RCEMLEARNING

RCEM BLOGS

BOOK 3

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LOOKING LIKE MAGGIE SIMPSON

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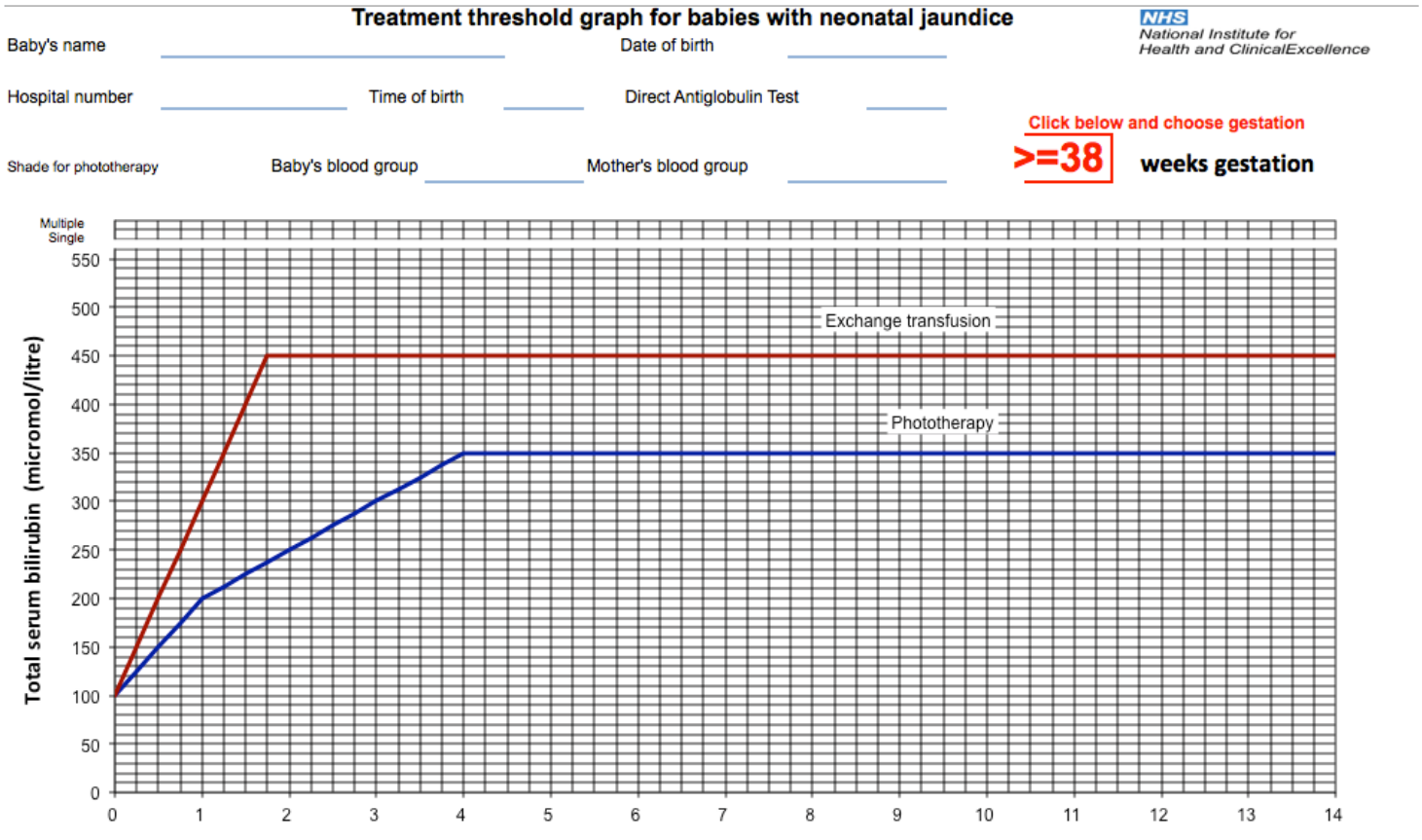


TREATMENT THRESHOLD GRAPH FOR BABIES WITH NEONATAL JAUNDICE

IT'S COMMON

It's a common card to pick up in some paeds EDs – the yellow newborn. But whilst this can be an 'easy' one, such tiny babies can strike fear into the hearts of some! So a quick review of what to look for, and what not to miss, should keep us all calm when presented with a baby who looks like they could be auditioning for the Simpsons.

When thinking about neonatal jaundice we can break it down into early (generally regarded as up to 14 days) and prolonged (over 2 weeks in term babies, or over 21 days in preterm infants). This post will look specifically at early jaundice.

Most babies presenting to the ED with this complaint will be a few days old. It is rare for us to see it in the first 24 hours of life, as many babies are still on postnatal wards at this time. But of course, some babies have an early discharge from hospital (which can be as little as 6 hours after a normal vaginal delivery ouch!), and some are born at home, so it is possible for them to pitch up to the ED.

Jaundice in the first 24 hours of life

Jaundice in the first 24 hours of life is ALWAYS PATHOLOGICAL and should be treated very seriously.

When you see it, think of sepsis, ABO/rhesus incompatibility or haemorrhage (e.g. subgaleal bleed). These babies should be seen and investigated quickly, with a septic screen, FBC, Direct Coombs test and split bilirubin level, and referred promptly to the General Paediatric take for admission and management.

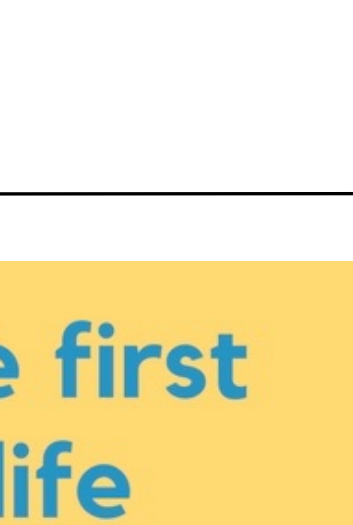
Assuming the jaundice isn't in the first 24 hours of life though we can be a little more discerning with what we do, depending on our history and examination findings.

Jaundice in the first 24 hours of life is *always* pathological

Think of:

Sepsis

ABO/rhesus incompatibility



Haemorrhage

Early Jaundice after the first 24 hours of life

So how do these babies present? Well they are usually a few days old (commonly 2-6, but may be earlier or later), and come with a history of increasing, or newly noted jaundice. They may have been asked to attend by a midwife or GP.

In some areas of the UK, babies may bypass the ED and be admitted directly to a ward, as community midwives send blood samples in from home and only refer the patient if they need treatment. Aside from jaundice, these babies may also have features such as lethargy (not waking for feeds), poor feeding (not interested in, or falling asleep whilst feeding), and they may be floppy or irritable. So how should you approach these patients? Start by congratulating the parents on the birth of their baby, and recognise and acknowledge the fact that they are probably exhausted and anxious.

Take a thorough history, including birth history, gestation, birth weight, risk factors for sepsis (although don't let this falsely reassure you as many babies with early sepsis don't have 'risk factors'), date and time of birth (you'll need it to plot the bilirubin later), history of bruising (e.g. forceps delivery), method and amounts of feeding, and mum's blood group. Examine the baby from top to toe, noting whether the conjunctiva are icteric and how far down the body the jaundice is evident (it starts on the face and progresses downwards). Look for features of sepsis such as irritability, floppiness, poor perfusion or a raised or tense fontanelle. Don't forget to carefully listen to the heart and check the femorals (just in case you are the first to also pick up congenital heart disease).

Weigh the baby (totally naked, yes you have to risk getting weed on) and calculate how much weight has been lost from the birth weight. Every hospital has a different guideline, but generally speaking if it is about 10-12% you'll need to discuss the baby with the paediatric team. Even if their jaundice does not need treatment these babies are often admitted for observation of feeds.

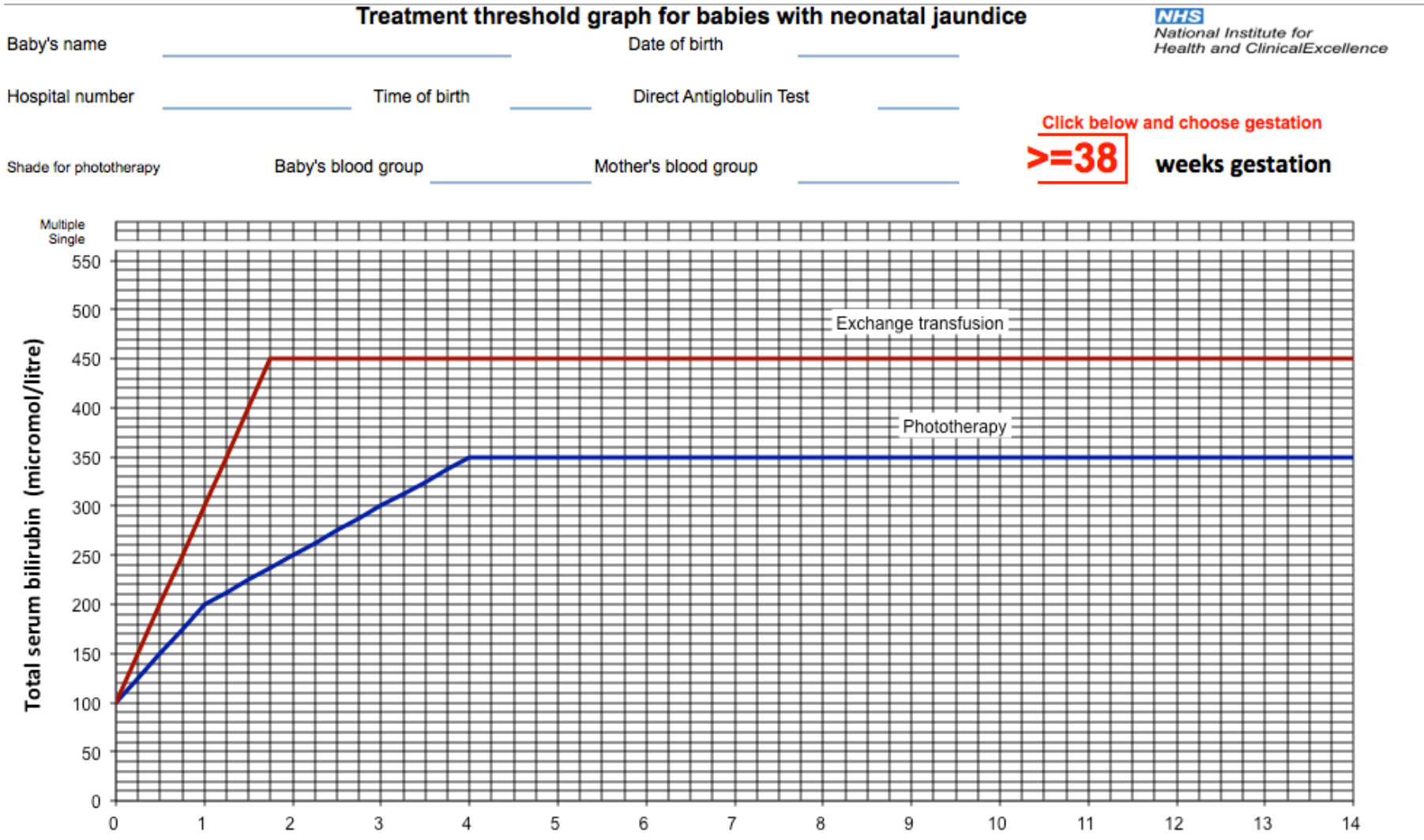
If there are no red flags for sepsis in the history, and the baby examines well but has significant jaundice (i.e. you can see they are jaundiced) then NICE recommends you send a split bilirubin, haematocrit (FBC), group and Direct Antiglobuin Test (DAT, aka Direct Coomb's Test or DCT). All of these can be done with a heel prick. Also remember to consider adding a G6PD if the baby is of appropriate ethnic origin. If there is poor feeding, it's probably sensible to also include a U&E (as hypernatraemic dehydration is common), and a blood sugar.

Any concerns for sepsis and you need to have a have low threshold for doing a full septic screen (blood, urine and CSF cultures) and commencing appropriate IV antibiotics. If in doubt, you can get advice from the paediatric team. Remember that newborns can have very vague features of sepsis and may not mount a fever or much of an inflammatory response on their bloods. Be concerned if anything is amiss with their feeding, sleeping, general handling or appearance.

Just as an aside, NICE has updated their guideline this year and it recommends the use of a bilirubinometer in the first instance rather than blood tests, if one is available. This is great for use on the postnatal wards where they are doing hundreds of bili checks, but most EDs might not have one of these, as we have relatively fewer cases. So a heelprick it is! If you do have access to a bilirubinometer device then check out the **NICE** guidance for when to use it and when it is contra-indicated. This **video** shows how to use one.

Get the bloods done early and be warned that they clot very easily, largely because newborn babies have such a high haematocit, but potential poor feeding and poor perfusion also doesn't help. If possible, get someone experienced to do the heel prick. Once the bloods are back you need to **download a gestation specific bilirubin chart** and plot the bilirubin at the appropriate time from birth (this is when you need an accurate time and date of birth from the parents).

Looking like Maggie Simpson



TREATMENT THRESHOLD GRAPH FOR BABIES WITH NEONATAL JAUNDICE

Remember that each little box on the chart is equivalent to 6 hours. If the bilirubin is above the treatment line, the baby needs admission for phototherapy, so refer to the General Paediatric take. If they are over the exchange transfusion line, they are at risk of kernicterus, seizures and coma. They need urgent phototherapy with as many light units as possible and IV fluids whilst an exchange transfusion is organised (this takes time), but get help early in view of this.
If the bilirubin is below the line then the family get to go home -hurray! But bear in mind that if it is less than 50 micromol/l below the line you'll need to organise for a further blood test within 18-24 hours (18 hours if there are recognised risk factors, which include sibling requiring phototherapy and exclusive breastfeeding). The NICE guidance has more information on this but also ask around locally as to whether the baby will have to return to ED or whether a community midwife could send a sample in.

A quick reminder about performing 'split' (sometimes called neonatal) bilirubin samples. The result will show the conjugated fraction, the unconjugated fraction and the total bilirubin level. A conjugated hyperbilirubinemia, where the conjugated fraction is 20% of the total level is normally detected on a prolonged jaundiced screen (performed after 14 days). It is ALWAYS pathological, and normally represents hepatobiliary disease, such as biliary atresia. So you should always just check that the conjugated fraction is <20% of the total and if not the baby would need admitting under the paediatric team. This link has more information about conjugated hyperbilrubinaemia and the contact details for the UK Liver Units in case you need more help.

Causes of Jaundice

What causes the jaundice in these babies? Well, the 'first day' list above is still relevant in the babies over 24 hours of age (so sepsis, ABO/rhesus incompatibility and haemorrhage should still be in the back of your mind). I personally use a conscious forcing strategy to mentally exclude sepsis whenever I see a jaundiced baby. There is more information about strategies such as this, and other ways to unbias yourself in this excellent podcast from Emergency Medicine Cases.

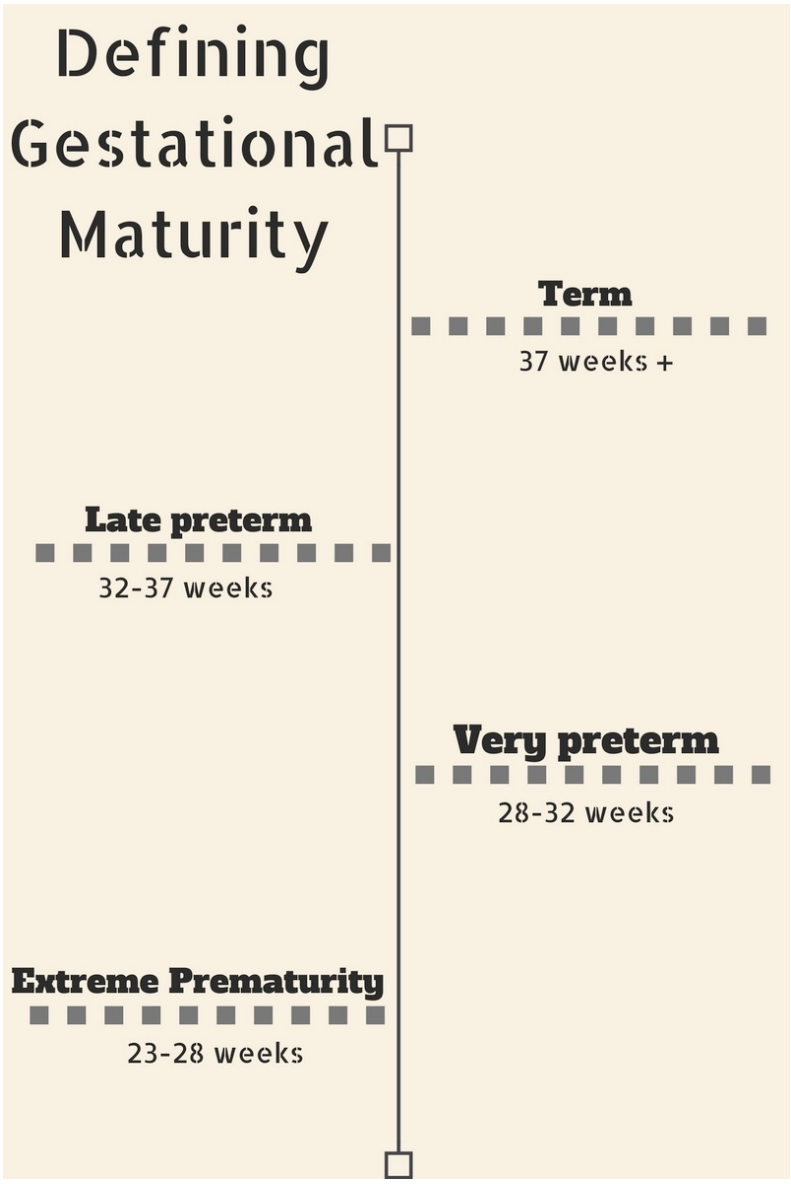
Other causes include: haemolysis, which should be picked up by your DAT or blood film; bruising or bleeding, which should be evident on examination; G6PD- test for this if you have any concerns; or congenital infections, which again should be evident on examination. Most babies however, will have physiologic jaundice or breast-milk jaundice. Whilst these are both diagnoses of exclusion, given the high incidence of jaundice in the newborn, NICE doesn't recommend doing more investigations than those listed above at first presentation. If the jaundice is prolonged that is when you start to pull out the stops but you can read all about the investigation and management of prolonged jaundice in chapter 3 of this book.

References/further reading:

1. NICE Clinical Guideline 98, Jaundice in Newborn Babies Under 28 days
2. AAFP: Hyperbilirubinaemia in the term newborn
3. NHS: Neonatal Jaundice
4. Emergency Medicine Cases: Decision Making in EM Cognitive Debiasing, Situational Awareness & Preferred Error
5. NICE Parent information leaflet

PEM-AND-EX-PREMS

Author: Katie Knight / **Peer Reviewed:** Charlotte Durand / **Code:** PAP13 / **Published:** 07/11/2016



SOME DEFINITIONS

23 weeks is the accepted limit of viability in the UK
very few survivors are born this early

SUCCESS STORY

Neonatal care is a huge success story of modern medicine. It is now possible for babies born at 23-24 weeks gestation to survive (although often with profound and wide ranging long term problems) while those survivors in older groups (born 28 weeks plus) are doing better than ever.

Most EM trainees wont have had the benefit of ever working in neonatal intensive care, so this is a short primer which will hopefully help you understand a bit more about this particular group of babies.

What does corrected gestational age mean?
Parents might say that the child is eight months old, but six months corrected. Corrected gestational age is how old the baby should be if they had been born on time.

Or if you are mathematically challenged like me – **this website** calculates corrected age for you.

The Story of Noah – A typical NICU journey

There is no typical NICU stay, but this fictional story of Noah describes what a NICU parent may have been through

(Stock photo by Ceejayoz on wikimedia commons).

Noah is an extreme pre-term born at 28 weeks, weighing a mere 1.4kg his mum developed an infection and went into early labour at her local hospital. At birth Noah is floppy and not breathing. The neonatal team intubate him straight away. Noah is taken to NICU, and put on a ventilator. The neonatal team starts antibiotics, and put in an umbilical venous catheter (to give fluids) and umbilical arterial catheter (for central blood pressure monitoring). The blood pressure keeps dropping and a dopamine infusion is needed. Because of the severe infection the ventilation is difficult to manage, and at 12 hours old Noah needs an emergency transfer across the city to a tertiary NICU.
Mum is still unwell herself and has not been able to meet her baby yet.
Dad runs between mum and Noah all night checking they are both OK. He has not been able to touch or hold him either.

Dad makes the difficult decision to go with Noah in the ambulance which means leaving his partner behind in ITU

At the tertiary hospital Noah spends a week on a ventilator. A head scan shows that there is a bleed into one of the ventricles (common in this age group). The long term effects of this are unpredictable at the moment. He is jaundiced, so the incubator is lit with blue phototherapy lights. He is too sick to be fed through a NG tube, so is on parenteral nutrition. After three days mum is finally well enough to come and see Noah for the first time. She gets her first cuddle. Turning a corner after a week on antibiotics, Noah is extubated and put on CPAP (via a nasal mask). He does well and two days later is well enough to go back to the local NICU.

At three weeks old (corrected age 31 weeks gestation), suddenly Noah has an apnoea. His parents watch as the neonatal doctors resuscitate him. Infection is suspected. He has to be intubated and ventilated again for a couple of days. The feeding is set back because of this; mum is running out of breast milk and the stress is not helping.
At four weeks old (corrected age 32 weeks gestation), Noah has made it off CPAP but still needs oxygen through nasal cannulae. This means he has chronic lung disease (defined by still needing oxygen after four weeks of age). He is fed via a NG tube, as he still doesnt have a suck reflex. Mum has to pump her breast milk and give it to the NICU nurses to keep in the fridge for Noah.

His parents are travelling between home and hospital several times a day. Only the immediate family are allowed onto the NICU for infection control reasons.
At 35 weeks corrected gestation, Noah is able to take some breast feeds, but this is tiring for him and he still needs the NG tube. He has finally stopped needing oxygen. He has another two days on antibiotics after seeming a bit unsettled with a few large vomits. Luckily, this time the blood cultures are negative.
At 36 weeks the feeding is going better, and at 2.0kg Noah has put on just enough weight to be discharged home. He needs long term follow up to monitor his development. The family have by this point been in the NICU for 8 weeks, and they feel lucky to have had a relatively straightforward stay. Many other NICU parents theyve met will still be there for months.

Insider knowledge

NICU parents may have had an unwelcome crash course in neonatal medicine, but the advantage of this is that they will be able to give you a very detailed history if you know the right questions to ask.

Respiratory problems:

Are probably the most common reason for ex-prems to come to the ED. Most preterms will have had some form of respiratory support, and as you can probably guess, babies who needed longer periods of more invasive support are the ones to worry about more.

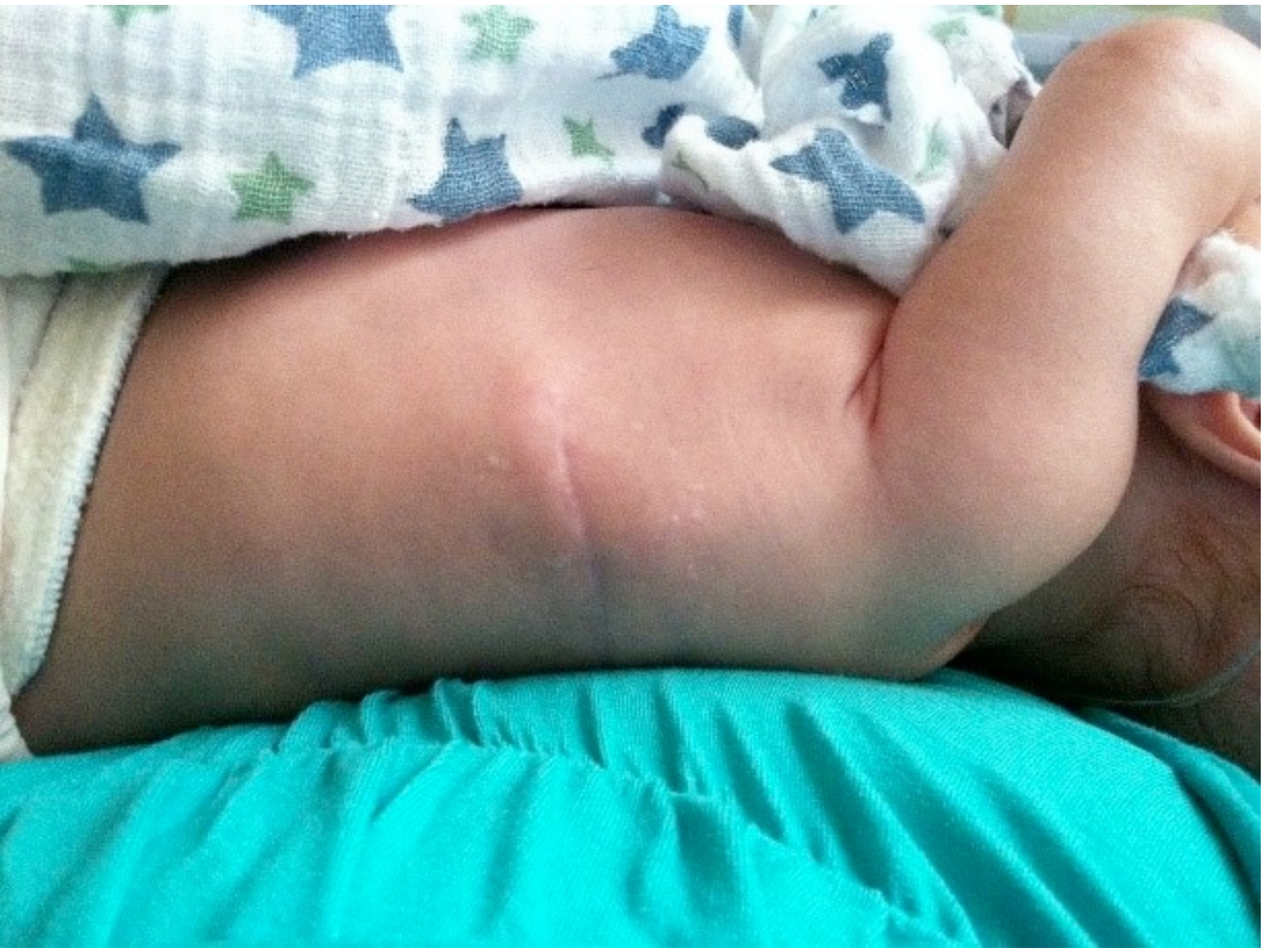
So, ask parents how many days/weeks the baby was **on a ventilator** for, how long they needed **CPAP or high flow oxygen**, and how long they needed **oxygen via nasal cannulae**

If they needed steroids to get off the ventilator, needed **any form of oxygen after 28 days of chronological age**, or are **still on home oxygen** or respiratory support now, these are indicators of chronic lung disease of prematurity (CLD). The major causes of death in babies with CLD (in NICU and after discharge) are sepsis/respiratory infection, respiratory failure or pulmonary hypertension.
CLD is related to gestational age at birth and also birth weight (the more premature and the smaller you are, the more likely you are to have CLD). Ante- and postnatal infections, mechanical ventilation and oxygen therapy also contribute to the development of CLD. Using mechanical ventilation and oxygen is pretty much unavoidable in premature babies, but modern neonatal care focuses on keeping ventilation pressures as low as possible to avoid barotrauma, with tightly controlled oxygen levels.

If any ex-prem not just those with CLD – attends ED with a respiratory complaint, however minor, it is pretty unusual for them not to be admitted. Even well appearing babies of this group can decompensate fast and need close observation.

Surgery:

The most common surgical procedures premature babies undergo are repair of inguinal hernias (this might happen electively or as an emergency if the hernia strangulates), closure of a patent ductus arteriosus (PDA), and – less commonly – bowel resection, and possibly colostomy formation, if they have suffered necrotising enterocolitis (NEC). Scars from these operations will be there if you know where to look (its a left lateral thoracotomy scar for a PDA closure).



PDA and its tell-tale repair scar

Feeding:

Many preterms are discharged home on nasogastric feeds which parents are trained to do at home. Taking a good feeding history is really important covering which milk they use, how many feeds a day, how long a break they have from feeds overnight.
A smaller subset of babies (for example those with neurological problems or severe reflux) will be PEG fed. Problems with feeding (or tubes) are a common reason to present to the ED; any child who is at home needing feeding support like this will have a community nurse who is a good point of contact for information.

Vaccines:

Premature babies get these at their chronological age, rather than their corrected age. So they should have had their 2, 3 and 4 month vaccines 2, 3 and 4 months after their ACTUAL birthday rather than their due date. Also, some ex-prems (exact criteria vary slightly from hospital to hospital) receive an extra winter vaccine Palivizumab against RSV, the main culprit of bronchiolitis.

As ex-premature babies are so fragile, it is important that they are kept in a side room away from all the other snotty, viral older children in the ED (hopefully your triage will have sorted this out).

Development:

Starting life in NICU can have huge effects on development, even if the baby did not suffer any brain injury. The NICU environment is stressful despite the efforts we make to try and minimise this, and babies will not have the normal amount of interaction and stimulation from their parents. Their development is more likely to follow their corrected, rather than chronological age.

Alarm bells

Babies who needed oxygen for over a month on NICU, or are on home oxygen these babies have chronic lung disease of prematurity. Bronchiolitis, or any viral URTI, could be catastrophic.
Recent discharge from NICU – the baby may be suddenly unwell or maybe the parents aren't coping with the overwhelming anxiety of being at home after spending months in intensive care. Handle with care.
Parental concern this goes for all areas of paediatrics a parents instinct is usually spot on, but even more so in parents of ex-prems who have spent literally months sitting at an incubator watching their baby's every move.

Take home messages

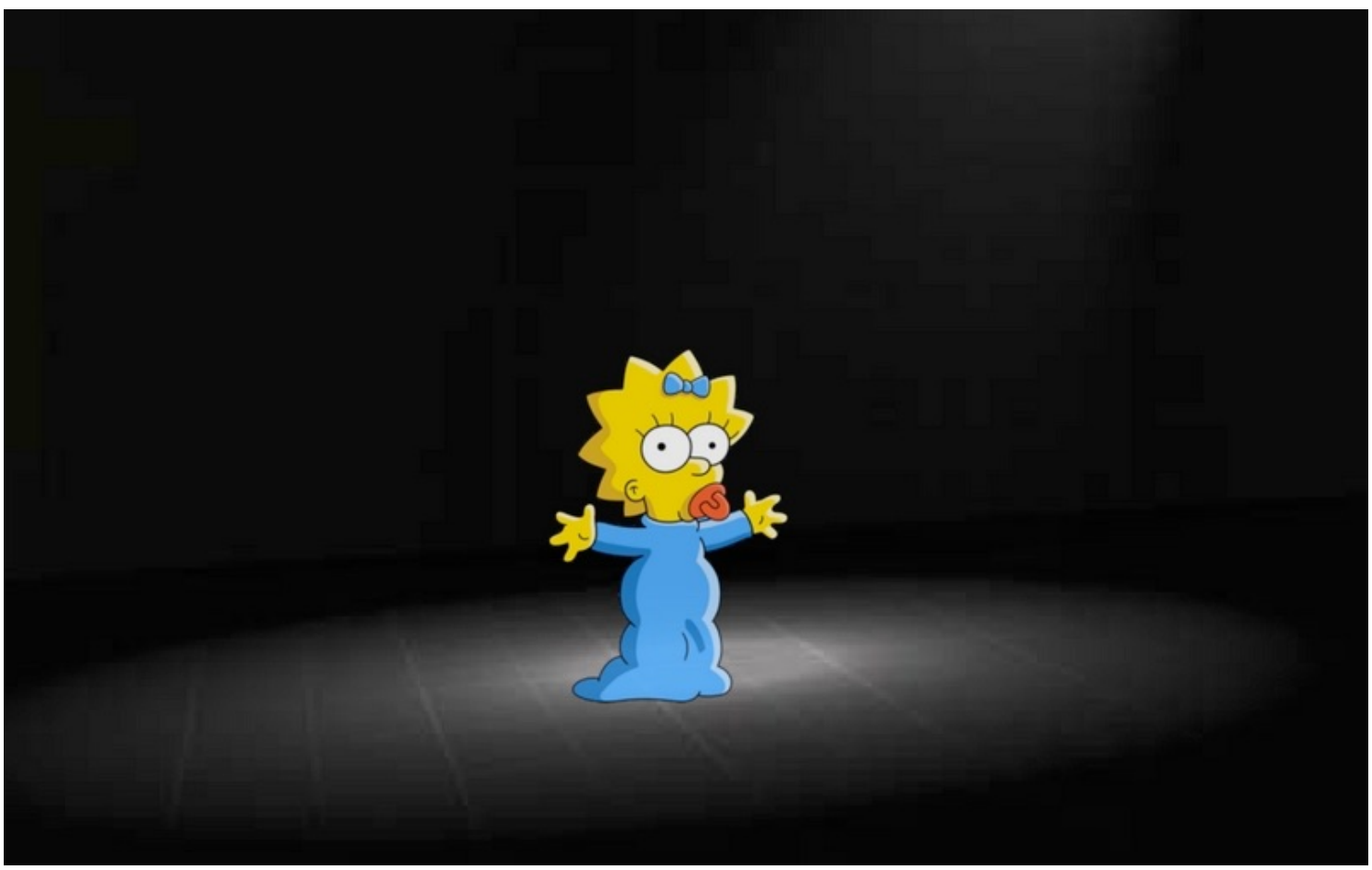
1 Have an extremely low threshold for concern whatever the presenting complaint
2 The default assumption should be that the baby will need admission
3 Consider discussion with the paediatric team if in any doubt

References/Further reading:

1. EPICure:Population based studies of survival and later health status in extremely premature infants
2. Gov.UK: Childhood immunisations UpToDate: Pathogenesis and clinical features of bronchopulmonary dysplasia (not open access)

MAGGIE SIMPSONS SECOND AUDITION- PROLONGED JAUNDICE

Author: Meriel Tolhurst-Cleaver / **Codes:** PAP13 / **Published:** 14/08/2017



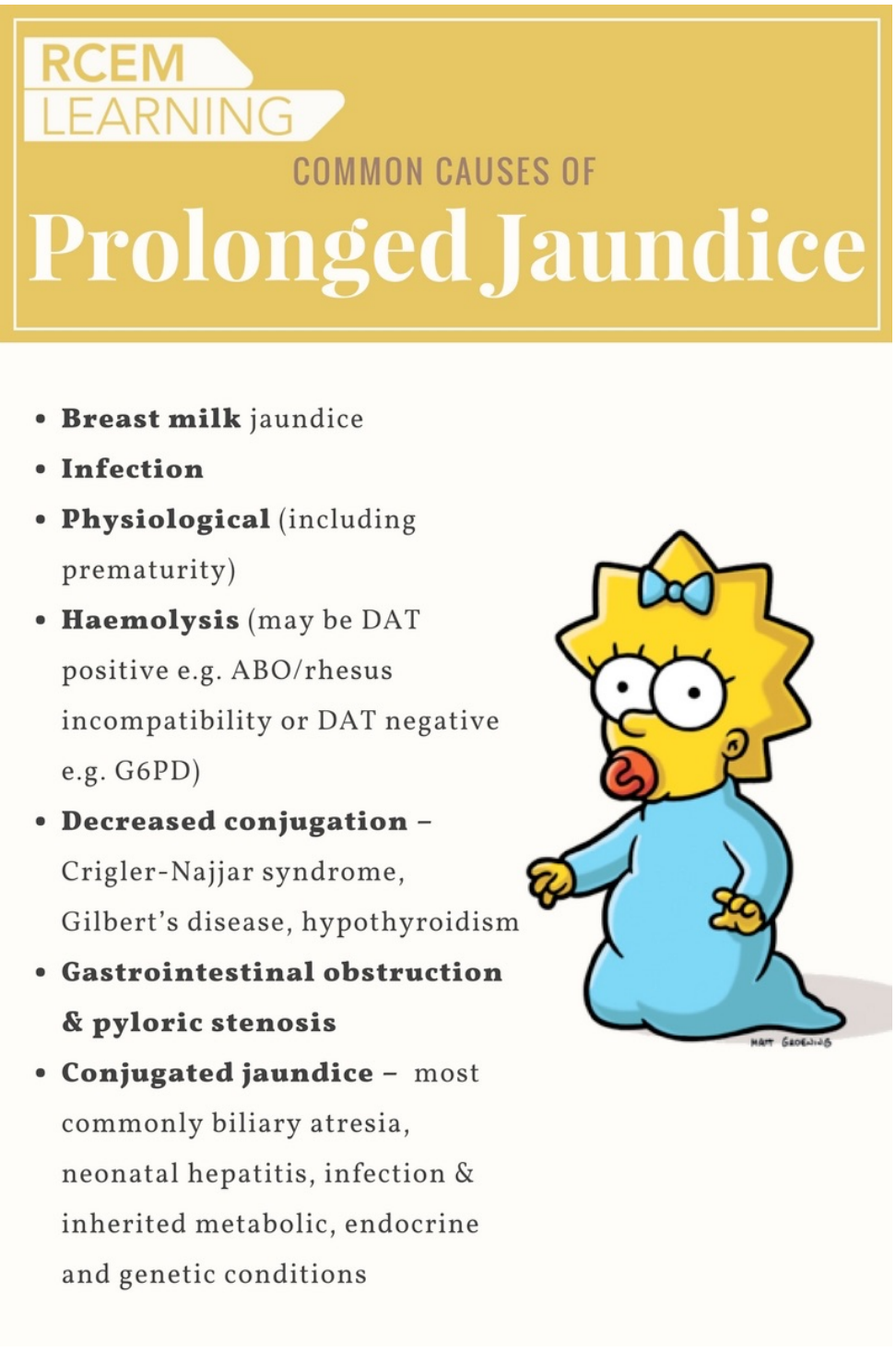
PROLONGED JAUNDICE

Prolonged jaundice is different from early jaundice, which we discussed in our previous chapter, as it is jaundice which persists for 14 days in a baby who was born at term (37 weeks or more gestation), or to 21 days in a pre-term baby born before 37 weeks gestation.

It generally is referred to a paediatric clinic but many of these neonates still rock-up to the ED, so it is good for us to know how to manage them.
Up to 15% of babies have prolonged jaundice, and many will have no underlying pathology. The most common cause of prolonged jaundice is exclusive breastfeeding (breast milk jaundice), and immature neonatal mechanisms and prematurity can also cause benign physiological jaundice after 14 days.

However these are both diagnoses of exclusion and in prolonged jaundice we have to do a bit more digging before we can reassure the parents (and ourselves) that all is well. Most importantly, we have to exclude liver disease and conjugated hyperbilirubinaemia. The most common cause of neonatal liver disease is biliary atresia and the surgical management of this is time critical, i.e. within the first few weeks of life.

Giving some thought to the various causes of prolonged jaundice will allow you to target your history, examination and investigations appropriately. For an exhaustive list, see these papers on unconjugated neonatal hyperbilirubinemia and conjugated.



Where to start

Congratulations on your beautiful little boy/girl/ bundle of joy you must be exhausted, how are you doing?, or similar congratulatory and empathetic phrase is a great way to break the ice with these tired, stressed parents before you launch into the detailed history you need. Then down to the nitty gritty:

1. Presenting complaint might sound obvious but is the jaundice the only problem? Are they unwell at all with poor feeding, vomiting, difficulty breathing. Has there been any bleeding or bruising?

2. Pregnancy history – any anti-D given? Any maternal drugs? Normal scans?

3. Delivery type (thinking about potential for bleeding or bruising), risk factors for sepsis (prolonged rupture of membranes, Group B streptococcus, maternal infection at the time of birth), birth gestation, did they have vitamin K at birth?

4. Weight note their birth weight and any recent/ current weights (you need to weigh again today if not already done), plot them in the red book and note the centile they are on. Note that most babies have regained their birth weight by day 14

5. Feeding – breast, bottle, mixed? If on formula, which, how much and how often?

6. Jaundice – when was it noticed, has any treatment already been given?

7. Stools and urine – careful questioning about stools, specifically asking parents whether stools are pale or chalky and whether the urine is very dark and stains the nappy (stools in newborns should be green or bright yellow and urine should be straw coloured). Have there been plenty of wet and dirty nappies? Did they pass meconium in the first 24 hours of life?

8. Drugs/PMH are they on any medications or have any known medical conditions. Have the Guthrie card (heelprick blood tests) been done on day 5?

9. Family history ask about jaundice in the family and, specifically about any blood or liver disorders, cystic fibrosis or metabolic disease.

Examination

A set of observations should have been performed at triage, but if not make sure you get them. If the baby appears obviously unwell perform an ABCD assessment, get help and resuscitate as appropriate. Otherwise perform a neonatal top-to-toe examination.

Look for dysmorphic features, jaundice, pallor and signs of bleeding (petechiae or purpura). Does the baby have normal tone, alertness and handling? Note if the baby is floppy or appears encephalopathic (even a newborn baby should have a flat back if held in ventral suspension, they shouldn't droop over your hand, check out this video if you are unsure what is normal tone in a newborn). Assess their hydration status (capillary refill, anterior fontanelle, mucous membranes). Quickly scan the eyes for a present red reflex to exclude cataracts. Examine the chest and pulses for features of congenital heart disease and examine the abdomen for hepatosplenomegaly.

ALWAYS check the nappy to see if you can see any evidence of stool or urine colour for yourself. Let this part of the examination be a reminder for you to ask about stool and urine colour if you haven't already.

Investigations

In prolonged jaundice initial investigations are not too cumbersome. You need to perform a split bilirubin (which should give you a total and a conjugated level), an FBC, a group and Coombs test (also called a Direct antiglobulin test, DAT) and thyroid function tests, all of which can be done from a heelprick blood sample.

You also need to collect a clean-catch urine for culture. Remember to confirm with the parents that the Guthrie screening has been sent at 5 days, and ideally check the result if it is available to you. Before sending the baby home you should see the bilirubin level, FBC, group and Coombs and the urine microscopy. If those are all within normal limits then the baby can go home with a follow-up appointment in clinic to check the thyroid function test and the urine culture.

Management

There isn't any specific management of prolonged neonatal jaundice itself, it doesn't need phototherapy like early jaundice does as the blood brain barrier has matured by around days 10-14 and prevents kernicterus. However, treatment is needed for many of the underlying causes (most urgently the Kasai surgical procedure for biliary atresia) if they are found, and so you essentially need to respond to the results of the investigations you have performed. It goes without saying that if a UTI is found the baby (who is under 3 months of age) would need admitting for IV antibiotics under the General Paediatric team.

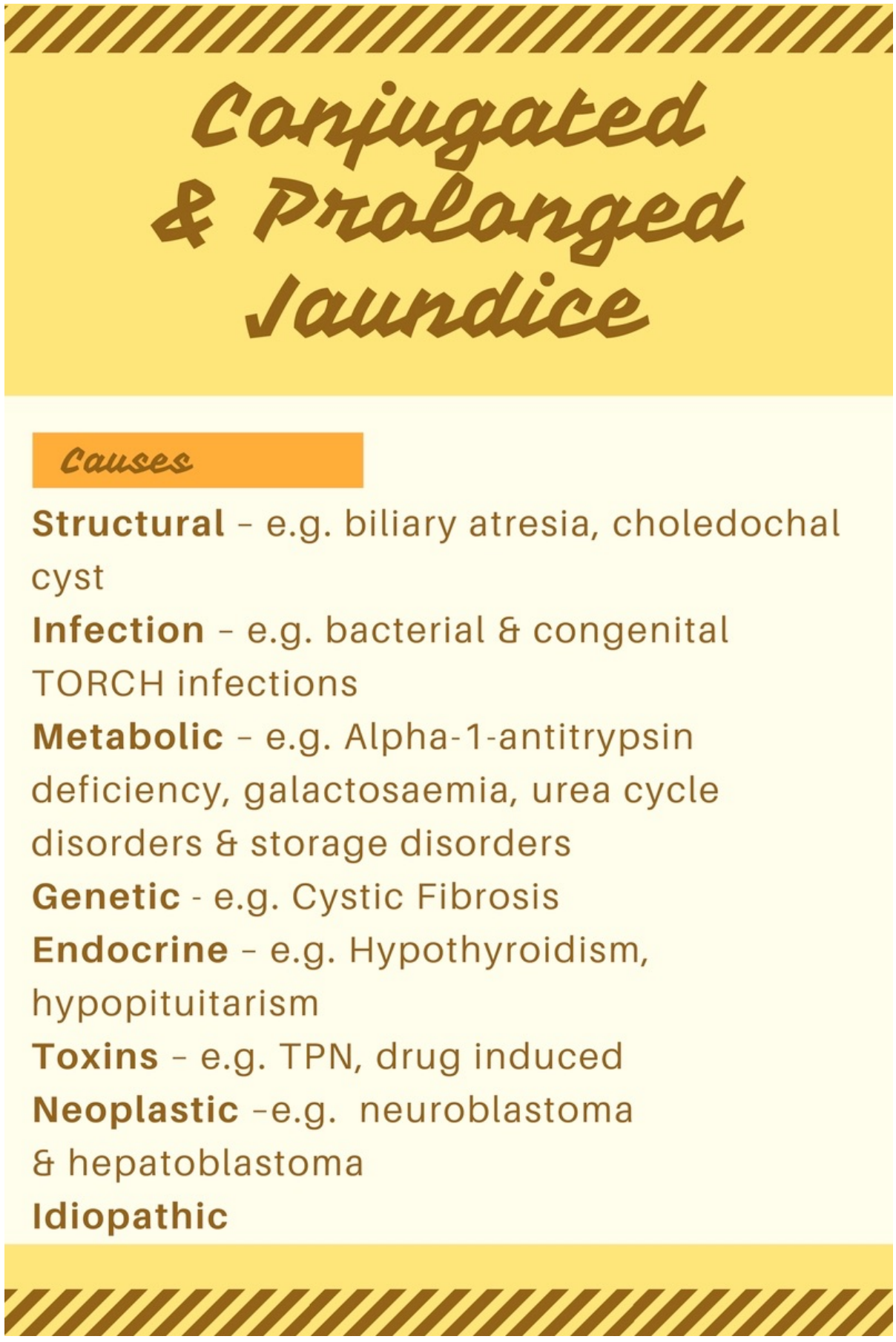
The single most important thing to check is the conjugated bilirubin level.

Conjugated hyperbilirubinaemia is defined as a conjugated bilirubin >25micromol/l or if the conjugated fraction is over 20% of the total level. If this is found then a whole heap of tests need to be done, looking for a variety of congenital, liver and metabolic diseases. The common causes are listed below but a full differential diagnosis of conjugated hyperbilirubinaemia and the investigations needed are outlined in this paper. There is also a handy guideline on the management of neonatal conjugated hyperbilirubinaemia from the British Society of Paediatric Gastroenterology, Hepatology and Nutrition that includes an investigation summary sheet to print out and put in the notes.

However, these investigation lists are long, and in the ED you realistically want to recognise conjugated hyperbilirubinaemia and refer to the General Paediatric team for admission and further investigation.

An initial prolonged jaundice screen may pop up incidentally. For example, anaemia and low neutrophils are fairly common in neonates and are generally just repeated in a week/few weeks, but its best to consult local guidelines as to when they should be seen again.

Some local teams will also repeat another bilirubin in a week or so if the total is over 350, even if it is unconjugated, to ensure it is trending downwards. Whether the family you are looking after is being admitted or discharged a patient information leaflet is useful to explain what is going on. Most trusts will have one (and Ive included our local one as an example), but the excellent www.yellowalert.org website which has generic leaflets to download on all aspects of neonatal jaundice, including a very useful and comprehensive overview advice leaflet. If you have unfortunately made a diagnosis of



conjugated hyperbilirubinaemia, the Children's Liver Disease website is also an excellent resource for families. It has specific leaflets on biliary atresia and all the other pathologies listed above.

References/further reading

1. NICE Clinical Guideline 98 Jaundice in Newborn Babies Under 28 Days, May 2010
2. Gupte G. Conjugated Hyperbilirubinaemia. Paediatrics and Child Health.2008:18(10):474476
3. Gilmour S. Prolonged Neonatal jaundice: When to worry and what to do. Paediatrics and Child Health 2004; 9(10): 700704