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ORIGINAL ARTICLE

How to establish a successful bowel management programme in children: a tertiary paediatric centre experience

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Abstract

Background Bowel management is a term used to describe a medical approach to the management of faecal incontinence.

Aims To present the outcomes of an individualised bowel management programme developed by a tertiary paediatric centre and evaluate contributory factors for successful bowel management in children.

Methods A retrospective review of children attending a bowel management clinic in a tertiary centre in Dublin, Ireland, over 5 years (2010–2015). The main outcome measure was the ability to achieve a regular bowel pattern and remain socially clean. Multiple linear regression analyses were used to determine the factors contributing to successful bowel management.

Results One hundred ninety-two children attended the clinic over 5 years. The median age at commencement of washouts was 7 years. Underlying diagnosis was spina bifida in 50%, imperforate anus in 17.7%, Hirschsprung's disease in 14.6%, idiopathic constipation in 7.8%, and other conditions in 9.9% of patients. Children with spina bifida and Hirschsprung's disease preferred Peristeen washouts, while those with imperforate anus and idiopathic constipation preferred Willis washouts ($p < 0.001$). Our programme was successful in 93.7% of cases. Regression analysis showed that the underlying condition ($p < 0.001$), washout medication ($p = 0.016$), and individuals administering washouts ($p < 0.001$) contributed to a successful bowel management programme.

Conclusion Treatment protocols should be individualised based on the underlying condition and outcomes. Decision-making must be cognisant of the physical, social, psychological, and developmental needs of the child and family. A partnership approach is advocated, which includes child and parent/carer preferences allowing them to make an informed decision.

Keywords Bowel management · Bowel washout · Children · Constipation · Faecal incontinence

Introduction

Bowel management is a term used to describe a medical approach to the management of faecal incontinence. The aim of an individualised bowel management programme (BMP) is to render a child with faecal incontinence socially clean. Faecal incontinence has a major negative impact on physical and psychological health and lifestyle [1], with severe social restrictions in many cases [2]. Achieving continence is an important milestone in any child's development. Failure to achieve this milestone can impede a child's social and psychological development [3].

Faecal incontinence is described as 'the involuntary loss of flatus, liquid or solid stool that is a social or hygienic problem' [4]. Faecal incontinence can be divided into two categories: true incontinence and pseudo-incontinence [1]. Bischoff et al. describe true faecal incontinence as the lack of the ability to have voluntary bowel movements [1]. This may be due to congenital malformations with a poor functional prognosis (spina bifida, tethered cord, sacrococcygeal teratoma) or loss of the integrity of the anal canal due to previous operations (Hirschsprung's disease, anorectal malformation) [5]. On the

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other hand, children with pseudo-incontinence have poorly treated constipation, which may be idiopathic or post successful corrective surgery, and are behaving as faecally incontinent [1]. According to EUROCAT, anorectal malformation occurs in 1 in 4360 live births and Hirschsprung's disease occurs in 1 in 6450 live births [6]. Spina bifida occurs in 1 in every 1000 live births in Ireland, one of the highest figures worldwide [7].

A successful BMP enables a child to develop a regular bowel pattern and remain socially clean. An individualised programme must be tailored to each patient and requires time, effort, and constant adjustments. This can only be performed with intensive involvement of a colorectal clinical nurse specialist (CNSp). This study describes the profile of children attending a bowel management clinic in a large tertiary paediatric hospital, presents their treatment protocols and outcomes, and evaluates the contributory factors for a successful BMP in children. We will also provide an overview of the available trans-anal irrigation devices and their implications in clinical practice.

Material and methods

A retrospective review was undertaken of the healthcare records of all children ($N = 192$) attending the bowel management clinic, in the largest tertiary paediatric centre in Ireland over a 5-year period (2010–2015). These patients were identified during routine clinic visits and referred accordingly if they had ongoing issues with faecal incontinence or refractory constipation. Referrals were made at the discretion of the primary surgical team. All children underwent an initial evaluation by the CNSp and primary surgeon to establish that the child is faecally incontinent and attempt to distinguish between true and pseudo-incontinence. An individualised BMP is commenced after a complete history, clinical examination, review of medical and operative records, and a baseline plain film of the abdomen. Follow-up is paramount to success and the CNSp performs this.

All patients, regardless of the type of faecal incontinence, must complete the first stage of the BMP before trans-anal irrigation is considered (Fig. 1). If faecal loading is identified on the baseline abdominal X-ray, it is recommended to treat this with oral medications or rectal enemas. After successful disimpaction, maintenance medication is prescribed. This first stage involves monitoring the patient's fluid and fibre intake. The child and parent at home document this for at least a 1-week period. The type of stool (using the Bristol Stool Chart) [8] and frequency is also documented. The child and parent are educated on the anatomy and physiology of the bowel. This is important so they can understand the reasoning for timed toileting. We use timed toileting in the first stage of treatment to take advantage of the gastrocolic reflex. After a period of 6 months, the child's progress is reviewed by the primary surgical team and CNSp, and if there is little or no improvement, then true incontinence is likely and trans-anal irrigation is instituted. Once it is established that trans-anal irrigation is required, we use our washout suitability tool (Fig. 2), to decide which irrigation equipment is most suitable for the child. Severity scores, such as the Faecal Incontinence Severity Index (FISI) [9], are not routinely used in our centre.

Data was collected on patient demographics, age at commencement of treatment, underlying diagnosis, treatment option(s), outcomes, duration of treatment, and continence scores. Success of our BMP was defined as the child being clean with absence of soiling both during the day and at night. Chi-square test and one-way analysis of variance (ANOVA) were used for statistical analysis and a probability value of < 0.05 was regarded as significant. Multiple linear regression analysis was used to determine potential contributory factors for a successful BMP. Approval for this study was obtained from our institutional ethics committee.

Results

One hundred ninety-two patients [105 (55%) male, 87 (45%) female] were divided into five groups according to their condition (Fig. 3). Other conditions included pelvic tumours, sacrococcygeal teratomas, and pelvic or spinal traumas. In our cohort, all children required trans-anal irrigation after the first stage of the BMP. In retrospect, this is likely due to the severity of the underlying condition of children referred to our bowel management clinic as a last resort to managing their faecal incontinence. The median age at commencement of washouts was 7 years (range, 2–17 years). The different bowel management strategies used included the Willis washout system in 87 (45.3%), Peristeen® system (Coloplast Ltd., UK) in 70 (36.4%), Braun® system (Braun Medical Ltd., UK) in 8 (4.2%), and rectal tube irrigation in 3 (1.6%) cases. In addition, 24 (12.5%) patients went on to have an antegrade continence enema (ACE) procedure. The different bowel washout systems in relation to underlying diagnosis are outlined in Table 1.

Our BMP was successful in 180 (93.7%) cases, with the child being able to achieve a regular bowel pattern and remain socially clean. Of those, 13 (6.8%) children (10 idiopathic constipation, 2 anorectal malformation, 1 Hirschsprung's disease) were able to discontinue washouts and continue to achieve faecal continence. The frequency of washouts was tailored to individual outcomes. Washouts were performed daily in 28 (14.6%) cases, alternate days in 106 (55.2%) cases, three times per week in 52 (27.1%) cases, and once a week in 6 (3.1%) cases. The BMP was unsuccessful in 12 patients who continued to have soiling episodes. However, this was not related to the type of washout system used but rather as a result of non-compliance to medications or washouts and difficult

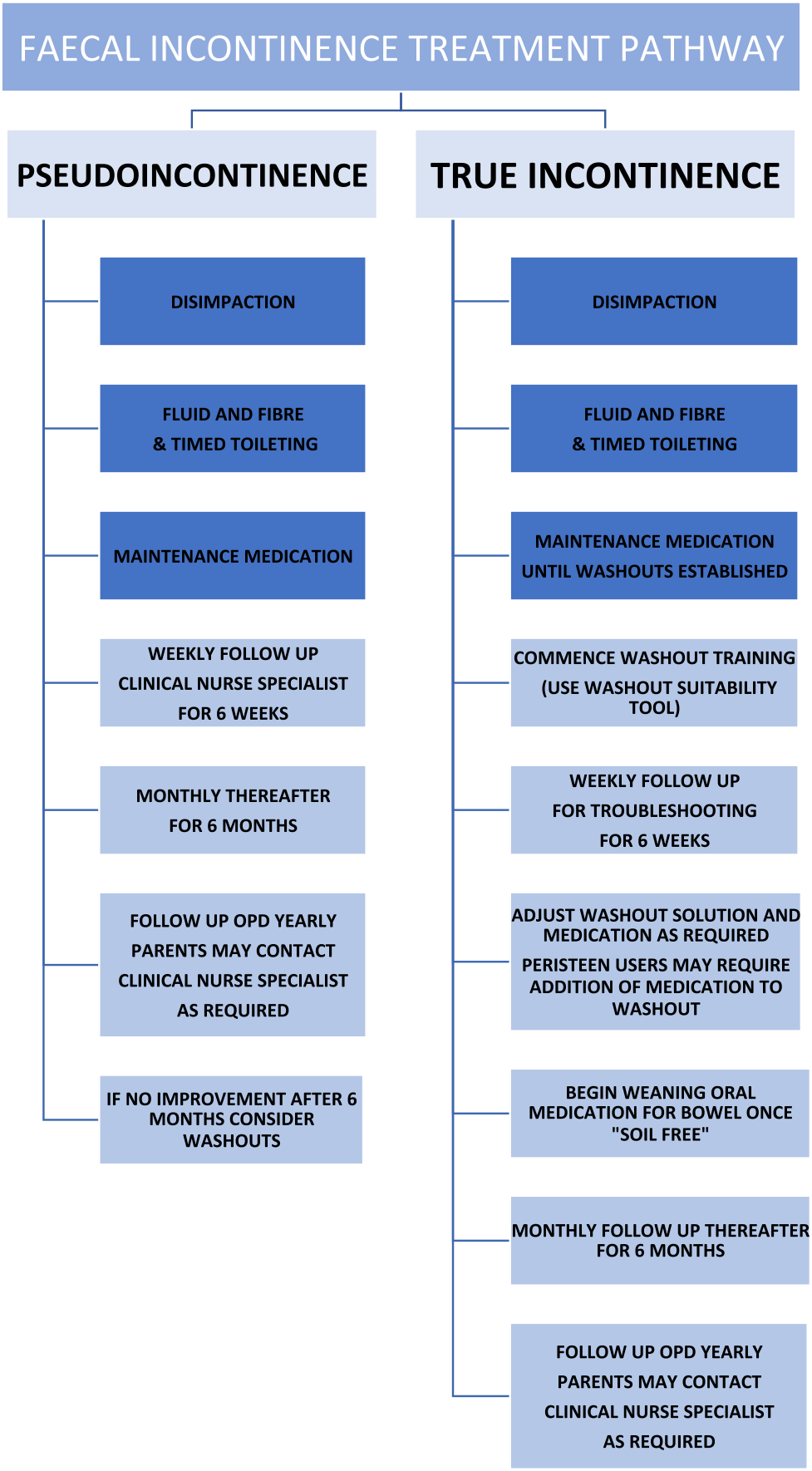

Fig. 1 Faecal incontinence treatment pathway [first stage of bowel management programme (dark shaded boxes)]

Fig. 2 Washout suitability tool

WASHOUT SUITABILITY TOOL		WILLIS WASHOUT	BRAUN IRIMATIC PUMP	PERISTEEN	RECTAL CATHETER WITH SYRINGE
AGE	≤ 3 YEARS OF AGE				√
	≥3 YEARS OF AGE	√	√		
	≥7 YEARS OF AGE	√	√	√	
COST YEARLY €	SELF-FUNDED	180	750	2500	180
	ASSISTED	√		√	√
INDEPENDENCE	SELF			√	
	ASSISTED	√	√		√
PHYSICAL FACTORS	PATULOUS ANUS	√	√		
	ANAL SENSATION	√	√		
	REFLEX ACTIVITY	√	√		
	POOR DEXTERITY	√	√		
	GOOD DEXTERITY			√	
	BALANCE			√	

follow-up due to social reasons. No complications or adverse effects due to washouts were noted during the studied period.

Regression analysis showed that the underlying condition ($p < 0.001$), medications in the washout ($p = 0.016$), and individuals administering the washouts ($p < 0.001$) were potential contributory factors for a successful BMP (Table 2). Children with spina bifida [63 (65.6%)] had a preference towards Peristeen®, in contrast to those with imperforate anus [26 (76.5%)] and idiopathic constipation [10 (66.7%)] who preferred the Willis washout system ($p < 0.001$). Although our data showed that patients with Hirschsprung's disease preferred either Peristeen® or Willis washouts, in our experience, such patients are more likely to be compliant with the Peristeen® washout. Therefore, we recommend this type of washout for patients with Hirschsprung's disease. In most cases, the parents/carers were doing the washouts [151 (78.6%)]. Of the 41 patients performing the irrigation themselves, 23 (56.1%) had spina bifida versus 4 (9.8%) Hirschsprung's disease, 5 (12.2%) imperforate anus, 2 (4.9%) idiopathic constipation, and 7 (17%) with other conditions ($p < 0.001$).

Discussion

We have been very successful with our BMP, with the ability of the child to achieve a regular bowel pattern and remain socially clean in 93.7% of patients. Of those, 6.8% have been able to discontinue washouts and continue to remain socially clean. Also, in more than 30% of cases, we were able to wean down the frequency of wash outs to three times a week or less. In a comprehensive literature review by Mosiello et al. of children with functional or neurogenic bowel dysfunction, the average success rate of trans-anal irrigation was estimated to be 78% for faecal incontinence [10]. Another review by Bray et al. reported success rates of up to 90% in children with neurogenic bowel [11]. Appropriate choice of washout equipment and strict CNSp follow-up have allowed us to achieve a higher success rate with trans-anal irrigation.

Our study has shown that the underlying condition has a significant impact on the success of the BMP. Of the 12 patients that continued to soil, 6 had an anorectal malformation, 5 Hirschsprung's disease, and 1 spina bifida. Although non-compliance to medications or washouts was a major contributory factor, the severity of the underlying malformation cannot be overlooked. It is in this group of patients that the availability of a dedicated CNSp cannot be over emphasised.

Regression analysis (Table 2) showed that patients with Hirschsprung's disease and anorectal malformation were less likely to achieve social cleanliness compared to patients with spina bifida, idiopathic constipation, and traumatic pelvic injuries and pelvic tumours. This is probably related to the loss of the integrity of the anal canal due to previous operations (Hirschsprung's disease, anorectal malformation). Forty-one children (21%) performed the washouts independently and this was associated with higher social cleanliness rates when compared to those performed by a parent or carer. This is a reflection of increased motivation and determination in those children who managed to achieve independence, without reliance on the availability of the parent/carer to perform the washouts. Although independent use is encouraged, this relies on the underlying pathology and maturity of the patient [10]. Moreover, the frequency of washouts depends on clinical response and should be adjusted accordingly.

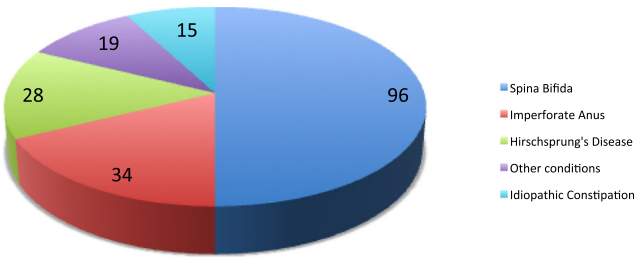

Fig. 3 Patient stratification based on underlying condition [*n* (%)]

Table 1 The type and duration of rectal washouts according to underlying condition

Underlying conditions (*N*)	Type of washout, *N* (%)				
	Peristeen® 87 (45.3%)	Willis 70 (36.4%)	Braun® 8 (4.2%)	Tube 3 (1.6%)	ACE 24 (12.5%)
Hirschsprung's disease (28)	11 (39.3%)	12 (42.8%)	3 (10.7%)	1 (3.6%)	1 (3.6%)
Imperforate anus (34)	6 (17.6%)	26 (76.5%)	2 (5.9%)	0 (0%)	0 (0%)
Spina bifida (96)	63 (65.6%)	18 (18.8%)	2(2.1%)	0 (0%)	13 (13.5%)
Idiopathic constipation (15)	3 (20%)	10 (66.6%)	1 (6.7%)	0 (0%)	1 (6.7%)
Other conditions (19)	4 (21.1%)	4 (21.1%)	0 (0%)	2 (10.5%)	9 (47.3%)
Mean duration of washout (months) [mean ± standard deviation]	17.16 ± 20.63	28.32 ± 38.44	0.34 ± 2.53	0.81 ± 6.44	9.68 ± 27.66

Patients with ongoing soiling are placed initially on daily washouts and weaned accordingly. Adding bisacodyl to the irrigation solution was also associated with favourable outcomes.

The CNSp role within the multidisciplinary team is to assess patients with faecal incontinence and establish a programme that will deem the patient socially clean. The European Society for Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN)/North American Society for Paediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) and NICE guidelines both state that education and demystification are the first steps before treating children with bowel dysfunction [10]. These steps along with other non-pharmacological therapies such as a toilet programme and adequate fibre and water intake are performed by our CNSp and further reinforced at each clinic visit or telephone call as necessary.

The use of trans-anal irrigation to manage constipation with or without faecal incontinence that is refractory to conservative methods is well established in the literature [10, 11]. However, the majority of published articles focus on success achieved using one type of irrigation equipment [1, 5, 10]. This is the first study covering a wide spectrum of conditions and a variety of irrigation equipment and indeed the first to outline which system best suits the patient. Although this offers more choices to the patient, experience has shown us that it is not advantageous for patients to choose their own equipment. We have found that there must be criteria for each equipment type, i.e., washout suitability tool.

Once the child is commenced on irrigation, the most important part of the BMP is the follow-up. Education by the CNSp is needed to ensure the parent and child know how to perform the irrigation. Prescribing an enema and assuming that the parent knows what it is and how to use it frequently lead to treatment failure [5]. Initially, weekly phone calls to the parent allowed authors to discuss progress and make adjustments to the irrigation if needed. Adjustments included increasing the volume of solution, adjusting the dose of medication used in the solution, changing the frequency of washouts, and adjusting oral medication. Parents and children alike need to have realistic expectations about the irrigation programme in order to adhere to it. It is unrealistic to expect immediate cessation of faecal incontinence. The use of daily

Table 2 Logistic regression analysis of significant factors contributing to a successful bowel management programme

Variable		Continence score		*p* value
		Social cleanliness	Soiling	
Underlying condition	Hirschsprung's disease*	23 (82.1%)	5 (17.9%)	$p < 0.001$*
	Imperforate anus*	28 (82.4%)	6 (17.6%)	
	Spina bifida	95 (99%)	1 (1%)	
	Idiopathic constipation	15 (100%)	0 (0%)	
	Other conditions	19 (100%)	0 (0%)	
Performed by	Carer/parent	139 (92%)	12 (8%)	$p < 0.001$
	Child	41 (100%)	0 (0%)	
Medication in washout		112 (91.8%)	10 (8.2%)	$p = 0.016$

* Post pull-through surgery (Hirschsprung's disease, imperforate anus) versus non-surgical cases (spina bifida, idiopathic constipation, other conditions)

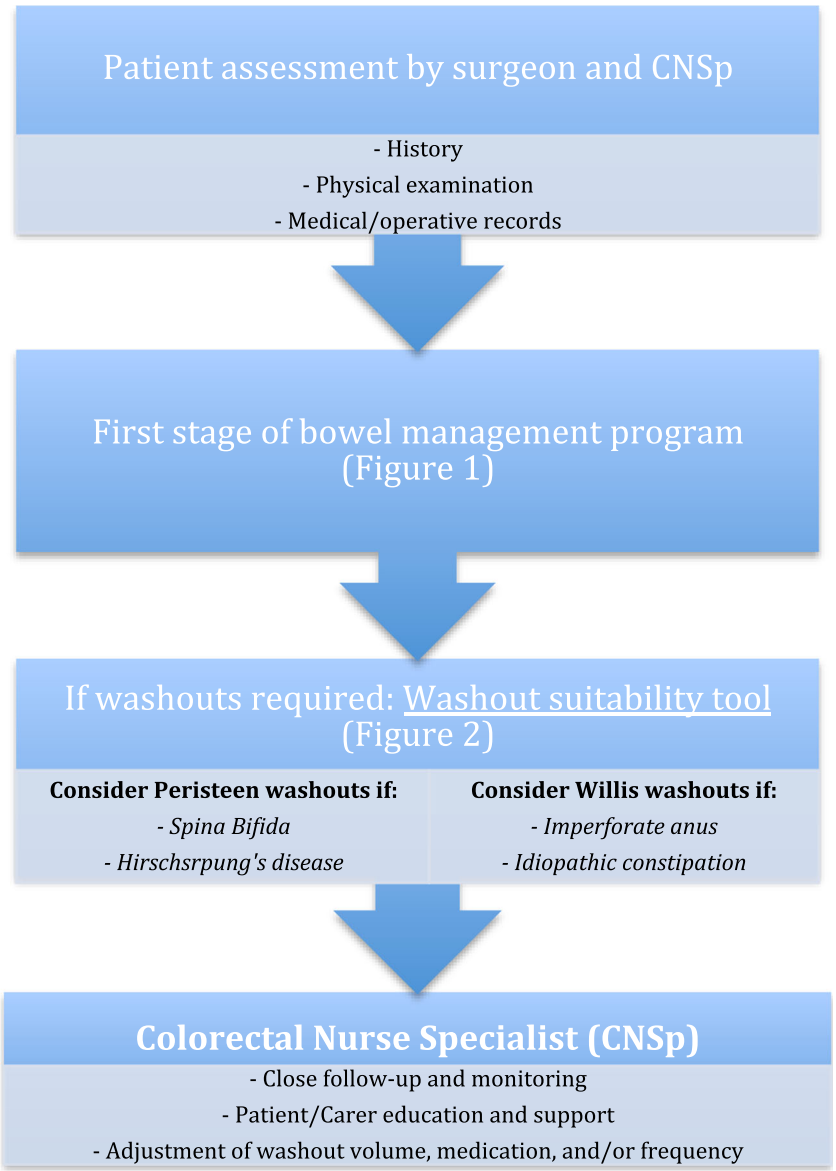

Fig. 4 Flow chart for establishing a successful bowel management programme

irrigations initially will allow for better results and allow the child and parent to become accustomed to the system.

Historically, the rectal tube washout and the Willis washout system were used for trans-anal irrigation [12]. The use of the rectal catheter with the syringe is ideal for the child under 3 years of age. Irrigation is usually performed in this group due to high-frequency stool output post stoma closure or the need for enemas and irrigation to treat constipation.

The Willis washout system dates back to 1978 [12] and was originally designed for colostomy irrigation by Hollister ® (Hollister Incorporated, UK). It involves a cone attached to a water bag. The water bag holds the irrigation solution and flows by gravity and a handheld regulator controls the flow of the water. The cone is lubricated and inserted into the anus and the irrigation solution is instilled over a period of 5 min. The cone must be held in place a further 5 min so to allow the solution to take effect. The cone is then removed and the child must stay on the toilet for 30–40 min. The bowel response may be immediate or may take up to 30 min, occasionally longer.

The Braun® irrimatic pump is similar to the Willis washout system in that a cone is used [13]. However, it is a unique electrical irrigation system that does not require manual pumping of water. This system is less commonly used, as the patient must purchase it since it is not available on the Primary Care Reimbursement Service in Ireland. In 2010, the Peristeen® system was introduced to our centre. This system introduces water into the rectum via the anus using a catheter. The balloon on the catheter is inflated to hold the catheter in place allowing for greater independence. A manual pump then introduces the water. Peristeen® washouts can reach stool as far up as the splenic flexure, therefore enabling a more complete emptying [3].

The addition of medication is not a new concept. Historically, in this centre, the standard washout solution was normal saline 20 ml/kg plus bisacodyl enema. The amount of bisacodyl ranged from 5 to 10 mg depending on age and response. This irrigation solution was used with the Willis washout system. The purpose of the bisacodyl is to stimulate the bowel to achieve complete emptying. Other centres use phosphate enema, glycerin, or soap in the irrigation solution [5]. Due to the potential of electrolyte imbalance when using phosphate enema [14, 15], this centre uses bisacodyl enema. With the advent of the Peristeen® system, irrigation solution was water only. However, the authors found that patients who had previously been using the Willis washout system with bisacodyl did not have the same success with Peristeen® and water alone. In this cohort of patients, 5–10 mg of bisacodyl was added to the water.

It can prove difficult for children to perform irrigation independently. The Peristeen® system is the only system designed to be used independently. A child needs to be able to understand how to assemble the Peristeen® system and to insert the catheter into the rectum. This requires intellectual competence, dexterity, and balance. The Willis and the Braun® require the full or partial assistance of a carer. The cone is held in place for the duration of the solution instillation, which can take up to 5 min. Following this, the cone must be held in place for a further 5 min to allow the bisacodyl to take effect. This can prove difficult for a child to do and so will need some degree of assistance. Interestingly, our study showed that higher success rates were found when the child performed the washout rather than the parents or carers.

In this centre, some patients are considered eligible for the antegrade continence enema (ACE) after a period of successful trans-anal irrigation. Some patients opt for this alternative to acquire a greater degree of independence. However, with the availability of the Peristeen® system, independence can be achieved without the need for an ACE.

There are several limitations to this study. This was a retrospective single-institution study, which has inherent biases. The practice and approach to faecal incontinence differ across institutions, and so, our results may not reflect other common practices. Also, although our algorithms were used across a large cohort of patients, they were developed based on our experience and are therefore not standardised systems.

Conclusion

For a successful BMP, treatment protocols need to be individualised based on underlying condition and outcomes. Decision-making must be cognisant of the physical, social, psychological, and developmental needs of the child and their families. A partnership approach is advocated, which involves the child and parent/carer preferences allowing them to make an informed decision. A number of factors affect the efficiency of the irrigation and the BMP. Patients must be assessed individually and a BMP tailored accordingly. The authors believe every child should have the chance to be socially clean. A successful bowel management programme takes time and effort and needs to be flexible to change. Both carer/parents and the child need to be adequately motivated and compliance with washouts must be closely monitored. Also, frequency and washout volume and medications in the washout solution need to be adjusted to achieve the desired outcome. The requirement of close follow-up by a colorectal nurse specialist is paramount to achieve success.

A dedicated service along with structured treatment protocols is needed to successfully treat paediatric faecal incontinence. Based on our experience, and by analysing factors that potentially contributed to a successful BMP, the authors propose the following algorithm for establishing and achieving a successful BMP (Fig. 4).

Compliance with ethical standards

Ethics statement For this type of study, formal consent is not required. This article does not contain any studies with human participants or animals performed by any of the authors.

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