

# Recognition of bilious aspirates in a tertiary neonatal centre

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## Abstract

We set out to assess overall agreement in recognition of bilious aspirates within a tertiary neonatal centre and to identify any differences between health professionals. Photographs displaying syringes containing simulated neonatal gastric aspirates were prepared. Various health professionals within a tertiary neonatal centre were recruited. For each of the photographs, they were asked to indicate 'bile' or 'no bile'. 100% of participants identified milky aspirates as non-bilious, 94.3% indicated green aspirates as bilious. Yellow aspirates were indicated as bilious by 44.8%. A Chi-square test comparing Doctors, Nurses and Midwives response to yellow aspirates found a statistical difference between the 3 groups in their answers.

Tertiary neonatal centre staff can identify overt bilious aspirates correctly, but agreement on less clear degrees of bile in aspirates is lacking. Over identification of bile may lead to unnecessary interruption of feeds by staff fearing obstruction. Use of bile colour charts may improve consistency of reporting and help the education of staff.

## ABBREVIATIONS

NEC – Necrotizing Enterocolitis

## INTRODUCTION

Signs and symptoms of a newborn bowel obstruction may be subtle and non-specific. The significance of bilious gastric aspirates or emesis in a neonate cannot be underestimated, suggesting an obstruction distal to the ampulla of Vater, usually in the proximal small bowel, and demanding an immediate evaluation<sup>1</sup>. The differential diagnosis for neonatal intestinal obstruction presenting with bilious vomiting or aspirates includes: - malrotation and volvulus, duodenal atresia (if obstruction distal to Ampulla of Vater – 80% of cases), jejuno-ileal atresia, meconium ileus or necrotising enterocolitis. There is also the possibility of a non-pathological cause, as many preterm infants will experience bilious aspirates as a result of their immaturity.

In determining the cause of a bilious aspirate, one must take it in the context of the clinical situation. This is very often complicated by the subtle graduations of bile that may be observed in a neonates aspirate and has provided many a pause for thought on morning ward rounds on our unit. However, it was our experience that perceptions of gastric aspirates vary greatly between professionals, both on the unit and on the postnatal wards, with quite clear cut aspirates being documented differently by staff from shift to shift. The

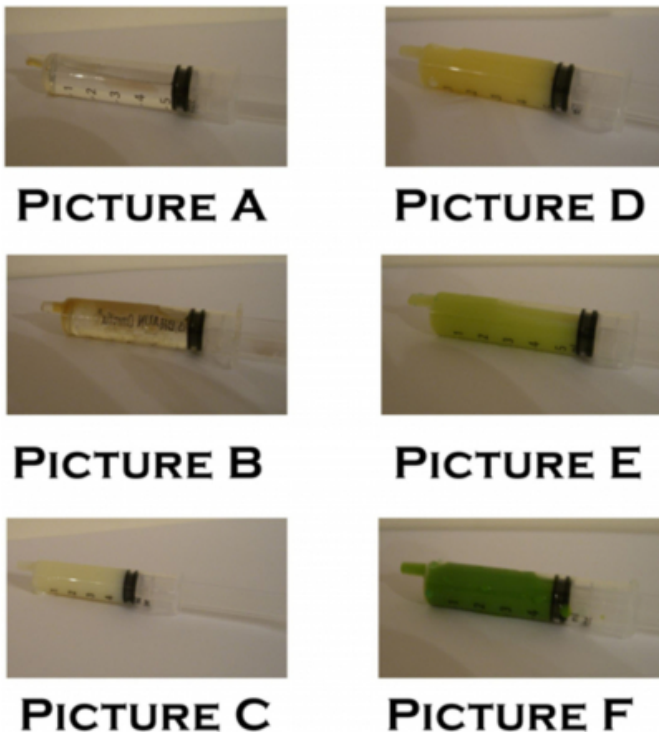
recognition of bile potentially means the withholding of feeds and the performing of x-rays, ultrasound examinations or contrast studies. Although entirely appropriate investigations in the case of possible bowel obstruction, this set of actions may be wrongly carried out if bile is incorrectly identified and it has previously been shown that wrongful stopping of feeds is a significant contributor to poor growth in infants<sup>2</sup>. We set out to study the current situation within St Mary's Hospital, Manchester with regards to recognition of bile in gastric aspirates. Firstly, we will assess the overall agreement in recognition of bile within the study population. Secondly, we will seek to identify any differences between Doctors, Nurse and Midwives in their recognition of bile.

## MATERIALS AND METHODS

A large number of digital photographs were taken of five millilitre syringes that had been prepared with contents to mimic a range of different gastric aspirates. Actual aspirates were not used due to the difficulties in gathering such a different range of aspirates at any one time and concerns over infection risk. The investigators then selected six photographs that were distinct and represented the range of aspirates that are encountered on our unit (figure 1). The photographs were printed at A5 size in 2400 dots per inch colour resolution.

**Figure 1**

Figure 1: Six photographs simulating neonatal aspirates



Instruction cards were prepared to accompany the photographs. The text was as follows: - “Thank you for agreeing to take part in this project. We are studying subjectivity in a particular clinical setting and would value your opinion. This should only take a few minutes. If at any point you wish not to proceed, please let the investigator know. What follows are a group of photographs picturing syringes. They contain gastric aspirates obtained from a neonate via a nasogastric tube. Based on this information alone, please indicate which of the photos you see definitely contain bile.”

Recruitment was within a two-week period in St Mary's Hospital, Manchester and was by 2 investigators. All medical, nursing and midwife staff on the neonatal, postnatal and paediatrics units were eligible and all staff willing to take part were included. They were asked to read the two instruction cards and indicate their answer 'bile' or 'no bile' for each of the 6 photographs. Their job and grade were also recorded. Results were entered into 'SPSS for windows 12.5' (SPSS Inc, Chicago, USA) for descriptive statistical analysis. Ethical approval was not obtained, as all responses were anonymous.

**RESULTS**

A total of 105 staff agreed to take part in the study and no one refused to take part. They consisted of 56 nursing staff,

23 doctors, 10 nursing students, 15 midwives and one health care assistant. The overall results for each photograph are shown in table 1. Variations between different groups are shown in table 2.

**Figure 2**

Table 1: Overall response to each picture

	<b>Bile</b>	<b>No Bile</b>
<b>Picture A</b>	11	94
<b>Picture B</b>	40	65
<b>Picture C</b>	0	105
<b>Picture D</b>	47	58
<b>Picture E</b>	99	6
<b>Picture F</b>	99	6

**Figure 3**

Table 2: Breakdown of responses into different health care workers

	Picture A		Picture B		Picture C		Picture D		Picture E		Picture F	
	Bile	No Bile	Bile	No Bile	Bile	No bile	Bile	No Bile	Bile	No Bile	Bile	No Bile
<b>Nurse</b>	7	49	21	35	0	56	24	32	55	1	54	2
<b>Doctor</b>	0	23	2	21	0	23	4	19	21	2	22	1
<b>Student</b>	2	8	5	5	0	10	7	3	9	1	8	2
<b>Midwife</b>	1	14	11	4	0	15	11	4	13	2	14	1
<b>Care assistant</b>	1	0	1	0	0	1	1	0	1	0	1	0

A chi-square test was performed comparing the responses in the three major groups of participants for each photograph and results shown in table 3.

Figure 4

Table 3: Chi-square results for test comparing Doctors, Nurses and Midwives response for each picture

Picture	P value
A	0.187
B	<0.001
C	No value
D	0.003
E	0.147
F	0.870

No result was obtained for Picture C as all responses were for 'no bile'. There was a significant difference between Doctors, Nurses and Midwives in their responses for picture B and picture D.

**DISCUSSION**

Bilious vomiting in newborns is an urgent condition and is an initial sign of intestinal obstruction <sup>3</sup>. Patients who are thought to have an obstruction need prompt examination followed by decompression of the stomach and investigation as to the cause.

Although many don't go on to have surgery <sup>4</sup>, neonates can deteriorate rapidly and then appropriate surgical treatment becomes more hazardous. Early diagnosis depends largely on the prompt detection of obstructive manifestations by the clinician and the subsequent accurate interpretation of

radiographic findings and other investigations <sup>5</sup>.

In the neonatal unit, many babies have feeds suspended on several occasions throughout their stay due to the reporting of bile stained aspirates. This is in line with research on conditions such as NEC, which have found that conservative feeding protocols and the stopping of feeds with the slightest sign of sluggishness is the best way to avoid the condition <sup>6</sup>. Nevertheless, unnecessary interruption of feeding due to misidentification of bile will be detrimental to the growth of the neonate <sup>2</sup>.

The identification of bile by parents and professionals was recently investigated by Walker et al <sup>7</sup> who used the identification of colours on a chart as their outcome measure. They found that most parents thought bile was yellow and not green. Much smaller number of health professionals failed to identify green as a colour of bile in this study. Reassuringly, our data found that the overwhelming majority (94.3%) of health care workers identified a green shaded aspirate as bilious and that there was no significant difference between groups of health care workers on this issue.

Non-bile stained yellow aspirates, as presented in picture D, should not be ignored as there is recognition that non-bile stained emesis or aspirates can still be associated with intestinal obstruction <sup>8,9</sup>. However, as a lone feature in a clinically well neonate, this would not justify the interruption of feeding. There was little agreement amongst our study population as to the classification of yellow contents, with 44.8% reporting bile. There was a statistical difference on the identification of a yellow aspirate by different study groups, with doctors being less likely to label them as bile than neonatal nurses or midwives. This is an important finding as neonatal nurses are very often the only staff to actually see the aspirates in question and will initially be those to suspend feeds on babies after identifying 'bilious aspirates'.

Further disagreement took place with regards to our 'mucky' aspirate (Picture B). This simulated gastric contents with possibly a trace of altered blood, but certainly no bile. This was identified by 38.1% of participants as bile and again there was a statistically significant difference between groups, with doctors being less likely to identify bile in this sample than neonatal nurses or midwives. There was obviously alarm when faced with the contents of the aspirate, but identifying it as bile still does not accurately record the contents and in a true clinical situation may lead

to inappropriate treatment of the neonate.

The use of colour charts to identify bile, as used in the study by Walker et al <sup>7</sup>, is already in place in some neonatal centres <sup>10</sup> and allows for the systematic and consistent recording of the contents of aspirates. This measure allows all staff to understand the actual appearance of previous aspirates when taking over care of a neonate and also can stimulate education of all staff when discussed on ward rounds. This measure is currently being introduced on a trial basis on our unit. Further research is needed to ascertain the effectiveness of such charts in practice.

### CONCLUSIONS

Recognition of clearly bilious aspirates by professionals in a tertiary neonatal unit is almost universal. However, for cases where the presence of bile is less overt there was much more confusion. Staff that are less experienced in dealing with neonatal bowel obstruction exhibit less agreement when interpreting aspirates. Variations in reporting within day-to-day practise may be occurring.

The introduction of colour charts may help ascertain consistent recording of aspirates and allow all professionals involved in the care of neonates to more confidently identify and act on a bilious aspirate, when considered as part of the overall clinical picture. This will help to reduce over recognition of bile and unnecessary interruptions in feeding.

### ETHICAL APPROVAL

None required as this questionnaire study was deemed to be a service evaluation

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