

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-available⁴)
(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

⁴See plan Check-blood-test-mother.

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-phototherapy-failure^a)

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

^aSee plan Phototherapy-intensive.

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] [-, -] SELF)
(TSB-change \geq 1) *in* ([4h, -] [-, 6h] [-, -] SELF)
)

conditions

filter-precondition: (**or** (bilirubin = phototherapy-intensive) *in* NOW
normal-phototherapy-failure^a)

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

plan-body

Prescribe-intensive-phototherapy

^aSee plan Phototherapy-normal-prescription.

^bSee plan Phototherapy-normal-prescription.

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^a)

plan-body type = parallel

wait-for all

Prescribe-intensive-phototherapy

Prescribe-exchange-transfusion

^aSee plan Phototherapy-intensive.

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 main update*
- *Mar Marcos, 28.8.2002: Last small update*