

# Asbru protocol for the Management of Hyperbilirubinemia in the Healthy Term Newborn (version 1)

**plan** Hyperbilirubinemia

**intentions**

**avoid intermediate-state:** (bilirubin = transfusion)

**conditions**

**abort-condition:** (possibility-of-hemolytic-disease = yes)

**plan-body** type = unordered, wait-for-optional-subplans = yes

**wait-for** Diagnostics-and-Treatment-hyperbilirubinemia

Check-for-rapid-TSB-increase

Check-for-jaundice-after-2-weeks

Check-for-jaundice-after-3-weeks

Diagnostics-and-Treatment-hyperbilirubinemia

**plan** Check-for-rapid-TSB-increase

**intentions**

**achieve overall-state:** (**and** is-known-variable(possibility-of-G6PD) is-known-variable(possibility-of-hemolytic-disease))

**conditions**

**filter-precondition:** (**and** (TSB-decrease = no) *in* NOW  
(TSB-change > 0.5) *in* NOW  
)

**plan-body** type = sequentially

**wait-for** all

possibility-of-hemolytic-disease ← yes

**if** (age = day2)

**then**

possibility-of-G6PD ← yes

Exit-possibility-of-G6PD

**else**

possibility-of-G6PD ← no

Exit-possibility-of-hemolytic-disease

**plan** Exit-possibility-of-G6PD

*Exit this protocol. Perform appropriate laboratory assessment (possibility of hemolytic disease, probably caused by G6PD).*

**plan-body** user-performed

**plan** Exit-possibility-of-hemolytic-disease

*Exit this protocol. Perform appropriate laboratory assessment (possibility of hemolytic disease).*

**plan-body** user-performed

**plan** Check-for-jaundice-after-2-weeks

**intentions**

**achieve overall-state:** is-known-variable(possibility-of-cholestatic-disease)

**conditions**

**filter-precondition:** (jaundice-clinically-significant = yes) *in* ([-, 2w] [2w, -] [-, -] birth-date)

**plan-body** type = sequentially

**wait-for** all

**do** type = any-order

**wait-for** all

**ask** physical-exam-OK

**ask** colour-stools

**ask** colour-urine

**if** (or (physical-exam-OK = no) (colour-stools = "light") (colour-urine = "dark"))

**then**

**ask** direct-serum-bilirubin

possibility-of-cholestatic-disease ← yes

Exit-possibility-of-cholestatic-jaundice

**else**

possibility-of-cholestatic-disease ← no

Exit-provide-routine-care

**plan** Exit-possibility-of-cholestatic-jaundice

*Perform appropriate laboratory assessment, including possibility of cholestatic jaundice.*

**plan-body** user-performed

**plan** Exit-provide-routine-care

*Provide routine care, recommend routine feeding and follow-up.*

**plan-body** user-performed

**plan** Check-for-jaundice-after-3-weeks

**intentions**

**achieve overall-state:** is-known-variable(possibility-of-cholestatic-disease)

**conditions**

**filter-precondition:** (jaundice-clinically-significant = yes) *in* ([-, 3w] [3w, -] [-, -] birth-date)

**plan-body** type = sequentially

**wait-for** all

**do** type = any-order

**wait-for** all

**ask** TSB-value

**ask** direct-serum-bilirubin

**ask** total-urine-bilirubin

possibility-of-cholestatic-disease ← yes

Exit-possibility-of-cholestatic-jaundice

**plan** Diagnostics-and-Treatment-hyperbilirubinemia

**intentions**

**avoid intermediate-state:** (bilirubin = transfusion)

**conditions**

**complete-condition:** (or (jaundice-clinically-significant = no)  
*explanation* "Follow this infant into routine clinical supervision."  
completed(Treatment-hyperbilirubinemia) *in* NOW  
)

**abort-condition:** (or (term-child = no) *explanation* "Exiting the  
protocol to individualized clinical evaluation, including assessment  
of jaundice in light of prematurity."  
(age = day1) *explanation* "Exiting the protocol to individualized  
clinical evaluation, including assessment of jaundice and non-  
isoimmune hemolytic disease."  
(pathologic-reason = yes))

**plan-body** type = sequentially

**wait-for** none

ask term-child  
ask age-child  
Diagnostics-hyperbilirubinemia  
Treatment-hyperbilirubinemia

**plan** Diagnostics-hyperbilirubinemia

**intentions**

**achieve overall-state:** (and is-known-variable(pathologic-reason)  
(is-known-parameter(jaundice-clinically-significant)) *in* NOW  
)

**plan-body** type = sequentially

**wait-for** all

pathologic-reason ← no  
Anamnesis-abnormal-signs  
Blood-tests  
Anamnesis-hemolytic-disease  
Jaundice-determination

**plan** Anamnesis-abnormal-signs

**intentions**

**achieve overall-state:** is-known-variable(possibility-of-other-diseases)

**conditions**

**abort-condition:** (pathologic-reason = yes) *explanation* "Exiting the protocol to individualized clinical evaluation, including assessment of jaundice and underlying disease."

**plan-body** type = sequentially

**wait-for** all

**do** type = any-order

**wait-for** all

**ask** lethargy

**ask** apnea

**ask** tachypnea

**ask** instable-temperature

**ask** behavior-changes

**ask** hepatosplenomegaly

**ask** vomitting

**ask** feeding-difficulty

**ask** excessive-weight-loss

**if** (**or** (lethargy = yes) (apnea = yes) (tachypnea = yes) (instable-temperature = yes) (behavior-changes = yes) (hepatosplenomegaly = yes) (vomitting = yes) (feeding-difficulty = yes) (excessive-weight-loss = yes))

**then**

possibility-of-other-diseases ← yes

**else**

possibility-of-other-diseases ← no

**if** (possibility-of-other-diseases = yes)

**then**

pathologic-reason ← yes

**plan** Blood-tests

**plan-body** type = sequentially, wait-for-optional-subplans = yes

**wait-for** (**or** Check-blood-test-mother Perform-blood-test-child)

Check-blood-test-mother

Perform-blood-test-child

**plan** Check-blood-test-mother

**intentions**

**achieve overall-state:** is-known-variable(consider-holding-cord-blood)

**conditions**

**filter-precondition:** blood-test-mother-available: (and  
(is-known-parameter(bloodtype-mother)) *in* NOW  
(is-known-parameter(rhesustype-mother)) *in* NOW  
(is-known-parameter(serum-isoimmune-antibodies-mother)) *in*  
NOW  
)

**plan-body**

**if** (or (and (rhesustype-mother = positive) (serum-isoimmune-antibodies-mother = negative))  
(bloodtype-mother = O))

**then**

consider-holding-cord-blood ← yes  
Consider-holding-cord-blood

**else**

consider-holding-cord-blood ← no

**plan** Consider-holding-cord-blood

*Consider holding infant's cord blood in a blood bank in case future testing is necessary*

**plan-body** user-performed

**plan** Perform-blood-test-child

**intentions**

**achieve overall-state:** (and (is-known-parameter(bloodtype-child)) *in* NOW  
(is-known-parameter(rhesustype-child)) *in* NOW  
is-known-variable(possibility-of-isoimmune-hemolytic-disease))

**conditions**

**filter-precondition:** (or (not blood-test-mother-available)  
(rhesustype-mother = negative) (serum-isoimmune-antibodies-mother = positive))

**abort-condition:** (pathologic-reason = yes) *explanation* "Exiting the protocol to individualized clinical evaluation, including assessment of jaundice and isoimmune hemolytic disease (positive Coombs test)."

**plan-body** type = sequentially

**wait-for** all

**do** type = any-order

**wait-for** all

**ask** bloodtype-child

**ask** rhesustype-child

**ask** direct-Coombs-test

**if** (direct-Coombs-test = positive)

**then**

possibility-of-isoimmune-hemolytic-disease ← yes

**else**

possibility-of-isoimmune-hemolytic-disease ← no

**if** (possibility-of-isoimmune-hemolytic-disease = yes)

**then**

pathologic-reason ← yes

**plan** Anamnesis-hemolytic-disease

**intentions**

**achieve overall-state:** (and is-known-variable(possibility-of-hemolytic-disease) is-known-variable(possibility-of-inherited-disease))

**conditions**

**abort-condition:** (pathologic-reason = yes) *explanation* "Exiting the protocol to individualized clinical evaluation, including assessment of jaundice and non-isoimmune hemolytic disease."

**plan-body** type = sequentially

**wait-for** all

**do** type = any-order

**wait-for** all

**ask** family-history

**ask** ethnic-origin

**ask** geographic-origin

**ask** early-jaundice

**ask** pallor

**ask** hepatosplenomegaly

**if** (or (family-history = yes) (ethnic-origin = yes) (geographic-origin = yes) (early-jaundice = yes))

**then**

Investigate-possibility-of-hemolytic-disease

**ask** par-possibility-of-hemolytic-disease

**if** (par-possibility-of-hemolytic-disease = yes)

**then**

possibility-of-hemolytic-disease ← yes

**else**

possibility-of-hemolytic-disease ← no

**if** (ethnic-origin = yes)

**then**

possibility-of-inherited-disease ← yes

**else**

possibility-of-inherited-disease ← no

**if** (or (possibility-of-hemolytic-disease = yes) (possibility-of-inherited-disease = yes))

**then**

pathologic-reason ← yes

**plan** Investigate-possibility-of-hemolytic-disease

*Perform appropriate laboratory assessment of infant including (but not limited to): (1) complete blood count, differential smear, reticulocyte count; (2) G6PD screen; (3) hemoglobin electrophoresis.*

**plan-body** user-performed

**plan** Jaundice-determination

**intentions**

**achieve overall-state:** (is-known-parameter(jaundice-clinically-significant)) *in* NOW

**plan-body** type = sequentially

**wait-for** all

**do** type = any-order

**wait-for** one

Blanching-skin-with-digital-pressure-test

Ictrometer-test

Transcutaneous-jaundice-meter-test

Determine-extent-cephalocaudad-progression

**ask** jaundice-clinically-significant

**plan** Blanching-skin-with-digital-pressure-test

*Blanching skin with digital pressure test*

**conditions**

**activate-mode:** manual

**plan-body** user-performed

**plan** Ictrometer-test

*Ictrometer test*

**conditions**

**activate-mode:** manual

**plan-body** user-performed

**plan** Transcutaneous-jaundice-meter-test

*Transcutaneous jaundice meter test*

**conditions**

**activate-mode:** manual

**plan-body** user-performed

**plan** Determine-extent-cephalocaudad-progression

*Determine extent cephalocaudad progression*

**conditions**

**activate-mode:** manual

**plan-body** user-performed

**plan** Treatment-hyperbilirubinemia

**intentions**

**avoid intermediate-state:** (bilirubin = transfusion)

**achieve overall-state:** (bilirubin = observation)

**plan-body** type = parallel

**wait-for** one

**do** type = any-order

**wait-for** (or Regular-treatments Exchange-transfusion)

Regular-treatments **on-abort** Exchange-transfusion

Exchange-transfusion

**cyclical-plan**

**do** type = sequentially

**wait-for** all

**ask** TSB-value

**ask** age-child

**retry-delay** min = 12h, max = 24h

**plan** Regular-treatments

**intentions**

**avoid intermediate-state:** (bilirubin = transfusion)

**achieve overall-state:** (bilirubin = observation)

**conditions**

**filter-precondition:** (bilirubin  $\neq$  transfusion) *in* NOW

**abort-condition:** (or (bilirubin = transfusion) *in* NOW

intensive-photohterapy-failure)

**plan-body** type = unordered

**wait-for** all

Feeding-alternatives

**do** type = any-order, retry-aborted-subplans = yes

**wait-for** Observation

Phototherapy-intensive

Phototherapy-normal-prescription

Phototherapy-normal-recommendation

Observation

**plan** Feeding-alternatives

**plan-body** type = sequentially

**wait-for** all

**ask** breastfed-child

**if** (breastfed-child = yes)

**then**

Choose-feeding-alternative

**plan** Choose-feeding-alternative

**plan-body** type = any-order

**wait-for** one

Breastfeeding

Breastfeeding-with-formula

Formula-only

**plan** Breastfeeding  
*Breastfeeding*  
**conditions**  
    **activate-mode:** manual  
**plan-body** user-performed

**plan** Breastfeeding-with-formula  
*Breastfeeding with formula*  
**conditions**  
    **activate-mode:** manual  
**plan-body** user-performed

**plan** Formula-only  
*Formula only*  
**conditions**  
    **activate-mode:** manual  
**plan-body** user-performed

**plan** Phototherapy-intensive

**intentions**

**achieve overall-state:** (bilirubin = observation)  
**maintain intermediate-state:** (and (TSB-decrease = yes) in  
([4h, -] [-, 6h] [-, -] )  
(TSB-change  $\geq$  1) in ([4h, -] [-, 6h] [-, -] )  
)

**conditions**

**filter-precondition:** (or (bilirubin = phototherapy-intensive) in  
NOW  
normal-phototherapy-failure)  
  
**abort-condition:** (or (and (bilirubin  $\neq$  phototherapy-intensive)  
in NOW  
(not normal-phototherapy-failure))  
**intensive-phototherapy-failure:** (and (bilirubin =  
phototherapy-intensive) in NOW  
(or (and (TSB-decrease = yes) in ([4h, -] [-, 6h] [-, -] )  
(TSB-change  $<$  1) in ([4h, -] [-, 6h] [-, -] )  
)  
(TSB-decrease = no) in ([4h, -] [-, -] [-, -] )  
)  
) *explanation* "Failure of intensive phototherapy. Perform appropri-  
ate laboratory assessment (possibility of hemolytic disease)."  
)

**plan-body**

Prescribe-intensive-phototherapy

**plan** Prescribe-intensive-phototherapy

*Prescribe intensive phototherapy*

**plan-body** user-performed

**plan** Phototherapy-normal-prescription

**intentions**

**achieve overall-state:** (bilirubin = observation)

**maintain intermediate-state:** (TSB-decrease = yes)

**conditions**

**filter-precondition:** (bilirubin = phototherapy-normal) *in* NOW

**abort-condition:** (or (bilirubin  $\neq$  phototherapy-normal) *in* NOW

normal-phototherapy-failure: (and (bilirubin = phototherapy-normal) *in* NOW

(TSB-decrease = no) *in* NOW

)

)

**plan-body**

Prescribe-normal-phototherapy

**plan** Prescribe-normal-phototherapy

*Prescribe normal phototherapy*

**plan-body** user-performed

**plan** Phototherapy-normal-recommendation

**intentions**

**achieve overall-state:** (bilirubin = observation)

**avoid intermediate-state:** (therapy-risks = yes)

**conditions**

**filter-precondition:** (bilirubin = phototherapy-recommended) *in* NOW

**abort-condition:** (bilirubin  $\neq$  phototherapy-recommended) *in* NOW

**plan-body** type = any-order

**wait-for** one

Prescribe-observation-manual-activation

Prescribe-normal-phototherapy-manual-activation

**plan** Prescribe-observation-manual-activation

*Prescribe observation*

**conditions**

**activate-mode:** manual

**plan-body** user-performed

**plan** Prescribe-normal-phototherapy-manual-activation

*Prescribe normal phototherapy*

**conditions**

**activate-mode:** manual

**plan-body** user-performed

**plan** Observation

**intentions**

**maintain intermediate-state:** (bilirubin = observation)

**conditions**

**filter-precondition:** (bilirubin = observation) *in* NOW

**abort-condition:** (bilirubin  $\neq$  observation) *in* NOW

**plan-body**

Prescribe-observation

**plan** Prescribe-observation

*Prescribe observation*

**plan-body** user-performed

**plan** Exchange-transfusion

**intentions**

**avoid intermediate-state:** (bilirubin = transfusion)

**achieve overall-state:** (bilirubin  $\neq$  transfusion)

**conditions**

**filter-precondition:** (or (bilirubin = transfusion) *in* NOW  
intensive-phototherapy-failure)

**plan-body** type = parallel

**wait-for** all

Prescribe-intensive-phototherapy

Prescribe-exchange-transfusion

**plan** Prescribe-exchange-transfusion

*Prescribe exchange transfusion*

**plan-body** user-performed

*File created by Mar Marcos, Vrije Universiteit Amsterdam, on -.*

*File updates:*

- *Mar Marcos, 23.4.2002: Changes to treatment intentions (after CBO's proposal)*

- *Mar Marcos, 24.4.2002: Last update*