

# Management of bloody diarrhoea in children in primary care

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Bloody diarrhoea is an uncommon symptom in children, and it may indicate the presence of serious disease. This review focuses on children presenting in a primary care setting. The non-specialist should be aware of the likely causes, initial management, and indications for specialist referral. The emphasis is on children in the developed world, although traveller's diarrhoea is also considered. The epidemiology and management of this condition are different in the developing world, where infectious causes predominate. In recent years the reported incidence of inflammatory bowel disease increased greatly in the developed world and important advances have been made in its management. This diagnosis should always be considered carefully.

## What are the most likely causes of bloody diarrhoea in children?

The likely diagnoses vary depending on age (box). At every age intestinal bacterial infections are an important cause. Inflammatory bowel disease may occur at any age but is more likely in older children (>1 year). In young infants non-specific (perhaps allergic) colitis is most likely. Other conditions are rarer but should be considered as they can be serious and even life threatening.

## How common is infection compared with inflammatory bowel disease?

This is an important question because if it is assumed that bloody diarrhoea is caused by infection then inflammatory bowel disease will be missed. Because of this common assumption, children with inflammatory bowel disease often experience a delay in diagnosis.<sup>1</sup>

In the United Kingdom, the most likely causative infective agents are species of *Campylobacter*, *Salmonella*, and *Yersinia*. Much less often, *Shigella*, types of *Escherichia coli* that produce shiga toxin (such as *E coli* 0157:H7), and other organisms are responsible. In the developing world other disorders including bacterial (*Shigella*) and amoebic (*Entamoeba histolytica*) dysentery are important. This should be considered in those who have recently been overseas.

Determining the incidence of infection as a cause of bloody diarrhoea is not simple, but an estimate can be made. A prospective cohort study in the UK found that 1:30 people (adults and children) presented to their general practitioner annually with gastroenteritis.<sup>2</sup> Bacterial gastroenteritis was confirmed in a minority of cases. The annual incidences of specific bacterial isolates (per 1000 population) were *Campylobacter* 4.14 (95% confidence interval 3.34 to 5.13), *Salmonella* 1.57 (1.19 to 2.06), *Yersinia* 0.58 (0.42 to 0.88), *Shigella* 0.27 (0.16 to 0.47), and *E coli* 0157:H7 0.03 (0.01 to 0.11). Reports to the UK Health Protection Agency's centre for infections suggest that about 15% of *Campylobacter*, 30% of *Salmonella*, and 50% of *Yersinia* infections are in children ([www.hpa.org.uk](http://www.hpa.org.uk)). Thus, in a primary care setting the annual incidence of these bacterial infections in children may be around 1.5 per 1000. About 50-75 per 100 000 of children will develop bloody diarrhoea with these infections.

Bloody diarrhoea is a presenting symptom in about 75% of children with ulcerative colitis and 25% with Crohn's disease (table 1).<sup>1,3</sup> A prospective study of paediatric inflammatory bowel disease in the UK and Ireland reported an annual incidence of 5.2 (4.8 to 5.6) per 100 000.<sup>3</sup> Of these, 27% had ulcerative colitis and 60% Crohn's disease. The incidence of children presenting with bloody diarrhoea as a result of inflammatory bowel disease is therefore 2-3 per 100 000 population.

Thus, in the developed world bloody diarrhoea in children is 15-20 times more likely to be caused by intestinal infections than by inflammatory bowel disease. In the developing world, although the true

## SOURCES AND SELECTION CRITERIA

I used the Medline database to search for evidence from the literature. Randomised controlled trials, meta-analyses, and Cochrane reviews were used when relevant and available. Other sources of evidence included large case series and cohort studies. I obtained information on the incidence of specific pathogens from the UK Health Protection Agency's Centre for Infections

incidence of inflammatory bowel disease is unknown, bacterial and amoebic dysentery are much more likely to be the cause.

**How should I investigate and manage bloody diarrhoea in primary care?**

An appropriate strategy must take into account the severity and symptoms or signs of systemic illness or abdominal complications. Figure 1 outlines an approach to management, with suggested indications for specialist referral.

**How should I investigate and manage intestinal infections?**

Table 2 summarises the sources, clinical presentation, diagnosis, and management of various types of intestinal bacterial infections. Antibiotics are usually contraindicated. With *Campylobacter*, a meta-analysis of 11 randomised controlled trials reported that early antibiotics shortened the illness slightly,<sup>4</sup> but treatment is usually reserved for those with severe symptoms or impaired immunity. For *Salmonella*, a Cochrane review of 12 randomised controlled trials concluded that antibiotics provided no benefit and that treatment may prolong carriage.<sup>5</sup> Antibiotics are usually reserved for young infants and children with suspected bacteraemia, extraintestinal spread, or impaired immunity. Patients with *Shigella* require antibiotic treatment with, for example, ciprofloxacin. For this reason routine antibiotic treatment is given to patients with bloody diarrhoea in developing countries.

*Salmonella* infections generally present with diarrhoea and fever, and it usually settles within days. It is readily cultured from stool. In some patients, typically after a period of persistent diarrhoea, bloody mucoid diarrhoea develops as a result of colitis. If the organism is no longer detectable and the symptoms of colitis persist it may be difficult to distinguish from

**Causes of bloody diarrhoea (real or apparent) in infants and children**

**Infants aged <1 year**

**Common causes**  
Intestinal infection

- Infant colitis
- Non-specific colitis
  - Breast milk colitis
  - Cow's milk colitis

**Less common or rare causes**

- Intestinal ischaemia
- Intussusception
  - Malrotation and volvulus
- Necrotising enterocolitis  
Hirschsprung's disease  
Inflammatory bowel disease

- Crohn's colitis
  - Ulcerative colitis
- Systemic vasculitis  
Factitious illness

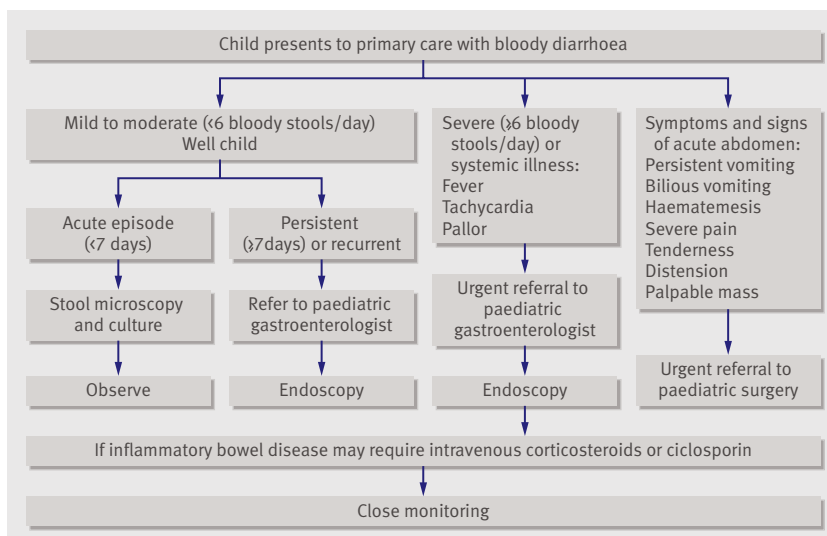
**Infants aged >1 year**

**Common causes**  
Intestinal infection

- Inflammatory bowel disease
- Crohn's colitis
  - Ulcerative colitis
- Juvenile polyp

**Less common or rare causes**

- Intestinal ischaemia
- Intussusception
  - Malrotation and volvulus
- Mucosal prolapse syndrome  
Henoch-Schönlein purpura or other forms of systemic vasculitis  
Factitious illness



**Fig 1 | Strategy for initial evaluation, management, and referral of children presenting with bloody diarrhoea**

inflammatory bowel disease (fig 2). *Yersinia* is most common in children under 5 years. It may cause pain and ulceration in the terminal ileum and Crohn's disease may be wrongly suspected.

Haemolytic uraemic syndrome is a rare and life threatening condition with sudden onset of microangiopathic haemolytic anaemia, thrombocytopenia, and renal insufficiency. Most (80%) patients will have had bloody diarrhoea for three to 16 days previously. It is usually caused by shiga toxin producing *E coli*, often 0157:H7.

**When should I suspect inflammatory bowel disease?**

Inflammatory bowel disease is uncommon in children, but prompt diagnosis is important. The interval from onset to diagnosis is often prolonged, and this can result in avoidable morbidity.<sup>13</sup> In a study of children presenting to a tertiary centre, even though 75% of

**UNANSWERED QUESTIONS**

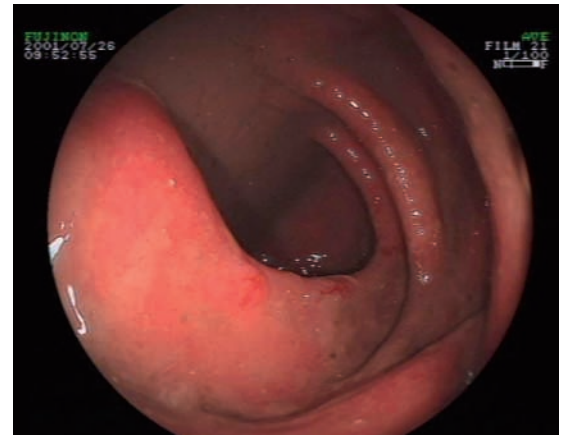
- How can the incidence of bacterial intestinal infection be reduced?
- Given the increased incidence of inflammatory bowel disease in the developed world, what environmental factors are responsible?
- Does bacterial gastroenteritis cause irritable bowel syndrome in children, as is reported in adults?
- Are antibiotics advisable for patients with haemorrhagic colitis caused by *Escherichia coli* that produce shiga toxin?
- What are the aetiology and pathogenesis of infant colitis?

those with ulcerative colitis had persistent or recurrent bloody diarrhoea, the mean time to diagnosis was 20 weeks (table 3).<sup>1</sup>

Although infection may be the first consideration, the possibility of inflammatory bowel disease should not be dismissed even in young children. Around half of children with inflammatory bowel disease present before 11 years of age, and the disease may occur even in the first year of life. If any symptoms suggest chronic gastrointestinal disease, inflammatory bowel disease should be considered (table 2). Persistent (more than seven days) or recurrent bloody diarrhoea are indications for referral to a paediatric gastroenterologist. Other important signs include impaired growth, weight loss, finger clubbing, and—in Crohn’s disease—oral or perianal abnormalities. Perianal disease occurs in up to 45% of people with Crohn’s disease.<sup>13</sup>

**How should I screen for inflammatory bowel disease?**

Screening blood tests can be helpful, but in the context of bloody diarrhoea their role is limited. In a study of children presenting to a specialist paediatric gastroenterology clinic with suspected inflammatory bowel disease the simple combination of haemoglobin and platelet count was useful.<sup>7</sup> Using “one or both tests abnormal” as a positive outcome gave a sensitivity of



**Fig 2 |** Ulcerative colitis resulting in mucosal inflammation with spontaneous bleeding. Patients with haemorrhagic colitis caused by *Salmonella* or other infections may present with an identical appearance

92%, a specificity of 80%, and positive and negative predictive values of 77% and 93% for ulcerative colitis. However, another study found that haemoglobin, albumin, erythrocyte sedimentation rate, and C reactive protein were normal in 19% of children presenting with clinically mild ulcerative colitis.<sup>8</sup> Normal blood tests do not rule out inflammatory bowel disease in children with bloody diarrhoea. Moreover, abnormal results may be found in children with bacterial gastroenteritis. In the absence of an identified stool pathogen, endoscopic evaluation is required in children with severe or persistent symptoms (fig 1).

**How can I recognise and manage severe colitis?**

Severe bloody diarrhoea (more than five bloody stools daily) requires urgent referral to a paediatric gastroenterologist. Severe colitis is associated with an increased risk of non-response to medical treatment, progression to toxic megacolon, and colonic perforation. Early referral may reduce these risks. Intravenous corticosteroids or ciclosporin are often effective in severe disease, and children need expert monitoring for signs of deterioration. In some cases emergency colectomy may be life saving.

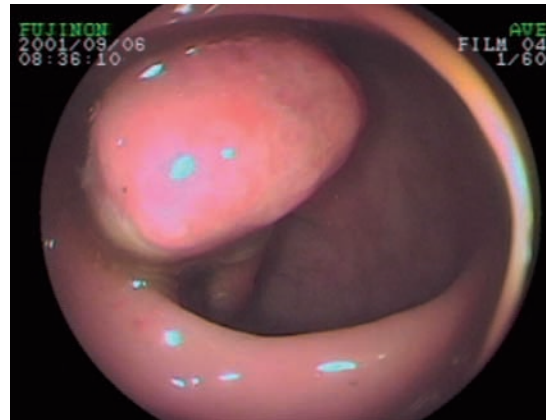
**Which diagnoses are most likely in infants?**

**Infant colitis**

Colonoscopy often shows mucosal inflammation and ulceration in infants who present with bloody diarrhoea. Although cows’ milk allergy is usually suspected, the aetiology is often uncertain. Allergy is probably overdiagnosed.<sup>9,10</sup> Many infants with bloody diarrhoea are breast fed and have “breast milk colitis.” In these cases, it has been proposed that small but immunologically relevant amounts of intact maternal dietary antigens might be transferred to breast milk via the mother’s bloodstream. However, this hypothesis has not been confirmed. A recent study of 40 infants presenting with blood in the stool provided a useful insight.<sup>10</sup> The mean age at presentation was 3 months

**Table 1 |** Presenting symptoms and signs in inflammatory bowel disease<sup>1</sup>

Symptoms	Crohn’s disease (%)	Ulcerative colitis (%)
<b>Intestinal symptoms</b>		
Bloody diarrhoea	22	75
Non-bloody diarrhoea	42	15
Diarrhoea (overall)	64	90
Blood per rectum (no diarrhoea)	1.6	10
Abdominal pain	83	83
Anorexia and weight loss	88	56
Perianal disease	45	0
Constipation	11	0
<b>Extraintestinal manifestations</b>		
Clubbing	25	0
Arthralgia	8	4.7
Erythema nodosum	5	0



**Fig 3** | Typical appearance of pedunculated juvenile polyp identified at colonoscopy in the sigmoid colon. This child was said to have bloody mucoid “diarrhoea”

(range 1-6). The stools were watery in 38% and mucoid in 73%. Colonoscopy showed mucosal aphthae (33%), microscopic inflammation (33%), and focal eosinophilic infiltration (23%). The infants were randomly allocated to a cows’ milk-free diet (n=19) or a normal diet (n=21), with breastfeeding mothers in the first group adopting a cows’ milk elimination diet. They

were reviewed at one and 12 months. During follow-up, bleeding was often intermittent, with an average time to the final episode of 24 days (range 1-85). All of the infants thrived. Cows’ milk elimination did not affect the duration of bleeding, and re-challenge supported a diagnosis of cows’ milk allergy in only 18%. The authors concluded that infant colitis is usually a benign self limiting disorder.

**Necrotising enterocolitis**

Necrotising enterocolitis is a serious disorder, rarely seen in primary care. It is characterised by diffuse or focal ulceration and necrosis in the small intestine and colon, and it may present with rectal bleeding or bloody diarrhoea. Other common features include abdominal distension, bilious vomiting, and signs of septicaemia. It mainly occurs in premature infants in the neonatal unit, although it can develop at any time up to 10 weeks of age. Moreover, up to 10% of cases are in full term infants.<sup>11</sup> In such cases, predisposing factors such as cardiac disease may be present.<sup>11,12</sup> When necrotising enterocolitis does occur in full term infants, the onset is usually within the first week of life.<sup>11,13</sup> If it is suspected then urgent hospital referral is necessary. Abdominal radiography may show features to support the diagnosis.

**Table 2** | Summary of bacterial intestinal infections that cause bloody diarrhoea

Pathogen	Sources	Incubation period	Clinical presentation	Diagnosis	Treatment
<i>Campylobacter jejuni</i>	Mainly from farm and domestic animals and animal food products, especially undercooked chicken	1-3 days (occasionally up to 10 days)	Fever and diarrhoea; bloody diarrhoea in up to 50%; usually lasts less than 1 week, with relapses in up to 25%	Stool culture; selective growth medium needed	Antibiotics reserved for those with severe symptoms or impaired immunity <sup>4</sup>
<i>Salmonella</i> species	Mainly food borne—can cause large outbreaks; farm animals (especially undercooked poultry); pets (including reptiles); person to person transmission less frequent; infants (3-5 months) especially vulnerable	6-48 hours (occasionally longer)	Gastroenteritis-like illness, often with fever lasting 3-4 days; bloody mucoid diarrhoea may follow as colitis develops; colitis may persist for 1-12 weeks	Stool culture; may stay positive for weeks	Antibiotics not usually beneficial and may prolong bacterial carriage <sup>5</sup> ; antibiotics reserved for young infants, those with suspected bacteraemia or with extraintestinal spread, and those with impaired immunity
<i>Yersinia enterocolitica</i>	Farm and domestic animals; epidemics related to contaminated milk and ice cream	3-7 days	Usually presents with fever, abdominal pain, and diarrhoea; blood present in the stool in about 30%; illness usually lasts 1-3 weeks	Stool culture; organism easily missed so the laboratory should be advised of suspicion	No evidence of benefit with antibiotics, and diagnosis is often late; antibiotics reserved for those with impaired immunity or extraintestinal spread
<i>Shiga</i> toxin producing <i>Escherichia coli</i> (such as O157 H7)	Often caused by foods contaminated with bovine faeces, such as undercooked minced (ground) beef; large outbreaks may occur	3-9 days	Often presents with watery diarrhoea, which progresses to bloody diarrhoea; typically lasts 3-8 days; haemolytic uraemic syndrome can develop after 3-16 days	Specialised diagnostic techniques needed	Antibiotics seem to have no clinical benefit and may increase the risk of haemolytic uraemic syndrome <sup>6</sup>
<i>Shigella</i> species	Highly contagious; usually person to person transmission; occasional outbreaks from contamination of food or water; most common between 6 months and 5 years of age; more severe in adults	1-4 days	A few patients present with gastroenteritis-like illness; most experience lower abdominal pain, bloody mucoid stools, and fever; illness may be life threatening, with septicaemia	Stool microscopy shows pus cells and red cells; the organism is fastidious and requires prompt inoculation into appropriate medium for culture	Treated with antibiotics (for example, ciprofloxacin); during outbreaks or in high prevalence areas in the developing world antibiotics are given presumptively



**Table 3** | Time interval from first symptoms to diagnosis of inflammatory bowel disease<sup>1</sup>

Diagnosis	Crohn's disease (weeks)	Ulcerative colitis
Crohn's disease	47	4 weeks to 7 years
With diarrhoea	28	4 weeks to 5 years
Without diarrhoea	66	27 weeks to 7 years
Ulcerative colitis	20	2 weeks to 3 years
Indeterminate colitis*	45	2 weeks to 2 years

\*Colitis caused by inflammatory bowel disease in which it is not possible to distinguish between ulcerative colitis and Crohn's disease.

### Hirschsprung's disease

Hirschsprung's disease (congenital absence of ganglion cells in the colon) occurs in 1:5000 live births. About 80% of affected children present in the first year of life. In more than 90% of affected infants the passage of meconium is delayed beyond the first 24 hours. The classic presentation is with constipation. However, 25% of infants present with enterocolitis causing abdominal distension, and severe watery and sometimes bloody diarrhoea.<sup>14</sup> This may cause hypovolaemic shock and colonic perforation, and mortality is 33% in these patients.<sup>15</sup> Early diagnosis is therefore essential.

### What other disorders should I consider?

Any disorder that leads to mucosal ischaemia can cause bloody diarrhoea.

### Intestinal infarction—a surgical emergency

Bloody diarrhoea can indicate a major surgical emergency. Intussusception occurs most often but not exclusively in the first year of life. The classic presentation is with episodic abdominal pain, vomiting, and the passage of blood and mucus. In some cases bloody diarrhoea is reported.<sup>16</sup> In infants and children with congenital gut malrotation, midgut volvulus may result in extensive intestinal gangrene. This catastrophic event typically presents with symptoms of obstruction including bilious vomiting. Again, however, bloody diarrhoea may be reported.<sup>17</sup>

### TIPS FOR NON-SPECIALISTS

Children with fewer than six stools daily may be managed in primary care if they are not systemically unwell and do not have an acute abdomen

Evidence of systemic illness includes fever, tachycardia, pallor, and shock

Evidence of an abdominal surgical emergency includes severe pain, persistent or bilious vomiting, haematemesis, distension, tenderness, a palpable mass, and signs of septicaemia or shock

Consider inflammatory bowel disease in children with evidence of chronic disease—persistent or recurrent bloody diarrhoea or other gastrointestinal symptoms, weight loss, or poor growth

Severe colitis—associated with severe bloody diarrhoea—is life threatening and requires immediate referral to a paediatric gastroenterologist

### ADDITIONAL EDUCATIONAL RESOURCES

#### Resources for healthcare professionals

Health Protection Agency, Centre for Infections ([www.hpa.org.uk](http://www.hpa.org.uk))—Provides up to date surveillance information on the epidemiology of gastrointestinal infections in the UK

#### Resources for parents

National Association for Colitis and Crohn's disease ([www.nacc.org.uk](http://www.nacc.org.uk))—Provides support and information for patients with ulcerative colitis and Crohn's disease

Crohn's in Childhood Research Association ([www.cicra.org](http://www.cicra.org))—Provides support for patients with inflammatory bowel disease, particularly children and young adults, and raises funds to support medical research into the disease

### Henoch-Schönlein purpura

Henoch-Schönlein purpura is a common form of idiopathic systemic vasculitis in children. It is associated with a characteristic rash (easily overlooked), abdominal pain, arthralgia, and overt or microscopic haematuria.<sup>18</sup> Overt gastrointestinal bleeding occurs in 25% of patients and bloody diarrhoea is sometimes seen.<sup>19</sup>

### Is it really bloody diarrhoea?

#### Juvenile polyyps

Juvenile polyyps (inflammatory polyyps) occur in about 1% of children (fig 3). They are usually associated with the passage of blood and mucous, but diarrhoea may be reported.<sup>20,21</sup> Colonoscopy is required for diagnosis.

### Mucosal prolapse syndrome and solitary rectal ulcer syndrome

Children with mucosal prolapse syndrome may report bloody diarrhoea.<sup>22</sup> However, the true symptom may be tenesmus—the frequent urge to defecate with just the passage of blood and mucus. In this disorder the anterior rectal mucosa is prone to prolapse, although this is often not reported by the child. The prolapse leads to mucosal injury. In some cases it is associated with the development of inflammatory cloacogenic polyyps at the anorectal junction. The polyyps may be detected on digital examination and are seen at endoscopy; they have a characteristic histological appearance.<sup>23</sup>

Solitary rectal ulcer syndrome presents with similar symptoms. The pathogenesis of this condition is uncertain, but it is probably also caused by mucosal prolapse. At endoscopy, anterior rectal ulceration is seen several centimetres above the anal canal.

### Factitious illness and illness induction

Very rarely, diarrhoea and gastrointestinal bleeding may be falsely reported either by young people or by carers.<sup>24,25</sup> This possibility should be considered if the clinical circumstances are bizarre or if there are other reasons for concern.

## SUMMARY POINTS

Bloody diarrhoea in infancy and childhood often indicates serious gastrointestinal disease

Intestinal bacterial infection is the most common cause—*Campylobacter*, *Salmonella*, and *Yersinia* are important in the developed world

Bacterial gastroenteritis is usually self limiting—antibiotics are needed only in selected cases

Crohn's disease and ulcerative colitis often present with bloody diarrhoea and should be considered in all ages

Children with severe bloody diarrhoea or signs of systemic illness need urgent specialist referral, as these symptoms may indicate a life threatening condition

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## DNR or PEACE?

I have huge difficulty in discussing “do not resuscitate” (DNR) orders with people whose loved ones are close to death, especially if this is untimely, unexpected, or non-malignant. This remains the case even when we know cardiopulmonary intervention would be futile. The response “But, doctor, surely we should give him a chance?” is all too frequent, and the explanation that the patient has no chance sounds arrogant, unhelpful, and final. Relatives can emerge from such meetings with a feeling that the doctors have decided to stop and that a chance, however tiny, has been squandered.

We, however, know the truth about futile resuscitation attempts in patients clearly dying of irreversible illnesses. To be coerced into carrying out theatrical cardiac massage or attempting to restart the heart of one who has just died of an irreversible organ failure is unpleasant, disrespectful, and wrong. How can we help people understand the truth about our position, especially when we are trying to do the explaining at a time of their maximal distress?

I have come to the conclusion that one reason for our difficulty lies in the terminology itself. The very word

“resuscitate” carries with it implications of success. “Do you wish your wife/husband/mother/father to be resuscitated?” will surely bring the answer yes from any sane person facing imminent loss of someone close. “Do not resuscitate” also sounds a bit harsh, a barked military command. Some have tried to soften it by using “do not attempt to resuscitate,” which, to me, sounds even worse: don't even dare to have a go, this patient is not to survive.

And yet there is a general public acceptance that the end of life must come and would be better if it were dignified and calm. Perhaps this is what our terminology should emphasise. We should change the name of the DNR order. I would suggest “patient's end of life avoidance of cardiopulmonary efforts”—PEACE. “We think it is only right to leave your loved one in PEACE.” Yes, that's it, that's what we are trying to say.

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