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# Knowledge and management of childhood constipation among South African Paediatric health care providers

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**Title:**

# Knowledge and Management of Childhood Constipation among South African Paediatric Health Care Providers

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Medicine

Johannesburg 2022

**Declaration**

I, Sheethal Ramsunder declare that this Research Report is my own, unaided work. It is being submitted for the Degree of Master of Medicine at the University of Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.



(Signature of candidate)

__21st_____day of_February_____2022_____

in__Johannesburg_____

**Acknowledgements**

With special thanks to

Dr De Maayer

Vashisht Ramsunder

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## 3. Nomenclature

| | |
|---|---|
| AAP | American Academy of Paediatrics |
| EDL | Essential Drug List |
| EMG | Essential Medical Guidance |
| EML | Essential Medicines List |
| ESPGHAN | European Society of Paediatric Gastroenterology, Hepatology and Nutrition |
| Ie | in essence |
| NASPGHAN | North American Society for Pediatric Gastroenterology, Hepatology and Nutrition |
| NICE | National Institute for Health and Clinical Excellence |
| PAWS | Paediatric Alumni of Witwatersrand Whatsapp® group |
| PEG | Polyethylene glycol |
| PUP | Paediatricians of the University of Pretoria Whatsapp® group |
| SAJCH | South African Journal of Child Health |
| URL | Universal Resource Locator |

4. **Article for Peer Review**

## 4.1 Abstract


### Introduction

Functional constipation is a chronic disorder characterised by difficult, sporadic, or incomplete defaecation, without physiological or structural abnormalities, that does not meet the criteria for irritable bowel disease. Significant differences in knowledge and practice patterns exist regarding the approach to paediatric constipation.

### Objectives

This study aimed to assess knowledge and practice patterns among paediatric health care providers in Gauteng province.

### Methods

An online survey was disseminated via email and WhatsApp to doctors in the University of Witwatersrand paediatric circuit, as well as private paediatricians. The questionnaire assessed the participants' demographic data, knowledge of pathophysiology, diagnostic criteria and danger signs, management and educational preferences for paediatric functional constipation.

### Results

139 responses were included in the study. There were widely varying levels of knowledge and management practices among all levels of healthcare providers.

48% of participants believed the most common cause for functional constipation ,was a low fibre intake, while only 36% indicated the cause was stool withholding. Most participants correctly identified the most obvious"red flags" in order to rule out organic causes of functional constipation.

When diagnosing functional constipation in children, 66% of participants always use only a history and examination, 15% always use a digital rectal exam while 8% avoid them completely.

In terms of treatment: Optimising fibre and fluid intake were routinely recommended by 66% and 71% respectively. 53% advise establishing a good toilet routine, while 19%

endorse instituting a reward system. The most popular choice for disimpaction was fleet enemas (69%) with only 22% using polyethylene glycol (PEG). Lactulose rather than PEG was preferred for maintenance therapy regardless of the age of the child. There was no consensus on the duration of treatment necessary to treat functional constipation.

**Conclusion**

There is no unified approach to constipation, even among colleagues working in the same sector. We recommend that there should be more emphasis placed on this topic at an undergraduate level and at academic conferences. National guidelines on the management of paediatric functional constipation would optimise and streamline treatment strategies into a unified approach.

## 4.2 Introduction

Functional constipation is a chronic disorder characterised by difficult, sporadic, or incomplete defaecation, without physiological or structural abnormalities, that does not meet the criteria for irritable bowel disease (1). It is a common paediatric ailment, with different studies reporting an international paediatric prevalence of 0.7 – 29%(2). It accounts for up to 25% of referrals to paediatric gastroenterologists (3). Constipation may begin in the first year of life in 17 - 40% of children globally (4). Chronic functional constipation may lead to reduced quality of life, a negative impact on academic performances, or be associated with psychological complications such as aggression, anxiety or depression. (5)

The Rome IV criteria for functional bowel disorders (published in 2016) provide diagnostic criteria to identify functional constipation (6). Organic causes of constipation may be suggested by looking for "red flags," ie: an abnormal neuromuscular exam may indicate a neurological cause for constipation, or delayed passage of meconium could point to Hirschsprung's disease or cystic fibrosis for example (7). Further investigation is warranted if a red flag is identified, in order to rule out an organic cause of constipation.

The pathophysiology of constipation is multifactorial, but an underlying cause is not often found in children. The most common cause is thought to be due to stool withholding (i.e. functional constipation), usually due to a painful experience during the passage of stools. Withholding behaviour leads to stasis of stool in the rectum, reabsorption of water from the stool, incomplete elimination of hardened faeces, faecal impaction, overflow faecal incontinence, and impaired rectal sensation (4). Chronic constipation may lead to several complications, including recurrent urinary tract infections, psychosocial effects, problems with toilet training, faecal impaction, faecal incontinence, rectal bleeding or prolapse, anorexia and nausea (3,8–10).

Treatment of constipation consists of a two-prong approach. Firstly, demystification of the pathophysiology and an explanation that stool-withholding behaviour is the root cause of childhood constipation is required. Secondly, stool softeners are needed to disrupt the pattern of painful defaecation. When stool impaction is present, disimpaction is also necessary (11).

Several guidelines for the diagnosis and management of constipation in children exist. One of the best-known guidelines is the 2014 medical position paper by The North

American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN). This is a evidence-based guideline with recommendations for the assessment and management of children with functional constipation in order to homogenise and enhance their quality of care. Key recommendations include that the diagnosis should be based on history and clinical examination, and that Polyethylene glycol (PEG) or lactulose is indicated as first-line treatment for both disimpaction and maintenance therapy. (12)

In terms of prognosis, half of the children referred to paediatric gastroenterologists recover after five years, and 80% recover by ten years. (12) However, a delay in initiating effective medical treatment for more than three months from symptom onset is associated with a longer duration of symptoms. (9)

Significant differences in knowledge and practice patterns exist regarding the approach to paediatric constipation. Clinicians need more education about the safety, efficacy the the overall role of medication in the management of constipation. Familiarity with practice guidelines may result in more effective and consistent management of this condition. (13) When chronic constipation is treated inappropriately in children, there may be a delay in toilet training. (2) Treatment of functional constipation in children is mostly based on clinical experience rather than on published clinical trials due to a lack of randomised controlled studies or familiarity with established guidelines. (3,14,15)

There are many misconceptions about the cause and management of functional constipation in children, in both caregivers and health practitioners. This study set out to illustrate the level of knowledge of current recommendations, and the management practices of functional constipation in paediatric healthcare providers in the Gauteng province of South Africa.

### 4.3 Objectives

To the best of our knowledge this study is be the first to assess the expertise and management of childhood functional constipation by paediatric healthcare providers in South Africa. Identification of knowledge gaps may inform future education efforts and be used to develop educational materials to improve the diagnosis and treatment of constipation in children. This study aimed to assess knowledge and practice patterns among paediatric health care providers in Gauteng province.

## 4.4 Methods

### Participants

Participants were invited to complete an online survey voluntarily. The aim was to have 25 participants in each group (i.e. 25 interns and medical officers, 25 paediatric registrars, 25 public hospital paediatricians and 25 private paediatricians). An anonymous questionnaire was developed to assess the participants' demographics, knowledge of pathophysiology and diagnostic criteria, management and educational preferences for functional constipation.

The online survey was designed and distributed using an online REDCap (Research Electronic Data Capture) database, hosted by the University of the Witwatersrand. Doctors working and training in the University of Witwatersrand paediatric circuit, and private paediatricians practising in Gauteng province were invited to participate via Whatsapp® and email.

All the participants in the study were doctors in Gauteng Province, South Africa who chose to complete the questionnaire. The category of non-specialists was represented by paediatric interns and medical officers, with paediatric registrars training to be paediatricians formed a second group. The category of specialist was represented by paediatricians and paediatric subspecialists in both the public and private sector. Incomplete surveys were excluded. Participants who were not practising in Gauteng or were not doctors who treat children were excluded.

### Site of Study

The survey was distributed among medical professionals that will most likely treat children with functional constipation, with varying levels of training and experience. The state sector was represented by Chris Hani Baragwanath Academic Hospital, Charlotte Maxeke Johannesburg Academic Hospital and Rahima Moosa Mother and Child Hospital, as well as other satellite hospitals that form part of the University of Witwatersrand paediatric circuit in Gauteng. The private sector was represented by the private paediatricians who chose to participate in the study via different Whatsapp® groups, including the PAWS (Paediatric Alumni of Witwatersrand) and PUP (Paediatricians of the University of Pretoria) groups.

### Ethical Considerations

Participants' responses were anonymous. Consent to conduct the study was obtained from the Heads of Department of Charlotte Maxeke Academic Hospital, Rahima Moosa Mother and Child Hospital, and Chris Hani Baragwanath Hospital. Approval to conduct research was also sought from the Human Research Ethics Committee of the University of the Witwatersrand (approval no: M200334). There were no incentives offered to complete this survey.

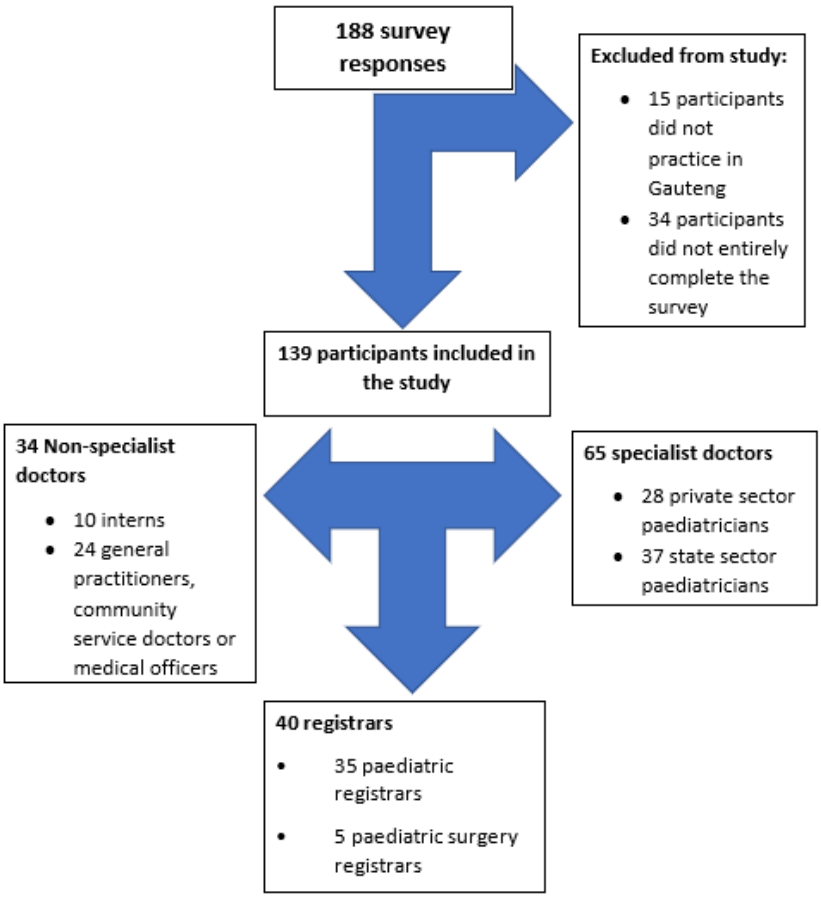
## 4.5. Results

### 4.5.1 Demographics

A total of 188 survey responses were received. 49 responses were excluded due to the participants either not practising in the province of Gauteng (15 participants), or the survey being incomplete (34 participants). A total of 139 participants were included, 34 were non-specialist doctors, 40 were registrars and 65 specialist paediatricians. The 37 state sector paediatricians may be further subdivided into 16 general paediatricians, and 21 subspecialists (including nephrologists, infectious diseases specialists, pulmonologists, critical care specialists, neonatologists, palliative care specialists, gastroenterologists, oncologists, neurologists and neurodevelopmental specialists). The 28 private sector paediatricians were made up of 22 general paediatricians, and six subspecialists (including neurologists, neonatologists, gastroenterologists, nephrologists and rheumatologists). The median work experience of the participants was seven years (range: 0 to 40 years)

Please see Figure 1 for a schematic representation.

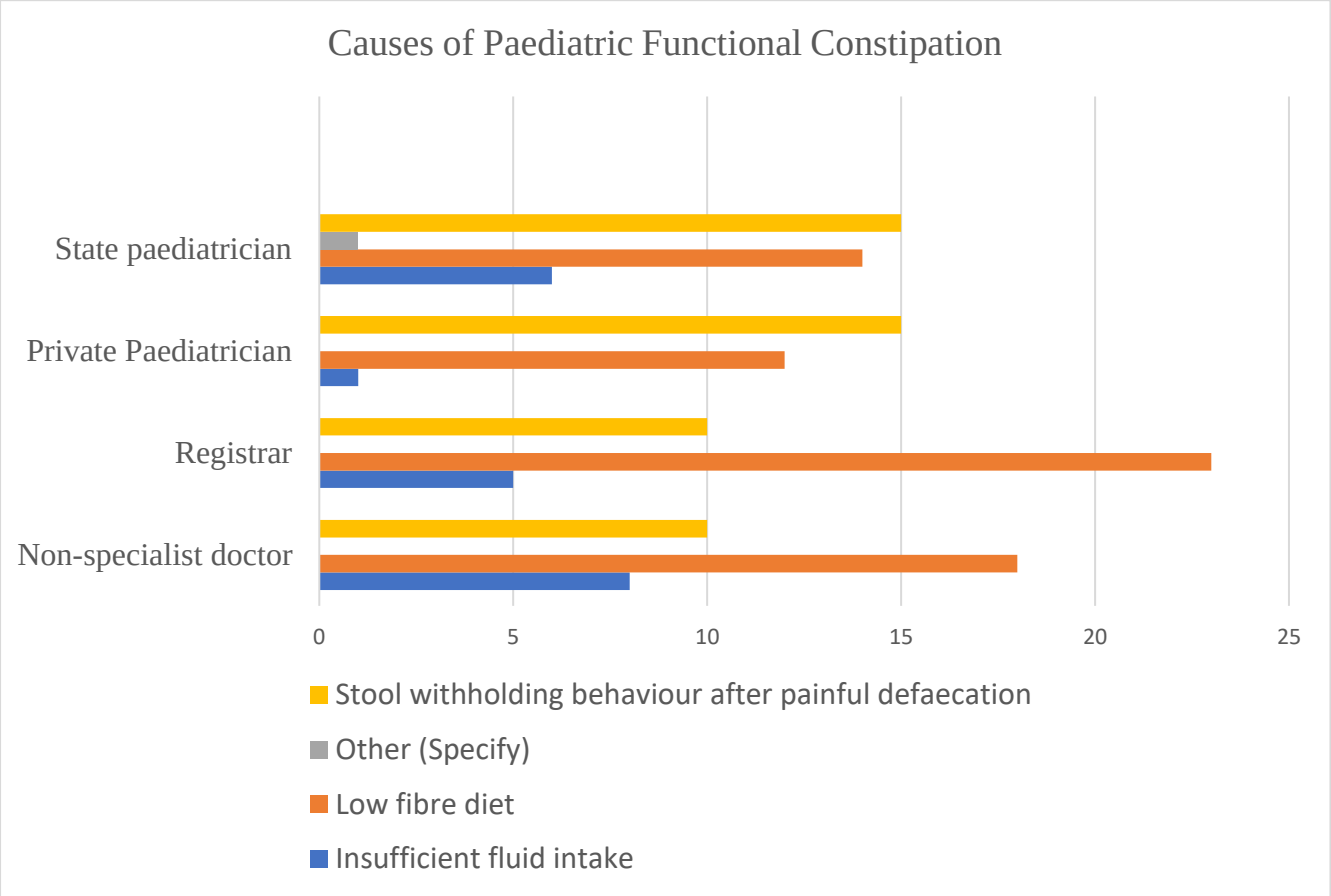
Figure 1: Flow chart of study participants



### 4.5.2 Aetiology

In terms of causes, 48% of participants believed the most common cause for functional constipation was a low fibre intake, while only 36% indicated the cause was stool withholding. (Table 1)

Figure 2. Causes of Paediatric Functional Constipation




### 4.5.3 Diagnosis

When identifying red flags to rule out organic causes of functional constipation, an "abnormal neuromuscular examination" and "failure to thrive" was correctly selected by most participants (95% and 87% respectively). Approximately one third (32%) of participants did not include "delayed passage of meconium" as a red flag, and incorrectly identified "intermittent diarrhoea" (33%) and "soiling after achieving continence" (41%) as red flags.

When diagnosing functional constipation in children, 66% of participants always use only a history and examination, 15% always use a digital rectal exam while 8% avoid them completely. Fourteen percent always use a stool diary, 17% always order an abdominal x-ray

and 1% never do. Twelve percent never use a contrast enema to diagnose functional constipation (none of our participants always routinely order this). Please see Table 1.

Table 1. Diagnosis of Paediatric Functional Constipation

| **Frequency of Use** | **History and exam only** | **Digital rectal exam** | **Stool diary** | **Abdominal X-ray** | **Contrast Enema** |
|---|---|---|---|---|---|
| Never | 3 (2%) | 11 (8%) | 31 (23%) | 2 (1%) | 16 (12%) |
| Seldom (< 25% of the time) | 4 (3%) | 61 (45%) | 40 (30%) | 43 (32%) | 105 (78%) |
| Often (50% of the time) | 5 (4%) | 28 (21%) | 30 (22%) | 40 (29%) | 11 (8%) |
| Usually (>75% of the time) | 34 (25%) | 15 (11%) | 14 (10%) | 28 (21%) | 3 (2%) |
| Always | 89 (66%) | 20 (15%) | 19 (14%) | 23 (17%) | 0 (0%) |

(* Totals may not add up to 139 as not all participants filled out this question.)

### 4.5.4 Treatment

In terms of non-pharmaceutical treatment options, optimising fibre and fluid intake were routinely recommended by 66% and 71% respectively. Fifty-three percent advise establishing a good toilet routine, while 19% endorse instituting a reward system. Four percent always refer their patients to a psychologist or behavioural therapist. The most popular choice for disimpaction was fleet enemas (69%) with only 22% using polyethylene glycol (PEG). Three private paediatricians used Sodium picosulphate (a stimulant laxative) for disimpaction. Lactulose rather than PEG was preferred for maintenance therapy regardless of the age of the child. Unresponsive constipation was treated most frequently with fleet enemas (24%) rather than the oral agents such as mineral oil (5%), milk of magnesia (4%), senna or bisacodyl (15%). Please see Table 2 for further detail.

Table 2. Treatment Options for Paediatric Functional Constipation

| Treatment options | Disimpaction | Maintenance (<1yr old) | Maintenance (>1yr old) | Unresponsive constipation | Never |
|---|---|---|---|---|---|
| Polyethylene glycol | 28 (19%) | 16 (11%) | 40 (28%) | 16 (11%) | 45 (31%) |
| Milk of Magnesia | 4 (4%) | 6 (5%) | 4 (4%) | 6 (5%) | 94 (83%) |
| Mineral Oil | 2 (2%) | 9 (8%) | 11 (9%) | 7 (6%) | 87 (75%) |
| Lactulose | 22 (11%) | 60 (30%) | 91 (46%) | 24 (12%) | 1 (0.5%) |
| Fleet Enema | 96 (65%) | 3 (2%) | 5 (3%) | 33 (22%) | 10 (7%) |
| Senna/ Biscodyl | 9 (7%) | 5 (4%) | 37 (29%) | 20 (16%) | 55 (44%) |
| Glycerine Suppositories | 58 (38%) | 53 (35%) | 17 (11%) | 15 (10%) | 10 (7%) |

There was no consensus on the duration of treatment necessary to treat functional constipation. Fifteen percent of participants said they did not know, 25% expected the duration of treatment to last two weeks, whilst 21% of participants anticipated six months of treatment.

### 4.6. Discussion

This survey showed there was no unified approach to diagnosis or management of functional constipation, and uncertainty about which guidelines and resources to use. There are a variety of guidelines from many different countries available that have diverse and sometimes contradictory approaches. There is not as much reliance on teaching from colleagues and senior doctors, indicating that perhaps this is not a topic that is widely taught to junior doctors at a departmental level.

Despite significant research to the contrary, low fibre is still seen as a significant cause of paediatric constipation, rather than stool withholding (16). This was reinforced by our study, which showed that almost half of the participants (48%) believe the main cause of functional constipation is poor fibre intake, with just over one third (36%) recognising stool withholding as a cause.

The concern with misunderstanding the cause and pathophysiology of constipation leads to a delay in initiating the correct treatment, including demystification and education of the parents. Patient education is crucial in preventing non-compliance with treatment, and in managing expectations, especially in parents expecting a immediate solution (7). Both the NICE guidelines and the NASPGHAN /ESPGHAN guidelines do not recommend dietary changes as first-line therapy for functional constipation in children.

To diagnose functional constipation, organic causes must be ruled out. This is often done through the exclusion of "red flags" – which allude to specific pathological reasons for constipation. A random selection of red flags was mixed with ordinary symptoms of constipation in our survey, and participants were asked to identify the red flags. It seems that red flags are not identified well, with participants not recognising that "intermittent diarrhoea" (33%) and "soiling after achieving continence" (41%) indicate overflow incontinence, a typical symptom associated with constipation. Almost one-third of respondents (33%) did not identify "delayed passage of meconium" (which could indicate Hirschsprung's disease) and 65% failed to recognise that cold intolerance was a red flag (may be a sign of hypothyroidism). Not recognising these "red flags" may lead to both missing important pathologies, and over-investigation in others (eg: unnecessary xrays ordered – with the associated exposure to radiation).

In this study, 66% of our participants felt that history and examination alone was sufficient to make a diagnosis of constipation in children. Only 15% of participants felt that a digital rectal exam was always necessary to diagnose constipation. Routine digital rectal exams are not recommended by either the ESPGHAN/NASPGHAN guidelines (12) or the NICE guidelines (17) to diagnose functional constipation. These guidelines state that a digital rectal exam should only be done if the diagnosis is uncertain, or to rule out organic causes of constipation. The exam should only be done by experienced health care professionals capable of interpreting features of anatomical pathology. Abdominal x-rays are often inappropriately ordered (17% always order an abdominal x-ray). The routine use of an abdominal radiograph is not recommended to diagnose functional constipation. Exceptions include when faecal impaction is suspected but the clinical examination is unreliable or not possible for some reason. (12,17)

The NASPGHAN/ ESPGHAN guidelines recommend polyethylene glycol (PEG) as the mainstay of treatment for both disimpaction and maintenance therapy. If PEG is not available, fleet enemas or lactulose may be used instead for disimpaction. Lactulose is also an acceptable alternative for maintenance therapy. Mineral oil, milk of magnesia and stimulant laxatives should be reserved for second-line therapy in unresponsive constipation (although some practioners chose these as first-line treatment). (3)

However, PEG is not widely available in the public sector in South Africa. Lactulose is accessible, affordable, safe, easy to use and familiar to most doctors.

Medical treatment should last for at least two months, or until constipation has been resolved for at least one month. If constipation occurs during toilet training, treatment should continue until toilet training has been well established. Treatment should be gradually tapered off. (12)

There may be several barriers to the treatment of constipation in children. Parental confusion about the causes of functional constipation, or frustration with previous constipation treatment regimens may lead to a delay in seeking health care. Parents may resort to home remedies, or even default treatment. (2)

Medical textbooks form the basis of knowledge about functional constipation across all the study groups, superseded only by conferences and academic presentations in specialist paediatricians. Internet resources were favoured over journal articles, followed by established guidelines. As mentioned above, there is little reliance on teaching from senior doctors about constipation. Although beyond the scope of this study, the authors suspect this may be an

effect of excessive focus on in-hospital, rather than ambulatory paediatrics in our training programme.

Most non-specialist doctors preferred learning about constipation through academic presentations, possibly due to the familiarity with this teaching method at an undergraduate level. Registrars and paediatricians preferred journal articles and specific South African guidelines. However, guidelines developed in western countries may not necessarily translate into our setting as our patient profile is different. Factors such as diet, socioeconomic factors, health-seeking behaviour, local misconceptions, traditional medicine use, access to medical care, availability of recommended medications all play a role. Currently, South Africa does not have peer-reviewed local guidelines for functional constipation for clinicians to follow. A local guideline with a stepwise approach, clear red flags, with criteria of when to escalate or refer the patient for specialist assessment, should provide a unified approach that is concise, acceptable, accessible, and easy to follow.

### 4.7 Study limitations

This study was conducted only in the province of Gauteng, with a relatively small sample size. There is a possibility that it may not be representative of practices in other provinces of South Africa. However, a significant number of the participants are likely to have completed under- and or post-graduate training in other provinces and it seems unlikely that the findings in this study would differ significantly in other provinces.

The bulk of the respondents that were excluded had not completed the survey, may not have finished the survey because they were not sure of the correct answers. However, incorrect answers were also a significant finding, as it displays the extent of the knowledge gap that we need to address.

Due to the high number of subspecialists involved in the study, some participants may not deal with patients with functional constipation in their day-to-day practice.

Lastly, it must be noted that the survey was conducted before the 2020 COVID-19 pandemic. As such, preferred education sources will likely be more heavily be in favour of electronic resources and online presentations currently.

### 4.8 Conclusion

There does not seem to be a unified approach to constipation, with great variation even among colleagues working in the same sector. Participants relied on a variety of different guidelines, including the Essential Drug List. The lack of knowledge about the underlying cause of functional constipation in children is concerning, as it will likely lead to inappropriate or delayed treatment and promote poor compliance.

Most of the clinical training received by undergraduate medical students and post-graduate paediatric doctors are based on in-patient management. Ambulatory paediatrics is underrepresented and is thus unfamiliar. We therefore recommend that there should be greater emphasis placed on this topic and ambulatory paediatrics in general at under- and post-graduate level and academic conferences.

In addition, national guidelines on the management of paediatric functional constipation would greatly assist to optimise and streamline the many treatment strategies into a unified approach. It is unclear why participants did not follow the EML STG guidelines. A single guideline would give all practitioners a way of identifying functional constipation, managing it and avoiding complications that is appropriate to our local setting. It would also prevent confusion for patients and their parents, who may not know whose advice to follow if different healthcare providers have different approaches.

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## 5. Appendices

5.1 Ethics Clearance Certificate

UNIVERSITY OF THE
WITWATERSRAND V
JOHANNESBURG

R 14/49 Dr S Ramsunder

# HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL) CLEARANCE CERTIFICATE NO. M200334

| | |
|---|---|
| NAME: (Principal Investigator) | Dr S Ramsunder |
| DEPARTMENT: | School of Clinical Medicine<br>Department of Paediatrics and Child Health<br>Rahima Moosa Mother and Child Hospital |
| PROJECT TITLE: | Knowledge and management of childhood constipation among South African paediatric health care providers |
| DATE CONSIDERED: | Ad hoc |
| DECISION: | Approved unconditionally |
| CONDITIONS: | CEO permission from all three sites received 30/03/2020<br>Previous condition withdrawn 28/05/2020 |
| SUPERVISOR: | Dr T De Maayer |
| APPROVED BY: | Dr CB Penny, Chairperson, HREC (Medical) |
| DATE OF APPROVAL: | 2020/03/25 |

This clearance certificate is valid for 5 years from the date of approval. Extension may be applied for.

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DECLARATION OF INVESTIGATORS

To be completed in duplicate and ONE COPY returned to the Research Office Secretary on the 3rd Floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to submit details to the Committee. I aqree to submit a yearly progress report. When a funder requires annual recertification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in March and will therefore reports and re-certification will be due early in the month of March each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).



_____ _____ 25/03/2020

Principal Investigator Signature Date

5.2 Protocol

# Title:

# Knowledge and Management of Childhood Constipation among South African Paediatric Health Care Providers

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MP0720500

Supervisor:

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Paediatric Gastroenterologist at Rahima Moosa Mother and Child Hospital

1. Introduction
2. Aim of the Study
3. Methods
3.1. Participants
3.1.1. Participation Recruitment
3.1.2. Inclusion Criteria
3.1.3. Exclusion Criteria
3.2. Site of Study
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**Title:**

# Knowledge and Management of Childhood constipation among South African Paediatric Health Care Providers

## 1. Introduction

Functional constipation is a chronic disorder characterised by difficult, sporadic, or incomplete defecation, without any physiological or structural abnormalities, and does not meet the criteria for irritable bowel disease.(1) Functional constipation is a fairly common paediatric ailment, with a 29.6% worldwide prevalence. (12) Constipation may begin in the first year of life in 17 - 40% of children globally. (4) Infants may pass five to forty stools per week in the first three months of life, which decreased in frequency at age one year to four to twenty motions per week. By three years to three to fourteen per week. (1)

Constipation is often associated with sporadic stools, painful defecation, overflow faecal incontinence, and abdominal pain. Psychosocial effects of constipation are often ignored. There is significant psychological stress to the child and family, which may be associated with a reduced quality of life or psychological issues, such as aggression, anxiety, depression, or emotional volatility. Social interactions may become more difficult, especially since childhood is when social and educational foundations are established. The child's academic performance may suffer, and their parents are subjected to the financial implications of recurrent doctor's visits.

The distended rectum of a constipated child applies direct pressure on the posterior bladder wall. Mechanical compression of the bladder causes trigonal irritation, which leads to posterior bladder wall invagination, resulting in bladder neck and urethral obstruction or distention. Urinary stasis and obstruction predisposes constipated children to recurrent urinary tract infections.(4,8,9,18)

The pathophysiology of constipation is multifactorial, but an underlying cause is not often found in most children. The most common cause is thought to be due to stool withholding, usually due to a painful experience during the passage of stools. Withholding behaviour leads to the dyssynergic passage of stools, incomplete elimination of faeces, faecal impaction, overflow faecal incontinence, and impaired rectal sensation.

Factors thought to contribute to functional constipation include genetic predisposition, low-socioeconomic status, inadequate fluid and fibre intake. Immobility, poor toilet training, psychological stress, or behavioral disorders (eg:Attention Deficit Hyperactivity Disorder or Autism Spectrum Disorder), especially withholding behavior (usually occurring after experiencing a painful passage of stools).

The Rome IV criteria for functional bowel disorders (published in 2016) provide diagnostic criteria to identify functional constipation. The goal of the Rome IV process was to update the parameters used to diagnose functional constipation in the Rome III criteria, based on reviewing new literature, including new information on gastrointestinal and brain interactions and their microenvironments. (4)

Rome IV Criteria

In infants up to four years old, at least two of the following present for at least one month:

1)Two or fewer defecations per week

2)History of excessive stool retention

3)History of painful or hard bowel movements

4)History of large-diameter stools

5)Presence of a large faecal mass in the rectum

In toilet-trained children, the following additional criteria may be used:

1)At least one episode/week of incontinence after the acquisition of toileting skills

2)History of large-diameter stools that may obstruct the toilet

In children with a developmental age of at least two years old, at least two of the following present at least once per week for at least one month:

1)Two or fewer defecations in the toilet/week

2)At least one episode of faecal incontinence per week

3)History of retentive posturing or excessive volitional stool retention

4)History of painful or hard bowel movements

5)Presence of a large faecal mass in the rectum

6)History of large-diameter stools that may obstruct the toilet

7)The symptoms cannot be fully explained by another medical condition.

Red flags that indicate a more sinister cause of constipation should always be ruled out first. Red flags include: Fever, mouth ulcers, associated hypotonia, absent or brisk lower limb reflexes, blood or mucus mixed with stool, perianal skin tags or fistulae, failure to thrive, delayed passage of meconium, age of onset less than a year old, abdominal distension, weight loss or poor weight gain, a history of abnormal bowel habit since birth, sensitivity to cold, fatigue, dry skin, pallor, or change in bowel habit with the introduction of cow's milk to the diet.(11)

Treatment of constipation consists of a two-prong approach: firstly, demystification of the pathophysiology and an explanation that stool-withholding behavior is the root cause of childhood constipation is required. Secondly, stool softeners are needed to disrupt the pattern of painful defaecation. When stool impaction is present, intensive disimpaction is also required.(11)Several guidelines for the diagnosis and management of constipation in children exist. The North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) published a medical position paper in 1999, which was updated in 2006. Key recommendations include that the diagnosis is based on history and clinical examination. The Rome criteria should be used to define functional constipation. If there is only one of the Rome criteria present and the diagnosis of functional constipation is in question, a digital rectal examination is recommended. A normal fibre and fluid intake, an average physical activity level are recommended.

Colonic transit studies, rectal ultrasounds or anorectal manometry are not useful in the diagnosis of constipation. Routine allergy testing to rule out cow's milk protein allergy, barium enema or screening for hypothyroidism, coeliac disease, hypercalcaemia is not needed in the diagnosis or management of functional constipation in the absence of danger signs.

Routine use of prebiotics or probiotics is not recommended in the treatment of childhood constipation. Non-pharmacological interventions consist of demystification, explanation, and guidance for toilet training (in children with a developmental age of at least 4 years). For disimpaction, the guideline recommends polyethylene glycol (PEG) orally (1 -1.5g/kg/day) for

three to six days. If PEG is not available, a daily enema for three to six days is an acceptable alternative. (19)

PEG with or without electrolytes is also recommended as the first-line maintenance treatment The National Institute for Health and Clinical Excellence (NICE) in the United Kingdom developed a guideline in 2010 for children with functional constipation, based on a best evidence strategy. It is a general guideline specifically for functional constipation and should not be considered a substitute for clinical judgment or an all-purpose protocol applicable to all patients.

Significant differences in knowledge and practice patterns exist regarding the approach to paediatric constipation. Treatment of functional constipation in children is mostly based on clinical experience rather than on published clinical trials because of a lack of randomized controlled studies or the familiarity with established guidelines. Early recognition and appropriate management is vital in ensuring successful treatment.(14,15,20)

There are many misconceptions about the cause and management of functional constipation in children, in both caregivers and health practitioners. Examples include believing that a low-fibre diet, low fluid intake or a lack of exercise leads to constipation, or that hard stools can be softened by drinking more water. Many believe that the chronic use of laxatives causes "dependence" or "colonic damage.".(12,15)

In terms of prognosis, of the total amount of patients referred to paediatric gastroenterologists: 50% will recover completely (three stools per week without faecal incontinence) and no longer require laxatives after six to twelve months, 10% are well while using laxatives and 40% will still be symptomatic despite using laxatives. Half of the children recover after five years, and 80% recover by ten years. The vast majority of patients will no longer require laxatives. A delay in initiating effective medical treatment for more than three months from symptom onset is associated with a longer duration of symptoms.(19)

There are many guidelines available for the management of functional constipation, for example, the 2014 North American Society of Paediatric Gastroenterology and Hepatology And Nutrition (NASPGHAN) and European Society of Paediatric Gastroenterology, Hepatology And Nutrition (ESPGHAN) guidelines, or the 2010 NICE guidelines.

Previous studies done to illustrate the poor knowledge and adherence to the NASPGHAN Functional Constipation guidelines include Focht et al in 1999(3), as well as Yang et al in

2006(13). More recently, a study was done in both the United States of America and Holland to assess the awareness and implementation of the 2014 NASPGAN and ESGHAN guidelines via a survey that circulated among paediatric health care providers in the aforementioned settings. They concluded that while almost one third of the doctors involved in their study were not familiar with the 2014 NASPGHAN/ ESPGHAN guidelines, they still had a fair correlation with their management of functional constipation when compared to the guidelines. (19)

To the best of our knowledge this study will be the first to assess the expertise and management of childhood constipation by child healthcare providers in South Africa. Identification of knowledge gaps may inform future education efforts and be used to develop educational materials to improve the diagnosis and treatment of constipation in children.

## 2. Aim of the Study

To assess the knowledge and management of paediatric functional constipation by paediatric doctors at different skill levels, in a South African setting. The paediatric doctors in question will include interns, paediatric registrars, paediatric consultants, paediatric subspecialists in the public and private sector.

Secondary goals include identifying specific weaknesses in knowledge, the most frequently used treatment strategies and preferred method of learning more about constipation.

## 3. Methods

### 3.1. Participants

#### 3.1.1. Participation Recruitment

Participants will be selected via convenience sampling, aiming to have 25 participants in each sector (i.e. 25 interns and medical officers, 25 paediatric registrars, 25 paediatric specialists & subspecialists, 25 private paediatricians). An anonymous questionnaire has been developed to assess the participants' demographics, their knowledge of pathophysiology and diagnostic criteria, their management and educational preferences for functional constipation. (please see attached appendix).

Participants will be invited to complete the survey using RedCap online database. The URL link to the survey will be distributed to doctors working and training in the University of Witwaterstrand paediatric circuit, as well as private paediatricians via the PAWS Whatsapp

group (an informal group of paediatric alumni of the University of Witwatersrand). The survey will also be available in a hard copy form that will be distributed manually at morning academic meetings, and at paediatric out patient clinics at Chris Hani Baragwanath Hospital, Charlotte Maxeke Hospital and Rahima Moosa Mother and Child Hospital. Participants will be requested to only answer the questionnaire once.

### 3.1.2. Inclusion Criteria

All the participants in the study are doctors in Gauteng Province, South Africa who choose to complete the questionnaire they are provided with. The category of non-specialists are represented by paediatric interns, medical officers and paediatric registrars. The category of specialist will be represented by paediatricians and paediatric subspecialists in both state and private sector.

### 3.1.3. Exclusion Criteria

Those who decline participation are the only ones to be excluded. Incompletely or incorrectly filled in surveys will be given a value of "I don't know."

## 3.2. Site of Study

The survey will be distributed among medical professionals that will most likely treat children with functional constipation in the private & state sector, with varying levels of training & experience. The state sector will be represented by Chris Hani Baragwanath Academic Hospital, Charlotte Maxeke Johannesburg Academic Hospital and Rahima Moosa Mother & Child Hospital. The private sector will be represented by the private paediatricians who chose to participate in the study via the Paediatric Alumni of Witwaterstrand Whatsapp group.

## 3.3. Study Design

This survey is a descriptive cross-sectional study.

# 4. Data Analysis

Data will be analysed using descriptive methods including percentages and a Likert scale. Inferential statistics comparing categorical variables will be done using the Chi square test with Fisher exact statistics where appropriate. Data will be analysed using the Stata 11 (®Statacorp, USA) statistical analysis programme. The results of this study will be disseminated via a peer review journal.

# 5. Ethical Considerations

The study questionnaires will be filled in on a voluntary basis and results will be kept anonymous. This protocol has been submitted to the Human Research Ethical Committee (HREC) of the University of the Witwatersrand for approval. Permission will also be sought from the Paediatric heads of department and Chief Executive Officers of the three hospitals involved, and the National Health Research Database. Participants will be invited to participate in the survey anonymously and will be asked to sign written consent (in the case of hardcopy survey), or by ticking a consent button (online survey).

## 6. Timing

Please see the following Gant chart.

| | Aug 2019 | Sept 2019 | Oct 2019 | Nov 2019 | Dec 2019 | Jan 2020 | Feb 2020 | Mar 2020 | Apr 2020 | May 2020 | Jun 2020 | Jul 2020 | Aug 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Literature Review** | | | | | | | | | | | | | |
| **Preparing protocol** | | | | | | | | | | | | | |
| **Protocol assessment** | | | | | | | | | | | | | |
| **Ethics application** | | | | | | | | | | | | | |
| **Collecting data** | | | | | | | | | | | | | |
| **Data analysis** | | | | | | | | | | | | | |
| **Write up** | | | | | | | | | | | | | |

## 7. Funding

The study will be self-funded, and a budget of R1000 will be set aside for printing costs.

## 5.3 Online Questionnaire

*Confidential*



# Knowledge and Management of Childhood constipation among South African Paediatric Health Care Providers

Dear Colleague,
I, Sheethal Ramsunder, am currently conducting research to determine the knowledge & management of functional constipation in children. The study will be used to identify potential knowledge gaps.
I would like to invite you to be a part of this study by completing a questionnaire that will take approximately 10 minutes to complete. You will remain anonymous as your name is not required on the questionnaire and your name will not be released in the final results. Your profession however, will be required on the questionnaire and will be documented in the research. Participation in this study is completely voluntary, and if you decide not to participate, there will be no consequences.
If you would like to take part in this study, please complete the questionnaire attached. For any further information based on this research you may contact me on drsramsunder@gmail.com or my supervisor, Dr Tim De Maayer at tim.demaayer@wits.ac.za
These questionnaires will be primarily distributed and manually collected by the researcher and/or her supervisor, or via an online survey platform.

| | **BACKGROUND INFORMATION** | |
|---|---|---|
| 1 | 1)This survey is aimed at assessing the knowledge and therapeutic practices for paediatric functional constipation in doctors currently working in the province of Gauteng, South Africa.<br>Are you currently practicing in the province of Gauteng? | ◯ yes<br>◯ no |
| | 2) My field of practice: | ◯ Intern<br>◯ General practitioner/Medical officer/Community Service Dr<br>◯ Paediatric Registrar<br>◯ Paediatrician<br>◯ Paediatric subspecialty (specify)<br>◯ other (specify) |
| | Specify | _____ |
| | 3) I work in a: | ◯ primary care setting<br>◯ Non-academic public hospital<br>◯ University hospital setting<br>◯ Private sector setting<br>◯ other (specify): |
| | Other work setting | _____ |
| | 4) Years of work experience | _____ |
| | 5) I am involved in the treatment of children with constipation and/or faecal incontinence. | ◯ Yes<br>◯ No |

**KNOWLEDGE**

| | |
|---|---|
| 6) What is the most common cause of chronic constipation in children? (Tick the most correct answer) | ◯ Low fibre diet<br>◯ Insufficient fluid intake<br>◯ Stool withholding behaviour after painful defaecation<br>◯ Lack of exercise<br>◯ Other (Specify) |
| Other cause: | _____ |
| 7) What are the red flags that allude to an underlying pathological cause of constipation (ie: not functional constipation)? Please select all that apply. | ☐ Delayed passage of meconium<br>☐ Intermittent diarrhoea<br>☐ Failure to thrive<br>☐ Bile stained vomiting<br>☐ Painful defeacation<br>☐ Abnormal position of anus<br>☐ Anal retentive posturing<br>☐ Absent anal wink<br>☐ Soiling after achieving faecal continence<br>☐ Cold intolerance<br>☐ Abnormal neuromuscular examination |
| 8) What is the expected minimum duration of laxative use in functional constipation? (Select one answer) | ◯ three days<br>◯ two weeks<br>◯ one month<br>◯ six months<br>◯ I don't know |

THERAPY

*Confidential*



**9)How often do you use the following diagnostic tools?**

| | Never | Seldom (< 25% of the time) | Often (50% of the time) | Usually (>75% of the time) | Always |
|---|---|---|---|---|---|
| History and examination only | ◯ | ◯ | ◯ | ◯ | ◯ |
| Digital rectal examination | ◯ | ◯ | ◯ | ◯ | ◯ |
| Stool diary | ◯ | ◯ | ◯ | ◯ | ◯ |
| Abdominal X-ray | ◯ | ◯ | ◯ | ◯ | ◯ |
| Contrast Enema | ◯ | ◯ | ◯ | ◯ | ◯ |

| **10)How often to you implement the following non-pharmacological interventions?** | | | | | |
|---|---|---|---|---|---|
| | Never | Seldom (< 25% of the time) | Often (50% of the time) | Usually (>75% of the time) | Always |
| Optimise fibre intake | ○ | ○ | ○ | ○ | ○ |
| Optimising fluid intake | ○ | ○ | ○ | ○ | ○ |
| Establishing a toilet routine (regular time, good position, etc) | ○ | ○ | ○ | ○ | ○ |
| Implementing a reward system | ○ | ○ | ○ | ○ | ○ |
| Psychologist/behavioural therapist referral | ○ | ○ | ○ | ○ | ○ |
| Other (Specify) | ○ | ○ | ○ | ○ | ○ |

Other (specify)



| **11)My preferred medications are:**<br>**(Multiple answers allowed)** | | | | | |
|---|---|---|---|---|---|
| | For disimpaction | For maintenance therapy in children under 1 year | For maintenance therapy in children over 1year | For unresponsive constipation | Never |
| Lactulose | ☐ | ☐ | ☐ | ☐ | ☐ |
| Polyethylene glycol | ☐ | ☐ | ☐ | ☐ | ☐ |
| Milk of Magnesia | ☐ | ☐ | ☐ | ☐ | ☐ |
| Mineral oil | ☐ | ☐ | ☐ | ☐ | ☐ |
| Fleet enemas | ☐ | ☐ | ☐ | ☐ | ☐ |
| Senna/Bisacodyl | ☐ | ☐ | ☐ | ☐ | ☐ |
| Glycerine suppositories | ☐ | ☐ | ☐ | ☐ | ☐ |
| Other (Specify) | ☐ | ☐ | ☐ | ☐ | ☐ |

Other (specify)

| **EDUCATION** | |
|---|---|
| 12) What is the source of your knowledge of paediatric constipation<br>(please select all that apply) | ☐ Medical textbooks<br>☐ Journal articles<br>☐ Internet resources<br>☐ Conferences<br>☐ Pharmaceutical industry symposia<br>☐ Published Guidelines (Specify):<br>☐ Other (Specify): |
| Specify | _____ |
| 13) My preferred methods of learning more about the management of paediatric functional constipation are:<br>(multiple answers allowed) | ☐ Academic meeting with Powerpoint® presentation<br>☐ Online lecture<br>☐ Podcast<br>☐ Journal review article<br>☐ Publication of specific South African constipation guidelines<br>☐ Other (Specify) |
| Other (specify) | _____ |

THANK YOU FOR YOUR COOPERATION!
Please dont forget to select "submit" to complete this survey.
If you have questions concerning this survey, please contact:
Dr S Ramsunder
0834433821
drsramsunder@gmail.com

## 5.4 Turn-It-In Report

Turnitin Originality Report

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5.5 South African Journal Child Health Author Submission Guidelines

Manuscript preparation

Preparing an article for anonymous review

To ensure a fair and unbiased review process, all submissions are to include an anonymised version of the manuscript. The exceptions to this are Correspondence, Book reviews and Obituary submissions.

Submitting a manuscript that needs additional blinding can slow down your review process, so please be sure to follow these simple guidelines as much as possible:

- An anonymous version should not contain any author, affiliation or particular institutional details that will enable identification.
- Please remove title page, acknowledgements, contact details, funding grants to a named person, and any running headers of author names.
- Mask self-citations by referring to your own work in third person.

General article format/layout

Accepted manuscripts that are not in the correct format specified in these guidelines will be returned to the author(s) for correction, which will delay publication.

General:

- Manuscripts must be written in UK English.
- The manuscript must be in Microsoft Word format. Text must be single-spaced, in 12-point Times New Roman font, and contain no unnecessary formatting (such as text in boxes).
- Please make your article concise, even if it is below the word limit.
- Qualifications, full affiliation (department, school/faculty, institution, city, country) and contact details of ALL authors must be provided in the manuscript and in the online submission process.
- Abbreviations should be spelt out when first used and thereafter used consistently, e.g. 'intravenous (IV)' or 'Department of Health (DoH)'.

- Include sections on Acknowledgements, Conflict of Interest, Author Contributions and Funding sources. If none is applicable, please state ‘none’.
- Scientific measurements must be expressed in SI units except: blood pressure (mmHg) and haemoglobin (g/dL).
- Litres is denoted with an uppercase L e.g. 'mL' for millilitres).
- Units should be preceded by a space (except for % and ºC), e.g. '40 kg' and '20 cm' but '50%' and '19ºC'.
- Please be sure to insert proper symbols e.g. µ not u for micro, a not a for alpha, b not B for beta, etc.
- Numbers should be written as grouped per thousand-units, i.e. 4 000, 22 160.
- Quotes should be placed in single quotation marks: i.e. The respondent stated: '...'
- Round brackets (parentheses) should be used, as opposed to square brackets, which are reserved for denoting concentrations or insertions in direct quotes.
- If you wish material to be in a box, simply indicate this in the text. You may use the table format –this is the only exception. Please DO NOT use fill, format lines and so on.

SAMJ is a generalist medical journal, therefore for articles covering genetics, it is the responsibility of authors to apply the following:

- Please ensure that all genes are in italics, and proteins/enzymes/hormones are not.
- Ensure that all genes are presented in the correct case e.g. TP53 not Tp53.

**NB: Copyeditors cannot be expected to pick up and correct errors wrt the above, although they will raise queries where concerned.

Preparation notes by article type

- Research
- Editorials
- CME

- In Practice and Case reports
- Reviews
- Clinical trials
- Correspondence
- Obituaries
- Book reviews
- Guidelines

Research

Guideline word limit: 4 000 words

Research articles describe the background, methods, results and conclusions of an original research study. The article should contain the following sections: introduction, methods, results, discussion and conclusion, and should include a structured abstract (see below). The introduction should be concise – no more than three paragraphs – on the background to the research question, and must include references to other relevant published studies that clearly lay out the rationale for conducting the study. Some common reasons for conducting a study are: to fill a gap in the literature, a logical extension of previous work, or to answer an important clinical question. If other papers related to the same study have been published previously, please make sure to refer to them specifically. Describe the study methods in as much detail as possible so that others would be able to replicate the study should they need to. Results should describe the study sample as well as the findings from the study itself, but all interpretation of findings must be kept in the discussion section, which should consider primary outcomes first before any secondary or tertiary findings or post-hoc analyses. The conclusion should briefly summarise the main message of the paper and provide recommendations for further study.

Select figures and tables for your paper carefully and sparingly. Use only those figures that provided added value to the paper, over and above what is written in the text.

Do not replicate data in tables and in text .

Structured abstract

- This should be 250-400 words, with the following recommended headings:
- Background: why the study is being done and how it relates to other published work.
- Objectives: what the study intends to find out
- Methods: must include study design, number of participants, description of the intervention, primary and secondary outcomes, any specific analyses that were done on the data.
- Results: first sentence must be brief population and sample description; outline the results according to the methods described. Primary outcomes must be described first, even if they are not the most significant findings of the study.
- Conclusion: must be supported by the data, include recommendations for further study/actions.
- Please ensure that the structured abstract is complete, accurate and clear and has been approved by all authors.
- Do not include any references in the abstracts.

Main article

All articles are to include the following main sections: Introduction/Background, Methods, Results, Discussion, Conclusions.

The following are additional heading or section options that may appear within these:

- Objectives (within Introduction/Background): a clear statement of the main aim of the study and the major hypothesis tested or research question posed
- Design (within Methods): including factors such as prospective, randomisation, blinding, placebo control, case control, crossover, criterion standards for diagnostic tests, etc.
- Setting (within Methods): level of care, e.g. primary, secondary, number of participating centres.
- Participants (instead of patients or subjects; within Methods): numbers entering and completing the study, sex, age and any other biological, behavioural, social or cultural factors (e.g. smoking status, socioeconomic group, educational attainment, co-existing

disease indicators, etc)that may have an impact on the study results. Clearly define how participants were enrolled, and describe selection and exclusion criteria.

- Interventions (within Methods): what, how, when and for how long. Typically for randomised controlled trials, crossover trials, and before and after studies.
- Main outcome measures (within Methods): those as planned in the protocol, and those ultimately measured. Explain differences, if any.

Results

- Start with description of the population and sample. Include key characteristics of comparison groups.
- Main results with (for quantitative studies) 95% confidence intervals and, where appropriate, the exact level of statistical significance and the number need to treat/harm. Whenever possible, state absolute rather than relative risks.
- Do not replicate data in tables and in text.
- If presenting mean and standard deviations, specify this clearly. Our house style is to present this as follows:
- E.g.: The mean (SD) birth weight was 2 500 (1 210) g. Do not use the ± symbol for mean (SD).
- Leave interpretation to the Discussion section. The Results section should just report the findings as per the Methods section.

Discussion

Please ensure that the discussion is concise and follows this overall structure – sub-headings are not needed:

- Statement of principal findings
- Strengths and weaknesses of the study
- Contribution to the body of knowledge

- Strengths and weaknesses in relation to other studies
- The meaning of the study – e.g. what this study means to clinicians and policymakers
- Unanswered questions and recommendations for future research

Conclusions

This may be the only section readers look at, therefore write it carefully. Include primary conclusions and their implications, suggesting areas for further research if appropriate. Do not go beyond the data in the article.

Illustrations/photos/scans

- If illustrations submitted have been published elsewhere, the author(s) should provide consent to republication obtained from the copyright holder.
- Figures must be numbered in Arabic numerals and referred to in the text e.g. '(Fig. 1)'.
- Each figure must have a caption/legend: Fig. 1. Description (any abbreviations in full).
- All images must be of high enough resolution/quality for print.
- All illustrations (graphs, diagrams, charts, etc.) must be in PDF or jpeg form.
- Ensure all graph axes are labelled appropriately, with a heading/description and units (as necessary) indicated. Do not include decimal places if not necessary e.g. 0; 1.0; 2.0; 3.0; 4.0 etc.
- Scans/photos showing a specific feature e.g. Intermediate magnification micrograph of a low malignant potential (LMP) mucinous ovarian tumour. (H&E stain). –include an arrow to show the tumour.
- Each image must be attached individually as a 'supplementary file' upon submission (not solely embedded in the accompanying manuscript) and named Fig. 1, Fig. 2, etc.

Tables

- Tables should be constructed carefully and simply for intelligible data representation. Unnecessarily complicated tables are strongly discouraged.
- Large tables will generally not be accepted for publication in their entirety. Please consider shortening and using the text to highlight specific important sections, or offer a large table as an addendum to the publication, but available in full on request from the author
- Embed/include each table in the manuscript Word file - do not provide separately as supplementary files.
- Number each table in Arabic numerals (Table 1, Table 2, etc.) and refer to consecutively in the text.
- Tables must be cell-based (i.e. not constructed with text boxes or tabs) and editable.
- Ensure each table has a concise title and column headings, and include units where necessary.
- Footnotes must be indicated with consecutive use of the following symbols: * † ‡ § ¶ || then ** †† ‡‡ etc.

Do not: Use [Enter] within a row to make ‘new rows’:

Rather:

Each row of data must have its own proper row:

Do not: use separate columns for n and %:

Rather:

Combine into one column, n (%):

Do not: have overlapping categories, e.g.:

Rather:

Use <> symbols or numbers that don’t overlap:

References

NB: Only complete, correctly formatted reference lists in Vancouver style will be accepted. Reference lists must be generated manually and not with the use of reference manager software. Endnotes must not be used.

- Authors must verify references from original sources.
- Citations should be inserted in the text as superscript numbers between square brackets, e.g. These regulations are endorsed by the World Health Organization,[2] and others.[3,4-6]
- All references should be listed at the end of the article in numerical order of appearance in the Vancouver style (not alphabetical order).
- Approved abbreviations of journal titles must be used; see the List of Journals in Index Medicus.
- Names and initials of all authors should be given; if there are more than six authors, the first three names should be given followed by et al.
- Volume and issue numbers should be given.
- First and last page, in full, should be given e.g.: 1215-1217 not 1215-17.
- Wherever possible, references must be accompanied by a digital object identifier (DOI) link). Authors are encouraged to use the DOI lookup service offered by CrossRef:

o On the Crossref homepage, paste the article title into the ‘Metadata search’ box.

o Look for the correct, matching article in the list of results.

o Click Actions > Cite

o Alongside 'url =' copy the URL between { }.

o Provide as follows, e.g.: https://doi.org/10.7196/07294.937.98x

Some examples:

- Journal references: Price NC, Jacobs NN, Roberts DA, et al. Importance of asking about glaucoma. Stat Med 1998;289(1):350-355. http://dx.doi.org/10.1000/hgjr.182

- Book references: Jeffcoate N. Principles of Gynaecology. 4th ed. London: Butterworth, 1975:96-101.
- Chapter/section in a book: Weinstein L, Swartz MN. Pathogenic Properties of Invading Microorganisms. In: Sodeman WA, Sodeman WA, eds. Pathologic Physiology: Mechanisms of Disease. Philadelphia: WB Saunders, 1974:457-472.
- Internet references: World Health Organization. The World Health Report 2002 - Reducing Risks, Promoting Healthy Life. Geneva: WHO, 2002. http://www.who.int/whr/2002 (accessed 16 January 2010).
- Legal references
- Government Gazettes:

  National Department of Health, South Africa. National Policy for Health Act, 1990 (Act No. 116 of 1990). Free primary health care services. Government Gazette No. 17507:1514. 1996.

  In this example, 17507 is the Gazette Number. This is followed by :1514 - this is the notice number in this Gazette.
- Provincial Gazettes:

  Gauteng Province, South Africa; Department of Agriculture, Conservation, Environment and Land Affairs. Publication of the Gauteng health care waste management draft regulations. Gauteng Provincial Gazette No. 373:3003, 2003.
- Acts:

  South Africa. National Health Act No. 61 of 2003.
- Regulations to an Act:

  South Africa. National Health Act of 2003. Regulations: Rendering of clinical forensic medicine services. Government Gazette No. 35099, 2012. (Published under Government Notice R176).
- Bills:

  South Africa. Traditional Health Practitioners Bill, No. B66B-2003, 2006.
- Green/white papers:

South Africa. Department of Health Green Paper: National Health Insurance in South Africa. 2011.

- Case law:

  Rex v Jopp and Another 1949 (4) SA 11 (N)

  Rex v Jopp and Another: Name of the parties concerned

  1949: Date of decision (or when the case was heard)

  (4): Volume number

  SA: SA Law Reports

  11: Page or section number

  (N): In this case Natal - where the case was heard. Similarly, (C) woud indicate Cape, (G) Gauteng, and so on.

NOTE: no . after the v

- Other references (e.g. reports) should follow the same format: Author(s). Title. Publisher place: Publisher name, year; pages.
- Cited manuscripts that have been accepted but not yet published can be included as references followed by '(in press)'.
- Unpublished observations and personal communications in the text must not appear in the reference list. The full name of the source person must be provided for personal communications e.g. '...(Prof. Michael Jones, personal communication)'.

5.6 Additional Tables

5.6.1 Table 3. Rome IV Criteria

For each age group, at least two criteria must be met for a minimum of one month:

| **Children with a developmental age of at least 2 years old** | **Infants < 4yrs** | **In toilet-trained children, the following additional criteria may be used:** |
|---|---|---|
| 2 or fewer defecations in the toilet/week | 2 or fewer defecations per week | At least one episode/week of incontinence after the acquisition of toileting skills |
| At least 1 episode of faecal incontinence per week | History of excessive stool retention | History of large-diameter stools that obstruct the toilet |
| History of retentive posturing or excessive volitional stool retention | History of painful or hard bowel movements | |
| History of painful or hard bowel movements | History of large-diameter stools | |
| Presence of a large faecal mass in the rectum | Presence of a large faecal mass in the rectum | |
| History of large-diameter stools that may obstruct the toilet | | |
| The symptoms cannot be fully explained by another medical condition. | The symptoms cannot be fully explained by another medical condition. | The symptoms cannot be fully explained by another medical condition. |

5.6.2 Table 4. Red Flags in Paediatric Functional Constipation

| **Identification of Red Flags** | **Non-specialist** | **Registrar** | **Private Paediatrician** | **State Paediatrician** | **Total** |
|---|---|---|---|---|---|
| Delayed passage of meconium | 25 (74%) | 33 (83%) | 22 (79%) | 14 (38%) | 94 (68%) |
| Intermittent diarrhoea | 8 (24%) | 12 (30%) | 11 (39%) | 15 (41%) | 46 (33%) |
| Failure to thrive | 27 (79%) | 36 (90%) | 27 (96%) | 31 (84%) | 121 (87%) |
| Bile-stained vomiting | 28 (82%) | 36 (90%) | 23 (82%) | 27 (73%) | 114 (82%) |
| Painful defaecation | 7 (21%) | 10 (25%) | 10 (36%) | 12 (32%) | 39 (28%) |
| Abnormal position of the anus | 21 (62%) | 29 (73%) | 21 (75%) | 28 (76%) | 99 (71%) |
| Cold intolerance | 6 (18%) | 15 (38%) | 11 (39%) | 17 (46%) | 49 (35%) |
| Abnormal neuromuscular exam | 33 (97%) | 37 (93%) | 27 (96%) | 35 (95%) | 132 (95%) |
| Anal retentive posturing | 3 (9%) | 4 (10%) | 5 (18%) | 4 (11%) | 16 (12%) |
| Soiling after achieving continence | 12 (35%) | 17 (18%) | 12 (43%) | 16 (43%) | 57(41%) |
| Absent anal wink | 20 (59%) | 26 (7%) | 20 (71%) | 24 (65%) | 90 (65%) |
| Total | 34 | 40 | 28 | 37 | 139 |

5.6.3 Table 5. Non-Pharmaceutical Management of Paediatric Functional Constipation

| **Non-Pharmaceutical Management** | **Optimise fibre intake** | **Optimise fluid intake** | **Establish a toilet routine** | **Implement a reward system** | **Psychologist/ behavioural therapist referral** |
|---|---|---|---|---|---|
| Never | 1 (1%) | 0 (0%) | 6 (5%) | 18 (14%) | 34 (25%) |
| Seldom (< 25% of the time) | 2 (2%) | 4 (3%) | 16 (12%) | 32 (24%) | 56 (42%) |
| Often (50% of the time) | 6 (5%) | 5 (4%) | 13 (10%) | 27 (20%) | 27 (20%) |
| Usually (>75% of the time) | 36 (27%) | 30 (23%) | 28 (21%) | 30 (23%) | 11 (8%) |
| Always | 88 (66%) | 94 (71%) | 70 (53%) | 25 (19%) | 6 (4%) |

5.6.4 Table 6. Preferred Method of Learning about Functional Constipation

| **Preferred Method of Learning** | **Non-specialist doctor** | **Registrar** | **Private Paediatrician** | **State Paediatrician** |
|---|---|---|---|---|
| Academic meeting with Powerpoint® presentation) | 24 (71%) | 19 (48%) | 13(46%) | 19 (51%) |
| Online lecture | 11 (32%) | 5 (13%) | 6 (21%) | 6 (16%) |
| Podcast | 9 (27%) | 15 (38%) | 5 (18%) | 7 (19%) |
| Journal review article | 19 (56%) | 17 (43%) | 13 (46%) | 22 (60%) |
| Publication of specific South African constipation guidelines | 23 (68%) | 28 (70%) | 23 (58%) | 24 (65%) |
| Other (Specify) | 0 | 0 | 0 | 1 (3%) |