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Colour of bile vomiting in intestinal obstruction in the newborn: questionnaire study

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Abstract

Objectives To identify the colour that different groups of observers thought represented bile in a newborn's vomit.
Design Questionnaires displaying eight colours (pale yellow to dark green).
Setting General practices in Glasgow, postnatal ward and level III special care baby unit in a university teaching hospital, and mother and toddler groups in Glasgow.
Participants 47 general practitioners, 29 nurses on the baby unit, 48 midwives, and 41 mothers of babies and infants.
Outcome measures Participants indicated which colour would represent bile in a baby's vomit. More than one colour could be chosen. Respondents were also asked to indicate one colour that was the best match for bile.
Results When any colour could be chosen, 12 (25%) general practitioners, 1 (3%) nurse on the baby unit, 5 (10%) postnatal midwives, and 23 (56%) parents did not consider green an appropriate colour for a baby's vomit containing bile. Twenty three (49%) general practitioners, 7 (24%) neonatal nurses, 15 (31%) postnatal midwives, and 29 (71%) parents thought yellow was the best colour match.
Conclusions There is little agreement about the colour of bile vomit in a newborn. It is more pertinent to ask parents about the colour of vomit rather than whether it contained bile. Many general practitioners and parents do not recognise green as an appropriate colour for bile in the vomit of newborns, which may delay surgical referral. Though yellow vomit does not exclude intestinal obstruction, the presence of green vomiting in a baby is a surgical emergency and requires expeditious referral.

Introduction

Classic teaching in paediatric surgery is that vomiting of bile in the newborn should be attributed to intestinal obstruction until proved otherwise. Reported series have confirmed the requirement for further investigation in this group, with a need for surgical intervention in 30-40%.[1 2] To "avoid errors in judgment" these studies included only babies with green vomit and excluded babies with yellow vomit. Together with other neonatal surgeons we advocate prompt and thorough investigation of any infant with green vomit to specifically exclude mechanical obstruction. In several infants referred to our unit with reported bile vomiting, however, a detailed history reveals only yellow vomiting, though we are aware that a proportion of such babies are found to have intestinal obstruction. We determined what colour was perceived by different observer groups to represent bile in a baby's vomit.

Methods

We developed a questionnaire with eight numbered colours varying from pale yellow through to dark green (fig 1). Respondents were asked to indicate which colour would represent bile in a baby's vomit. More than one colour could be chosen, but respondents were also asked to indicate one colour that was the best match for bile. We used four groups of observers. Questionnaires were delivered by hand to general practitioner clinics with stamped addressed envelopes. One questionnaire was left for each general practitioner in every practice visited. Questionnaires were distributed by hand to specialist nurses in a special care baby unit and in a postnatal ward, and a large envelope for collection was left on each site to ensure anonymity. Local mother and toddler groups were visited and questionnaires were handed to the parents of infants. Again, a large envelope for collection was left. The respondents in each group were asked not to confer.

We divided responses in returned questionnaires into yellow and green. We then analysed the proportions of yellow and green responses from each group using χ^2 tests, comparing each group with the responses from general practitioners.

Results

The response rate differed between the groups and reflects the methods used to ensure return of the questionnaires. All questionnaires handed to parents (41), special care baby unit nurses (29), and postnatal ward midwives (48) were returned. Of the 80 questionnaires delivered to general practitioners, 47 (58%) were returned using the stamped addressed envelopes.

When asked to indicate any colour that could represent bile in a baby's vomit, 23 (56%) parents did not choose any of the four green colours. Of the healthcare professionals, 12 (25%) general practitioners, 5 (10%) midwives from the postnatal wards, and 1 (3%) special care nurse did not chose any of the four green colours.

When we asked participants to indicate the one colour that was the best match for bile in a vomit, the distribution of results was similar to those above (table 1). There were significant differences in the proportions of green or yellow responses for each group ($P = 0.002$). We compared responses for each group with those from general practitioners (table 2). General practitioners identified a green colour in a significantly greater proportion of responses than parents but a significantly lower proportion of responses than special care nurses. Though the postnatal ward midwives identified a green colour more often than general practitioners, the difference was not significant.

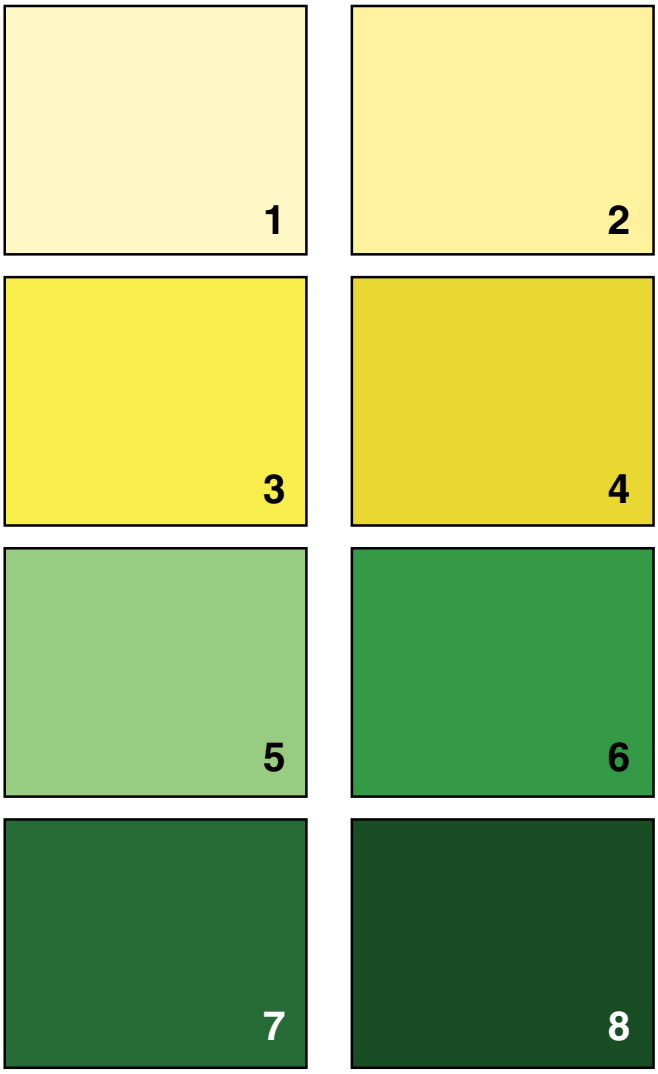

Fig 1 Choices of colours representing bile in a baby's vomit. Respondents were asked to tick all options that could represent bile, and then select the one best match

Discussion

Because bile enters the intestine in the second part of the duodenum, intestinal obstruction below this level can result in bile in the vomit or gastric aspirate (fig 2). In the newborn this can be associated with surgical conditions including intestinal atresia, intestinal malrotation, and Hirschsprung's disease.[1] These conditions are associated with considerable morbidity, particularly intestinal malrotation, in which rapid diagnosis is essential to prevent catastrophic ischaemia resulting from small bowel volvulus.[3] In cases of small bowel volvulus, bile vomiting may be the only early sign[4] and failure to act at this stage will result in avoidable delay. The presence of bile in the vomit is an independent sign of severity of disease and is rarely seen in well infants.[5]

Table 1 Colour chosen as best match for bile in a baby's vomit

Group	Green (%)	Yellow (%)
Parents	12 (29)	29 (71)
General practitioners	24 (51)	23 (49)
SCBU nurses	22 (76)	7 (24)
Postnatal midwives	33 (69)	15 (31)

SCBU=special care baby unit.

Table 2 Comparison of responses between observer groups

Comparison	Δ green/yellow (95% CI)	P value
GP *v* parents	0.218 (0.018 to 0.417)	0.038
GP *v* SCBU nurses	–0.248 (–0.459 to –0.037)	0.032
GP *v* ward midwives	–0.177 (–0.0371 to 0.017)	0.079

GP=general practitioner; SBCU=special care baby unit.

Fig 2 Gastric aspirate from a newborn with upper intestinal obstruction

Our study shows that, though there may be general awareness that bile in a baby's vomit is worrying, there is clearly no consensus as to its appearance. Parents often refer to their children's vomit as bilious when a small amount of non-food gastric residue is produced, so the responses were not surprising. When a history is taken from parents of a vomiting baby it is more informative to ask about the colour of the vomit rather than whether it contained "bile." The parents participating in this study were not asked if their children had any medical history of note. We used local mother and toddler groups rather than asking parents of inpatients to obtain a representative sample of the community.

The specialist nurses on the baby unit would be expected to have the highest exposure to bile vomiting in the newborn, and nearly all respondents indicated a green colour when any box could be ticked. It was surprising that nearly a quarter thought the best colour match was yellow. Postnatal midwives, both in hospital and in the community, have considerable experience in the assessment of newborns, yet a third indicated yellow as the best match.

The fact that half the general practitioners thought the best colour match for bile was yellow may be worrying, but the more relevant finding was that when given the opportunity to tick any colour, a quarter did not tick any green boxes at all. These data suggest that, in the community, a considerable number of parents and healthcare professionals would fail to recognise the importance of green vomiting. In cases of malrotation and volvulus, if intestinal ischaemia had developed at the time of the first green vomit, delay in surgical referral could result in critical intestinal loss.

We emphasise that yellow vomiting in babies should not be disregarded and that the clinical state of the patient should be paramount in assessing the need for referral. Further study should identify the proportion of newborns found to have intestinal obstruction whose vomit is predominantly yellow. Green vomiting in a newborn, however, is of major importance and

requires expeditious referral for surgical assessment, and failure to recognise this may have grave consequences.

Contributors: GMW was responsible for the original idea, identified the observer groups, visited the groups of parents, and drafted the manuscript. AN designed and distributed the questionnaire to healthcare professionals. DY advised on statistical analysis and modified the manuscript. PAMR (guarantor) provided advice throughout the study and modified the manuscript.

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Ethical approval: Not required as responses were anonymous.

What is already known on this topic

Bile vomiting in the newborn indicates intestinal obstruction and should result in immediate referral

Observational studies of bile vomiting in newborns have included only those with green vomit

What this study adds

There is no clear consensus on the colour of bile vomiting

Many parents and general practitioners do not think green vomiting represents bile, which may result in avoidable delay in surgical referral

It is more informative to ask about the colour of vomit rather than whether it contained bile

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