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## Clinical profile and management outcomes of Intussusception in children in Uyo, South-South, Nigeria.

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### Abstract

**Background:** Intussusception is the most common cause of intestinal obstruction in infants and children in Sub-Saharan Africa, and it is frequently associated with significant morbidity and mortality if treatment is delayed.

**Objective:** To investigate the presentation, management, and outcomes of paediatric intussusception at the University of Uyo Teaching Hospital over a 10-year period.

**Materials and Methods:** This retrospective, descriptive study examined children diagnosed with intussusception from January 2014 to December 2023. Data were collected from case notes and included patient's demographics, clinical presentation, surgical procedures, intraoperative findings, and postoperative outcomes.

**Results:** A total of 180 patients were included, comprising 103 males and 77 females (male-to-female ratio: 1.33:1). Ages ranged from 2 months to 5 years (median: 6 months, IQR 5 – 7 months). Only 22 patients (12%) presented within 3 days of symptom onset. Idiopathic cases accounted for 97.2%. Ultrasonography confirmed the diagnosis in 77.8% of cases. Surgical treatment was required in 82.8% of patients, with ileocolic intussusception observed in 138 patients (76.7%). Manual reduction was performed in 38.3% of cases, while bowel resection was required in 44.4%. The overall complication rate was 40.0%, with surgical-site infections being the most common (21.1%). The mortality rate was 12.8%, with delayed presentation and reoperation identified as key predictors of mortality ( $p = 0.016$  and  $0.01$ , respectively).

**Conclusion:** Late presentation remains a significant challenge in managing intussusception in our setting, contributing to high morbidity and mortality. Surgical intervention is often necessary to manage these cases effectively.

**Keywords:** Delayed, Presentation, Intussusception, Intestinal, Obstruction, Paediatric Surgery.



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## Introduction

Acute intestinal obstruction (AIO) is a prominent cause of paediatric surgical emergencies, with its aetiology varying based on age and geographical location.<sup>1,2</sup> In infants, intussusception is the leading cause of AIO in Sub-Saharan Africa, resulting in significant morbidity and mortality when diagnosis or treatment is delayed. It occurs in approximately 1 to 4 in 2000 children worldwide and affects children of all ages, with 75% of cases occurring within the first two years of life and 90% within three years of life. The highest incidence is seen between the ages of 4 and 8 months.<sup>3,4</sup>

Intussusception, defined as the invagination of a proximal segment of the intestine into the adjacent distal segment, is one of the oldest known intestinal disorders and surgical emergencies. It was first documented in Amsterdam in 1600 by Babette and later detailed by Hunter in 1750, and it remains a frequent cause of intestinal obstruction in infants worldwide.<sup>5-7</sup> Over the years, the management of intussusception has evolved, shifting from primarily surgical interventions to the use of non-operative reduction techniques, such as pneumatic and hydrostatic enemas, which have significantly reduced morbidity and mortality in infants. It is noteworthy that in resource-limited settings like ours, delays in diagnosis and access to appropriate treatment remain major challenges. These delays contribute to disparities in the presentation, management, and outcomes of intussusception when compared to high-income countries.<sup>8</sup>

The aim of this study is to examine the presentation, management, and outcomes of intussusception in children at the University of Uyo Teaching Hospital. The primary objective is to investigate the clinical profile of patients with intussusception, while the secondary objective is to assess predictors of poor outcomes.

## MATERIALS AND METHODS:

### *Study Setting and Design*

This retrospective, descriptive study was conducted at the University of Uyo Teaching Hospital (UUTH), a tertiary referral centre in South-South Nigeria. The study covered a 10-year period from January 2014 to December 2023.

### *Study Population and Eligibility Criteria*

The study included all children aged 15 years and younger who were diagnosed with intussusception and received treatment at UUTH during the study period. Patients with incomplete records and those who did not complete treatment at UUTH were excluded. Given the retrospective nature of the study, a consecutive sampling

method was used, where all eligible cases within the study period were included.

### *Data Collection and Study Variables*

Data were extracted from patient case notes and surgical records using a structured data abstraction form. Extracted information included demographic details, clinical presentation, diagnostic methods, treatment modalities, intraoperative findings, and outcomes. Age was categorised into 2–5 months, 6–10 months, 11–15 months, 16–20 months, and >20 months, and delayed presentation was defined as >3 days after symptom onset. The seasonal distribution of cases was explored by grouping them into Dry season (November–March) and Rainy season (April–October), with the total number of cases as the denominator.

Clinical features assessed included signs and symptoms on admission and feeding history, while treatment-related variables were the mode of diagnosis (clinical vs. ultrasound confirmation), treatment modality (operative vs. non-operative), intraoperative findings (type of intussusception, gangrenous bowel, perforation), need for bowel resection and reoperation. Pathological findings were documented based on the presence or absence of a pathological lead point.

Patient outcomes were assessed in terms of postoperative complications, perioperative mortality, and length of hospital stay. The duration of hospitalisation was measured in days, from the time of admission to discharge or death.

### *Data Analysis*

Statistical analysis was conducted using SPSS version 24 for Windows. Categorical variables were summarised as frequencies and percentages, while continuous variables were expressed as medians with interquartile ranges (IQR). Normality of continuous variables was assessed using the Shapiro–Wilk test, and since the variables were non-normally distributed, they were reported as medians with interquartile ranges (IQR). Monthly case frequency was determined by counting the number of confirmed intussusception cases recorded each month over the 10-year study period.

Comparisons between seasonal distributions were conducted using the Mann-Whitney U test, and binary logistic regression was used to identify predictors of bowel resection and mortality, with results reported as odds ratios (OR) with 95% confidence intervals (CI). A p-value <0.05 was considered statistically significant.

**RESULTS**

**Demography**

A total of 180 patients were admitted during the study period. Of these, 103 (57.2%) were male, and 77 (42.8%) were female, resulting in a male-to-female ratio of 1.3:1. The patients' ages ranged from 2 months to 5 years, with a median age of 6 months (IQR: 5–7 months). The peak occurrence was observed between 6 and 10 months of age, accounting for 53.9% (97) of cases, as shown in Table 1.

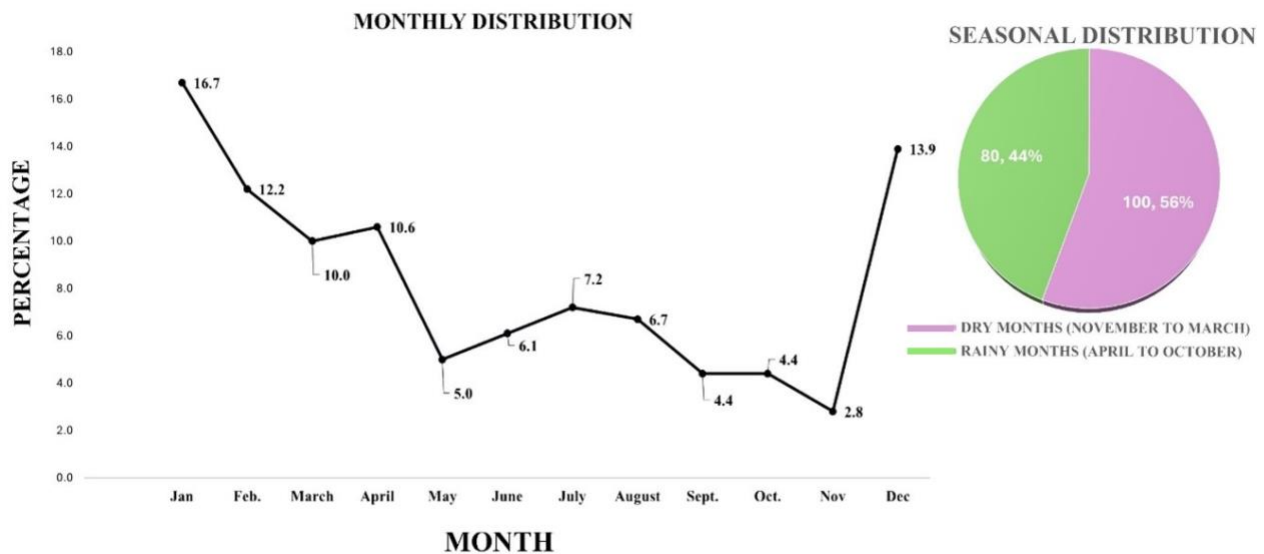
**Aetiology**

The aetiology was idiopathic in 175 patients (97.2%), while 2 patients (1.1%) had pathological lead points (an intestinal polyp and a lymphoma), and 3 (1.7%) developed postoperative intussusception. The majority of cases occurred during the dry season (November to March) (Figure 2), although the difference in frequency between the dry and rainy seasons was not statistically significant ( $z = -1.546, p = 0.149, r^2 = 0.199$ ). A total of 151 infants (83.9%) had been introduced to solid foods, while no feeding history was obtained for 29 patients (16.1%). Table 1 presents the common weaning foods used.

**Table 1 Demographic Variables of Patients with Intussusception**

VARIABLE	CATEGORY	FREQUENCY (n = 180)	PERCENTAGE (%)
Sex	Male	103	57.2
	Female	77	42.8
Age Group	2 – 5 months	69	38.3
	6 – 10 months	97	53.9
	11 – 15 months	5	2.8
	16 – 20 months	6	3.3
	> 20 months	3	1.7

**Figure 1 Monthly Frequency and Seasonal Distribution of Intussusception cases (n = 180) over a 10-year period (January 2014–December 2023)**



**Table 2 Common weaning foods used by parents**

<b>WEANING FOOD</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Guinea Corn Pap	130	72.2
White Maize Pap	12	6.7
Tom Brown	7	3.9
Canned Cereals	2	1.1
None/ No History Obtained	29	16.1
<b>Total</b>	<b>180</b>	<b>100</b>

**Clinical Presentation**

The clinical presentation varied among patients. Vomiting was the most common symptom, occurring in 177 patients (98.3%), followed by abdominal distension in 151 patients (83.9%) (Table 2). The classic triad of abdominal pain, a palpable abdominal mass, and bloody stools was observed in 46 patients (25.6%). A rectal mass was present in 59 patients (32.8%), of which twenty-nine (16.1%) had prolapsed from the anus.

The time from onset of symptoms to diagnosis ranged from 1 to 23 days, with a median of 7 days (IQR: 5–10 days). The highest frequency of patients (104 patients, 57.8%) presented between 4 and 7 days after symptom, while only 22 patients (12.2%) presented within the first 3 days (Table 2). Diagnosis was made clinically in all patients, and ultrasound confirmation was obtained in 140 patients (77.8%).

Bowel resection was significantly associated with delayed presentation of more than three days (OR = 2.020, 95%

CI [1.62–2.51],  $p < 0.001$ ). In contrast, neither age (OR = 0.948, 95% CI [0.76–1.17],  $p = 0.62$ ) nor the presence of peritonitis (OR = 0.938, 95% CI [0.75–1.164],  $p = 0.56$ ) were significantly associated with bowel resection. Ileocolic intussusception was the most common type encountered during surgery, occurring in 138 patients (76.7%). (Table 3). One hundred and thirty-two (132) complications were seen in 72 patients (40.0%), with superficial surgical site infections being the most frequent (38 cases, 21.2%). The range of complications is shown in Figure 3.

Following resuscitation, 149 patients (82.8%) underwent exploratory laparotomy. Of these, 80 patients required bowel resection, while 69 had manual reduction of the intussusception. Ileostomies were created for 38 patients (25 primary ileostomies and 13 secondary ileostomies). Table 3 summarises the treatment modalities for these patients.

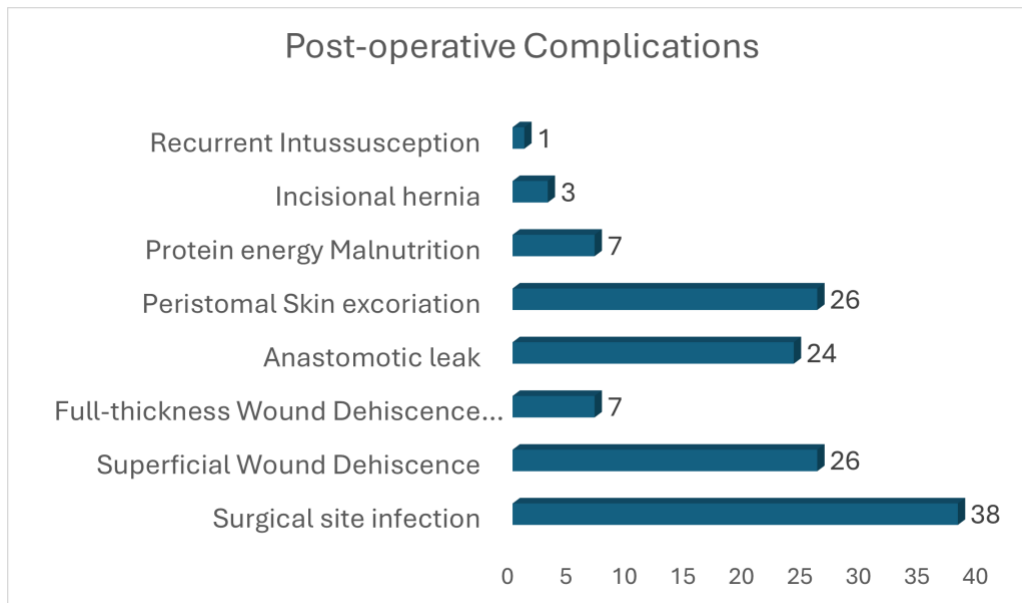
**Table 3 Clinical features at presentation**

<b>SYMPTOMS</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
<i>Vomiting</i>	177	98.3
<i>Abdominal distension</i>	151	83.9
<i>Red-currant jelly stool</i>	140	77.8
<i>Fever</i>	140	77.8
<i>Abdominal pain/Excessive Crying</i>	89	49.4
<i>Diarrhoea</i>	32	17.8
<i>Anal protrusion</i>	29	16.1
<i>Loss of consciousness/Seizures</i>	15	8.3
<i>Constipation</i>	8	4.4
<b>PHYSICAL FINDINGS</b>		
<i>Dehydration</i>	169	93.9
<i>Peritonism</i>	137	76.1
<i>Mass in rectum/Rectal Prolapse</i>	59	32.8
<i>Abdominal Mass</i>	46	25.6
<b>DURATION OF SYMPTOMS</b>		
1-3 days	22	12.2
4-7 days	104	57.8
>7 days	54	30.0
Total	180	100

**Treatment**

**Table 4 Treatment Modalities and Intraoperative findings**

<i>CATEGORY</i>	<i>FREQUENCY</i>	<i>PERCENTAGE</i>
<b>TREATMENT MODALITY</b>		
1. <b>Exploratory Laparotomy</b>	<b>149</b>	<b>82.8</b>
▪Manual Reduction	69	38.3
▪Bowel Resection	80	44.4
-Ileostomies	38	21.1
2. <b>Non-Operative Enema Reduction</b>	<b>11</b>	<b>6.1</b>
▪Hydrostatic	6	3.3
▪Pneumatic	5	2.8
3. <b>NONE</b>	<b>20</b>	<b>11.1</b>
▪Spontaneous resolution	11	6.1
▪Preoperative death	9	5.0
<b>TOTAL</b>	<b>180</b>	<b>100</b>
<b>INTRAOPERATIVE FINDINGS</b>		
A. Anatomical type of intussusception		
▪Ileocolic	138	76.7
▪Ileocaecocolic	6	3.3
▪Jejunojejunal	2	1.1
▪Ileoileal	2	1.1
▪Colocolic	1	0.6
B. Gangrenous Bowel	66	36.7
C. Bowel perforation	29	16.1



**Figure 2 Postoperative Complications**

Reoperation was required in 28 patients (15.6%), with anastomotic leakage as the most frequent indication in 19 children (10.6%), followed by full thickness wound dehiscence (Burst Abdomen) in 7 children (3.9%), ileostomy detachment in 1 child (0.6%) and recurrent intussusception in 1 patient (0.6%).

The length of hospital stay ranged from 3 to 60 days with a median of 10 days (IQR 7-14 days). A total of 23 mortalities were recorded (12.8%); 9 patients died before any intervention, while 14 died postoperatively. Binary logistic regression analysis identified delayed presentation (OR = 3.2, 95% CI [1.2–8.2],  $p = 0.016$ ) and reoperation (OR = 9.139, 95% CI [1.667–15.09],  $p = 0.01$ ) as significant predictors of mortality. In contrast, neither age (OR = 0.399, 95% CI [0.25–0.64],  $p = 0.65$ ) nor the presence of peritonitis (OR = 1.018, 95% CI [0.966–1.074],  $p = 0.48$ ) were significantly associated with mortality = 0.01) as significant predictors of mortality. In contrast, neither age (OR = 0.399, 95% CI [0.25–0.64],  $p = 0.65$ ) nor the presence of peritonitis (OR = 1.018, 95% CI [0.966–1.074],  $p = 0.48$ ) were significantly associated with mortality.

## Discussion

The study aimed to examine the patterns of presentation, management, and outcomes of intussusception in children over a 10-year period at the University of Uyo Teaching Hospital, Uyo. The age and gender of children studied were comparable to those reported in previous studies.<sup>10–16</sup> Intussusception is more common in children under 2 years old, particularly in infants aged 4 to 8 months, with a higher prevalence in males. The children in this study ranged in age from 2 months to 5 years, with the majority falling between 6 to 10 months, accounting for 53.9% of the cases.

In this study, 97.2% of cases were classified as idiopathic intussusception, with no identifiable pathological lead point. This finding is consistent with previous reports in the literature.<sup>10,11,17,18</sup> Pathological lead points were observed in only 1.1% of cases, a frequency that aligns with established data suggesting that such abnormalities are relatively rare in paediatric intussusception.<sup>3,19,20</sup> These lead points, such as Meckel's diverticulum or intestinal polyps, are more common in neonates or older children.<sup>21,22</sup> Postoperative intussusception accounted for 1.7% of cases, a finding also in line with prior studies which have linked postoperative occurrences to abnormal peristalsis during the resolution of ileus.<sup>21</sup> Our findings confirm the high proportion of idiopathic cases in this age group, which frequently occur at the ileo-colic junction, the site of lymphoid hyperplasia. Hypertrophy of the Peyer patches, which can be said to act as a lead point, is triggered by common viral infections, such as adenovirus or rotavirus, as well as food allergies from introduced weaning foods.<sup>23</sup> Early introduction of solid foods and cereals before the age of 6 months, a common practice in our subregion, may stimulate hypertrophy of Peyer's patches, contributing to the development of intussusception.<sup>24–27</sup> Over 83% of our patients had history of commencing weaning feeds, in particular guinea corn cereal (72.2%), prior to the onset of the illness. However, while this observation is notable, our study cannot draw a conclusion of direct causal relationship between weaning practices and the onset of intussusception.

Intussusception rates have been shown to vary seasonally, correlating with peaks in respiratory and gastrointestinal viral infections. In our study, 56% of cases occurred during the dry season (November to March), and 44% during the rainy season (April to October). This pattern is consistent with other studies from our subregion.<sup>10,11,28</sup> However, the seasonal difference in case frequency was not statistically significant in our study ( $p = 0.149$ ), which is in accordance with the results of other studies.<sup>14,29–31</sup> One possible explanation for the lack of statistical significance in our sample is that we did not control for confounding factors such as the local weaning practices which do not follow seasonal patterns. As stated before, the early introduction of solid foods is a common practice in our subregion and might contribute to the occurrence of intussusception independently of the season.

The duration of symptoms and timing of hospital presentation are key factors in predicting the severity of intussusception and patient outcomes.<sup>32</sup> In our study, most patients (57.8%) presented with a 4–7-day history of symptoms. This is consistent with other studies in our subregion, where patients typically present within 3 to 5 days of onset.<sup>11,13–15</sup> In contrast, in developed countries, most patients present within 24 hours of symptom onset, which leads to earlier intervention and better outcomes.<sup>16,33</sup>

Delayed presentation is often due to misdiagnosis. Patients with intussusception may present with a variety of symptoms, mimicking more benign conditions such as gastroenteritis, sepsis, and rectal prolapse.<sup>22</sup> Some infants may manifest only lethargy or altered consciousness, while older children may experience only pain.<sup>34</sup> As a result, diagnosing intussusception can be challenging for nonspecialists due to its nonspecific presentations, leading to delayed referrals. This challenge is reflected in our study where over three-quarters of our patients presented with features consistent with intestinal obstruction and bowel ischemia. These included vomiting (98.3%), abdominal distension (83.9%), bloody mucoid stools resembling red currant jelly (77.8%), and fever (77.8%). The classic

clinical triad of Ombredanne, which consists of intermittent abdominal pain, red currant jelly stool, and a sausage-shaped abdominal mass, was found in 25.6% of our patients. A sausage-shaped mass is sometimes palpable in the right abdomen, especially in patients who present early.<sup>29</sup> These findings are consistent with reports from other studies, where this classic triad is observed in rates ranging from 7.5% to 40% of patients.<sup>10,23,35,36</sup>

We found that 82.8% of our patients required an exploratory laparotomy, with either manual reduction of the intussusception (38.3%) or intestinal resection in the presence of bowel perforation or gangrene (44.4%). Reports from our subregion confirm that the surgery rates remain high, ranging from 74.6% to 100%.<sup>10,13,37,38</sup> The commonest reasons cited are delayed presentation and a lack of the expertise required for enema reductions.<sup>10,11,38,39</sup> Over 44.0% of our patients had bowel resections. This rate is less than the figure reported by Bode, who had 70.4% of his patients requiring intestinal resection, but similar to the findings by Talabi *et al.*<sup>37</sup>, Ogundoyin *et al.*<sup>13</sup>, Ajao *et al.*<sup>38</sup> and Chalya *et al.*<sup>10</sup> who reported rates of 41.0%, 43.6%, 43.8% and 46.4%, respectively. A delayed presentation more than three days after the onset of symptoms was significantly associated with a higher risk of intestinal resection in this study ( $p < 0.001$ ). This was in keeping with findings from other studies where prolonged duration of symptoms was associated with the need for operative management and/or bowel resection in the management of childhood intussusception.<sup>11,13,37,38</sup> In addition to the bowel resections, 21.1% of our patients who had or were at risk of having anastomotic complications were given temporary ileostomies, which is recommended to control sepsis and reduce the associated morbidity and mortality.<sup>40-42</sup>

In this study, 40.0% of patients experienced complications, with superficial surgical site infections being the most common (38 cases, 21.2%). The frequency and spectrum of complications in this study are similar to those reported in other studies.<sup>3,10,13,15,43</sup> The reoperation rate was 15.6%, with anastomotic leakage being the commonest indication in 10.6% of our patients, consistent with previous reports.<sup>44</sup> One patient (1.6%) had a recurrence after an initially successful pneumatic enema reduction. This rate is lower than what is reported in the literature, where recurrence rates range from 6 to 10% after enema reductions and are almost nonexistent after operative interventions.<sup>44-46</sup> Our low figure reflects the small number of enema reductions in this study.

In developed countries, death from intussusception is rare; however, reports from Nigeria and the African continent show mortality rates ranging from 8 to 33.7%.<sup>10,12,14,37,38,47-49</sup> This is consistent with a report that highlights high mortality rates among children in low-income countries undergoing emergency surgery, particularly within the first 24 hours.<sup>50</sup> For this reason, intussusception is thought to be underreported in Africa, especially for out-of-hospital deaths, where delayed diagnosis and referral obscure the true disease burden.<sup>8,46,49</sup> The mortality observed in this study was 12.8%, which aligns with the other reports.<sup>10,44,47</sup> In this study, delayed presentation ( $p = 0.016$ ) and reoperation ( $p = 0.01$ ) were identified as significant predictors of mortality, whereas age and the presence of peritonitis were not significant predictors ( $p = 0.65$  and  $p = 0.48$ , respectively). These findings reflect challenges in patient care, including referral delays, disease progression, and limited access to timely intervention.

#### Limitations

We acknowledge that this study has limitations, and thus, we should interpret our results with caution. One limitation is the potential to introduce a selection bias due to its retrospective design.<sup>51</sup> Moreover, the study being single-centre and retrospective limits the generalizability of the results. In addition, the relatively wide confidence interval for reoperation as a predictor of mortality reflects the smaller subset of patients requiring reoperation, which may limit the precision of the estimate. Therefore, we recommend that a multicenter prospective study with a larger sample be conducted to obtain a more comprehensive view of the epidemiology of intussusception in our subregion.

#### Conclusion

Intussusception is a common paediatric surgical emergency affecting infants and young children. The cause of intussusception in infants is not well understood, but it has been linked to factors that trigger an allergic response in the gastrointestinal tract. The impact of the introduction of the rotavirus vaccination for infants in Nigeria on the incidence of intussusception is yet to be determined. Late presentation presents challenges in patient management, resulting in a high rate of operative intervention and increased morbidity and mortality. To improve early diagnosis and achieve outcomes comparable to those seen in high-income countries, we recommend that population-level health education be improved, as well as training for primary healthcare providers. It is also critical to strengthen

referral channels from primary care settings to specialist care facilities.

**Ethical Considerations:** The study was conducted in compliance with the guidelines of the Helsinki declaration on research in human subjects.

**Conflict of Interest:** We declare no conflict of interest.

**Authorship:** All authors attest to and meets the current international committee of Medical Journals Editors (ICMJE) criteria for authorship

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