncertain, are asked to return within a few days. These scheduled follow-ups decrease the rate of unscheduled return visits as many patients may wait for the return date given rather than presenting earlier. Further studies are necessary to determine the rate of scheduled return visits and how this impacts the PED.

Studies have shown that younger children (< 6 years) are more likely to return[14,15,16]. A possible reason is the inability of young children to communicate how they are feeling, resulting in parents erring on the side of caution and bring them back. In our study, we did not find age to be a significant factor. However with logistic regression analysis and adjusting for confounding we found that every one month increase in age, resulted in a 0.6% decrease in risk of returning (p=0.079).

Given the high prevalence of HIV in South Africa, the HIV positivity rate of returning patients was surprisingly low. South Africa has the largest HIV treatment programme in the world[27]. Ninety five percent of pregnant women living with HIV have accessed antiretroviral (ARV) medication to prevent vertical transmission to their babies. In children already infected, ARVs result in better immune function and decreased childhood and opportunistic infections. These factors may be the reason why HIV status does not influence the return rate. Another factor influencing the HIV status is that many patients seen in the PED, did not have a documented HIV status, thereby limiting the validity of this result. It also indicates a missed opportunity for early diagnosis and treatment of HIV.

To my knowledge, this is the first study to evaluate nutrition as a factor associated with returning patients. Poor nutritional status has been shown to be associated with increased infection, hospitalization and increased length of stay in hospital[28]. In this study, we found that children with a lower weight for age have a greater probability of returning (p=0.016). Weight for age, height for age, weight for height and mid-upper-arm-circumference (MUAC) are the parameters used to assess nutrition in children. Unfortunately this could not be evaluated in this study as heights and MUAC

are not always documented in patient notes. Further studies are needed to better assess nutrition of patients attending the PED and those who return.

Previous studies reported that having a chronic illness increased the probability of returning to the emergency department[7]. Asthma was found to be the most common chronic illness in a study done in Philadelphia, with seizures in epilepsy being the 2nd most common. The present study showed that having a pre-existing health condition is associated with an unscheduled return visit (p=0.027) with prematurity and neurological illnesses being the most common.

The hospital in which this study was done is a state funded hospital. It offers free health care to those who are unable to afford private health care. The majority of the patients in both the cases and controls were of a lower income category. There was no difference found in income category between those who returned and those who did not. Patients who can afford private medical aid, will present either to a general practitioner or private funded hospital's emergency department. In the literature, in well-resourced countries, it is found that patients with state funded health (for example: medicare or medicaid) are more likely to return to the PED than patients with private health insurance[7,8]. Reasons given for this include the use of the ED as a primary care facility due to financial limitations or lack of physical access to other sources of care.

A study done in Taiwan had more return visits in the summer months[14], yet a study done in Philadelphia had increased return visits in winter months[15]. In the present study, the cases were matched to controls by month of presentation. It therefore cannot be determined if the month of presentation is a risk factor to return unscheduled. No difference was found in the day of week vs. weekend when comparing cases to controls. Other studies found that patients seen during the week days were more likely to return than patients seen during weekends[17]. Sung et al showed that patients seen after hours, had lower odds of returning[14]. When comparing cases and controls with regards to the time patients were seen, we found no significant difference if they were seen after hours compared to normal working hours.

The majority of the cases and controls were referred from PHC facilities. These are usually patients that lack private health care and rely on government funded health care. Patients and families who do have private health care present to GPs at initial presentation and should they require emergency treatment beyond the scope of the practice, the patients are referred to a PED in the private sector. There are patients without private health care who present to the GP initially and should they require further management, they are referred to the public hospitals PED. S. Burokiene et al. found that patients referred from GPs were associated with an increased return rate[17]. When comparing patients being referred from a GP vs. PHC facility, we too found that being referred from a GP was associated with an increased return visit. A possible reason for this could be that some patients who attend GP's are in a better socio-economical state. They have the means to return to hospital should the child not improve and therefore are sent home from the PED. Another reason may be that patients who presented to the clinic initially, return to the clinic (which may be closer their place of residence) after being discharged from the PED.

Previous studies have shown that patients presenting with a more acute/urgent triage category are associated with higher odds of returning[7,16], while others showed no difference[15]. In our study we found a significant difference in the triage category of those returning and compared to those who did not return (p=0.02). Patients with a higher acuity status were more likely to return within 72

hours. With multivariable analysis and after adjusting for confounding, it was found that orange vs green triage category was associated with an almost 2 fold increase in risk of returning (p=0.05). This result is what we would expect. Patients with a higher triage category are more ill than those with a lower triage category and may take longer to get better.

We hypothesized that the more inexperienced the doctor attending to a patient, the more likely it would be that the patient would have an unscheduled return visit. In the PED during the daytime there are usually 2 interns, 2 medical officers, 2 paediatric registrars, 1 emergency medicine registrar and 1 consultant. A large percentage (38%) of the patients who returned were seen initially by interns working in the PED. Interns work in the PED for a total duration of one month during their 4 month rotation in paediatrics. They are the most junior and inexperienced doctors attending to patients in the PED. In this study we found the level of experience of the doctor attending to a patient to be a significant risk factor to a return visit (p=0.03). This result is similar to a previous study[29] where the majority of patients who returned, were seen by a less experienced doctor on initial visit. Although there were more experienced doctors present in the PED, it is unknown whether these cases were discussed with them. We found that only 33% of the patients that returned had been discussed with senior doctors on initial visit while in 46 % of those that returned, it was not documented whether it had been discussed or not. The remainder (21%) were patients who were admitted overnight to the SSOU and seen by the consultant the next day. In the PED the more ill patients are usually seen by registrars during the day. More time is spent on treating a more acutely ill patient, which may be a reason why registrars see fewer patients. After hours, the PED is staffed by an intern and medical officer, with a paediatric registrar that covers both the paediatric wards and the PED. Therefore, most of the patients seen after hours will be seen by very junior doctors. Our study confirmed our hypothesis that being seen by a more senior doctor (registrar / consultant) lowered your chances of returning. Whether an inexperienced doctor discussed the case with a more senior doctor, could not be adequately determined given the lack of documentation in the notes.

Short stay observation units are an ideal place to observe children who are acutely ill on presentation but are expected to improve rapidly after treatment and are likely to be able to be discharged within 24 hours. It has been shown to reduce impatient hospitalisation and is cost effective[26]. We found that there was essentially an equal number of patients admitted to the short stay unit in the controls (n=44) and the cases (n=45), thus being admitted to SSOU did not increase nor decrease return visits. More studies in other settings are necessary to better evaluate the effect of SSOU on returning patients.

Half of the patients returned within 72 hours because the parents felt that the disease process was worsening or there were new symptoms which developed, still related to the initial presenting complaint. Thirty-seven percent returned because they saw no improvement in their child's condition. Persistence and worsening of symptoms are documented in previous studies as the main reason for return visits. A study done by ME Samuel-Karlow et al showed that a difference in language (between patient and doctor) can result in increased return visits[21]. This would be important in our setting as South Africa is a culturally diverse country with 11 official languages. We frequently encounter language barriers in our PED. This could not be assessed in our study, as 'language' is not always captured in the admission/triage note. Further prospective studies can be done in the future to determine the effect of language on return visits in our setting.

Our misdiagnosis rate among unscheduled return visits was low, emphasizing that which was found in previous studies, namely that progression of disease was the main reason for patients to return.

Of the patients who returned, the most common illnesses experienced included respiratory tract infections and acute gastroenteritis. This result is much the same to other studies[14]. Non returning patients had a similar disease profile. Pneumonia and diarrhoea are among the top 5 causes of under 5 child mortality in developing countries. This highlights the need for careful consideration before discharging patients with these illnesses.

Eleven (7%) of those that returned had experienced negative health consequence on their return visit. Seven of these had complications resulting from a gastrointestinal tract infection. Two had respiratory tract infections. As majority of the patients seen in our PED are from poor socioeconomic conditions, environmental services including water supply, sanitation and hygiene (in particular hand-washing with soap) are a vital underlying determinant to childhood diarrhoea. Every opportunity should be used to educate the public on primary prevention, basic treatment of diarrhoea at home, when to recognise danger signs and when to seek help. There were nil deaths associated with return visits in our study. One patient was admitted to ICU with apnoea secondary to a lower respiratory tract infection.

Studies have been done in an attempt to decrease return visits. A follow up phone call has shown to increase return visits[22] and protocolised discharge explanations with written discharge instructions have been shown to decrease return visits[30].

In our study we did not look at return visits from a patient's perspective as was done in other studies[31]. Given the diversity of our population, it may important to evaluate reasons and conditions around why patients return to the PED.

Strengths and limitations

This is the first study done in South Africa, looking at return visits in a paediatric emergency department in a resource-limited environment. We can now compare these results to studies done in first world countries as well as to studies done in resource limited countries. Numerous categories were included to assess the factors associated with return visits. These categories were relevant to a resource-limited setting, for example: weight for age, HIV status and income category of caregiver. The case-control study design used in this study, is a more powerful study design in determining associated factors related to an outcome.

Although this study is a useful evaluation of our PED, it was done in a single PED over a one year period and may not be generalizable to other regions. A retrospective study design was used, which in itself has limitations – inadequate data capturing of patients and incomplete documentation of medical notes. The interpretation of the reason for return was based on what was documented in the notes and not obtained directly from the patient. This subjective assessment leaves room for error. Patients may have been asked to return and this may not have been documented in the notes. Patients may have returned to other medical facilities (GP's, PHC clinics or secondary hospitals) and therefore "missed" as return visit.
The return rate was calculated by dividing the number of returns by the total number of patients seen in the PED. Surgical patients were excluded from the study population but were not excluded from the total number of patients seen. However, ward statistics show that the average number of

surgical patients is about 40 per month, therefore this was not felt to significantly impact the calculated rate.

Chapter 6: Conclusion

In this retrospective study, the rate of return visits in a resource limited setting was 1.07%. Factors associated with return visits included underweight for age, the presence of a predisposing/chronic illness, a higher triage category at initial visit and a less experienced doctor attending to the patient. The majority of the patients who returned did so due to progression of the disease process they presented with initially. Of the 7% that experienced a negative health consequence with the return visit, 63% was associated with a GIT infection.

As return rates and associated factors differ in various medical settings, these results may not be generalizable to all populations, but may well be valid in a resource limited area. Decreasing return visits may result in less overcrowding of the emergency department, shortened waiting time and improved patient satisfaction.

Meticulous attention should be paid to those being discharged following a gastrointestinal tract and respiratory tract infection. Of those that returned with a negative consequence, majority suffered one of these 2 conditions. These patients may benefit from admission to the SSOU or a scheduled follow up at the primary health care clinic.
As many of the patients seen in the PED are evaluated by intern doctors, adequate supervision should be in place to ensure patient care is not compromised.
Good parent education, explanation and discharge instructions in a language the parent understands, is fundamental when treating patients.

Though return rates in this study are low, much can be learnt to improve patient care and patient experience in the PED.

Appendix 1

General information:

Study no.	Hospital no.	Age (months)	Sex M/F	HIV status +/ - /Unknown	*Nutritional status based on weight N O U SAM	Income category of parent/guardian	**predisposing/ chronic illness	Details of chronic illness

*Nutritional status: N – normal weight for age, O – overweight for age, U – underweight for age, SAM – severely underweight for age

**Predisposing/Chronic illness: Defined as a medical condition that makes a patient more susceptible to an acute illness or a health problem which has been present for >3months and could last longer than 3 months, which affects the child's normal activities and requires recurrent hospitalisation, home care and/or extensive medical care. For example: Asthma, Diabetes, Cerebral palsy, AIDS, cancer, cystic fibrosis, congenital heart lesions, epilepsy and sickle cell anaemia.

Appendix 1

Initial visit

Study no.	Date dd/mm/yy	Day of week	Time	*Referral source	**Triage category	***Designation of Dr	Discussed with senior Dr (Y/N/NA)	****Discharge Diagnosis

*Referral source: home, community health clinic, primary level hospital, regional hospital

**Triage (according to South African Triage Category): Red, orange, yellow, green

***Designation of Dr: Consultant (paediatrician), Paediatric registrar, Emergency medicine registrar, Medical officer, Intern, Medical student

****Divided into systems: Upper respiratory tract/Lower respiratory tract/Cardiovascular/Gastrointestinal/Neruological/Dermatological/ Haematological/ other

Appendix 1

Return visit

Study no.	Date dd/mm/yy	Day of week	Time	Referral source	Triage category	Outcome – discharge/ Admitted	*Reason for return visit	**Adverse consequence (Y/N/NA)	Details of adverse consequence

* Reason for returning: Misdiagnosis, Progression of disease, non-compliance with medication, call back by doctor, left without being seen, not documented, other

** Adverse consequence: Hospital admission as well as duration of admission, ICU admission, death, development of complication (e.g. dehydration, abscess, empyema)

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