



Barnehelsesiden.no



Rikshospitalet – Radiumhospitalet **HF**

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1.1 Mål for oppgaven: Undersøkelse av nyfødte og småbarn – et multimedieverktøy for studenter ved 9.semester

Initiativet til oppgaven kom fra Ferdighetssenteret. Tanken bak denne oppgaven var å kunne samle tidligere oppgaver og gjøre dem tilgjengelig samlet. Samtidig å lage et verktøy som kunne bli bygd videre på i fremtiden. Det ble særlig lagt vekt på at instruksjonsvideoer Ferdighetssenteret allerede hadde, skulle gjøres tilgjengelig på en enklere måte en dagens DVD-utlån. Samtidig å kunne knytte eksisterende DVDer inn mot oppdatert fagstoff, og ikke minst gjøre det mulig å legge til nye videoer i fremtiden.

Sådan bestod ikke oppgaven bare av å tilrettelegge og publisere fagstoff, men også arbeidet med å redigere eksisterende DVDer og å programmere og designe en nettside som vil legge grunnlaget for fremtidige oppgaver i regi av Ferdighetssenteret.

Opgaven har til hensikt å danne grunnlaget for følgende:

- 1) Å kunne utnytte eksisterende utdanningsmaterieell på en mer effektiv og målrettet måte, herunder eksisterende videoer og publisert fagstoff.
- 2) Å være en samlende kilde til informasjon rettet mot medisinstudenter, og da særlig de studentene som stifter kjennskap med stoffet for første gang.
- 3) Legge grunnlaget for å kunne samle fremtid fagstoff og produksjoner på en nettside som er tilgjengelig for alle.

2.1 Inndeling av oppgaven og organer som omhandles

Opgaven ble delt inn i tre deler, basert på arbeidsmengde og innhold.

Del 1: Fagstoff

Del 2: Film-redigering

Del 3: Nettsiden

Fagstoff – Del 1

Fagstoffet som har blitt lagt til grunn er en kombinasjon av tidligere oppgaver utarbeidet for Ferdighetssenteret, anbefalte lærebøker for Pediatriterminen ved UiO, notater fra forelesninger, publikasjoner på nett og fagstoff mottatt av Ferdighetssenteret representert ved lektor Hanne Storm og Prof. Thor Willy Ruud Hansen ved Rikshospitalet.

Som en rød tråd gjennom oppgaven har vi lagt til grunn retningslinjene for undersøkelse på helsestasjon (Statens helsetilsyn 1998b) og i tillegg vaksinasjonsprogrammet som er i kraft pr. 1.9.2007. Oppgaven er derfor systematisk inndelt på barnets alder og organet som omhandles.

Film-redigering – Del 2

Ferdighetssenteret har pr.dags dato to ferdige DVDer som tar for seg nyfødte og ettåringer. Disse to DVDene har så langt lagt grunnlaget for den audiovisuelle delen av oppgaven, men det er tatt høyde for at DVDer for også de andre alderstrinnene etter hvert blir produsert og blir lagt til fortløpende.

Arbeidet med filmene har bestått i å inndelegge DVDene systematisk etter tema, legge til stikkordtekst og tilpasse formatet til visning på nettet. Arbeidet er gjort i henhold til gjeldende retningslinjer innen opphavsproblematikk.

Nettsiden – Del 3

Hovedpoenget med oppgaven var å kunne publisere arbeidet som var gjort av oss, og tidligere grupper, på nettet. Målsetningen er at arbeidet som har blitt utført skal tjene som et verktøy for kommende grupper og ikke minst studenter, både lokalt og internasjonalt. Nettsiden er av den grunn på engelsk.

Arbeidet med nettsiden har vært omfattende. Ikke bare har stoffet blitt redigert og tilpasset med tanke på en pedagogisk brukeropplevelse på nettet, men også den tekniske delen har blitt tilpasset bruk av audiovisuelle tjenester.

Vi har også tatt høyde for at det i fremtiden må være muligheter for å oppdatere fagstoffet og legge til nytt materiell. Alt arbeidet er utført under kyndig veiledning av Erling Løken Andersen og Bo Myrås ved Norsk Ideutvikling AS. Nettsiden, slik den fremstår i dag holder en internasjonal standard, og støtter de mest anvendte nettleserne verden over.

3.1 Fagpersoner

Vi har benyttet oss av fagpersoner i alle deler av oppgaven. Enkelte av dem har deltatt aktivt, mens andre har bistått oss som faglige veiledere og/eller vært kilde til fagstoff.

Når det gjelder det faglige innholdet har vi vært i dialog med følgende fagpersoner:

- a) Prof. dr Thor Willy Ruud Hansen - Rikshospitalet
- b) 1. Amanuensis, Lektor Hanne Storm - Rikshospitalet
- c) Dr. Arne Westgaard – Rikshospitalet
- d) Dr. Henrik Bruun – Rikshospitalet

Når det gjelder det tekniske innholdet har vi vært i dialog med følgende fagpersoner:

- a) Erling Løken Andersen
- b) Bo Myrås
- c) Jesper Thøgersen
- d) Phillip Johnsen

3.2 Samarbeidspartnere

Oppgaven har til dels vært utarbeidet på bakgrunn av de retningslinjene Ferdighetssenteret ved Rikshospitalet har utarbeidet sammen med oss, og i tråd med den strategien Rikshospitalet har i bruken av internettet som et verktøy for studenter ved UiO, Medisin.

3.3 Teknisk plattform

Nettsiden er programmert i et programmeringsspråk som heter PHP. Arbeidet er utført av Philip Johnsen i samarbeid med oss. Denne delen av arbeidet har vært overvåket av Bo Myrås.

Designet av nettsiden og utførelse av brukergrensesnittet har blitt utført av Jesper Thøgersen, i samarbeid med oss. Denne delen av arbeidet har vært overvåket av Erling Løken Andersen.

Redigeringen av filmene er gjort av oss i følgende programmer:

Bilde - Windows Moviemaker V6.0 og UleadVideoStudio V11.

Lyd - AudaCity

Foto- PhotoFiltre

Tjenesten på nett levers i samarbeid med Domeneshop AS og Norsk Ideutvikling AS. Alle kostnader knyttet til arbeidet med nettsiden og driften av tjenesten er sponset av Norsk Ideutvikling AS.

3.4 Domenevalg og brukergrensesnitt

Vi har valgt å døpe nettsiden til ”Barnehelsesiden.no”. Vi mener navnet på nettsiden reflekterer innholdet og er i samsvar med godt bruk av det norske språket på nett.

Videre har vi valgt å kjøpe et norsk domene (*.no), som gir nettsiden økt troverdighet og optimaliserer nettstedet for søk gjennom søkemotorer.

Nettsiden er utformet på enklest mulig måte, slik at ulike nettlesere og lav båndbredde ikke legger en demper på brukeropplevelsen. Videre er nettstedet fri for tekniske elementer som øker kravet til brukernes datakyndighet.

Siden er utformet på engelsk for å dekke det behovet som finnes blant studenter på 9.semester ved UiO, Medisin. Da undervisningen i dette semesteret er på engelsk. Dette fremhever også det internasjonale aspektet ved oppgaven.

3.5 Innhentet materiell fra Ferdighetscenteret

DVD 1: Examination Of The Newborn:

Directed by Robert Bentehagen & Anders Lippert
Photo by Christian Nissen & Bjørn Ohnstad
Editing by Christian Nissen
Doctor Thor Willy Ruud Hansen
Produced by Ferdighetscenteret, University Of Oslo
With the help of Foto & Videotjenesten UiO/RH 2003

DVD 2: The One-Year-Old – A clinical examination at the health centre:

Directed by Silje Smelvær & Charlotte Myhre
Supervised by Erik Hankø & Hanne Storm
Editing by Christian Nissen, Silje Smelvær & Charlotte Myhre
Photo by Christian Nissen & Charlotte Myhre
Doctor Iren Matthews
Health nurse Marte F. Myhre
Mother & Child 1 – Catherine Ordway & Joshan
Mother & Child 2 – Beate Fossum & Hedda
Produced by Ferdighetscenteret UiO
With the help of Foto & Videotjenesten UiO/RH 2004

3.6 Redigeringsarbeidet

Instruksjonsvideoene fra Ferdighetssenteret forelå som DVD-er. Disse DVD-ene er basert på konvertering fra VHS-format (videokassetter). Konverteringen fra videokassetter til DVDer i sin tid innebar en reduksjon i kvalitet. For å kunne benytte filmene på nettet var vi avhengige av å konvertere filmene på DVD-ene til enten avi eller mpeg formater. Vår bekymring bestod derfor i at videre konvertering for bruk på nettet kunne forringe bildeegenskapene ytterligere.

Etter forsøk med ulike metoder falt valget på å ”hente ut” filmene fra DVDene ved å sende digitale signaler via en DVD-spiller med DV-ut tattaket til et digitalt videokamera (DV-kamera). Fra dette kameraet ble signalet så sendt direkte til en PC. På datamaskinen sørget programmet Windows Movie Maker for å spille inn de innkommende signalene til det formatet vi ønsket oss.

Etter vår mening var dette et godt kompromiss som sikret oss adekvat bildekvalitet. Noe støy på lydsporet forekom, men dette ble justert vekk i programmet AudaCity.

DVD-ene hadde en spilletid på totalt 48 minutter (21min og 27min), noe som ble for stort for web-formatet der filmene skal kunne streames. Derfor har vi klippet og redigert hver film opp i mindre sekvenser. Disse sekvensene har en maksstørrelse på opp mot 90 sekunder, og egner seg bedre for visning på nettet. Etter klipping ble det lagt til tittel og referanser på hver fil. Denne delen av arbeidet ble utført i Windows Movie Maker.

Følgende 24 videoklipp ble laget fra DVD-en ”Examination Of The Newborn”:

- Clip 01 - Introduction & information
- Clip 02 - The Charts
- Clip 03 - Hip Screening
- Clip 04 - Malformations
- Clip 05 - Muscle Tone & Spontaneous Movement
- Clip 06 - Skin Tone
- Clip 07 - Breathing Pattern
- Clip 08 - Heart Auscultation
- Clip 09 - Lung Auscultation
- Clip 10 - Red Reflex
- Clip 11 - The Head
- Clip 12 - The Mouth
- Clip 13 - Neck & Clavicle
- Clip 14 - The Pulses
- Clip 15 - The Hands
- Clip 16 - The Abdomen
- Clip 17 - External Genitalia
- Clip 18 - The Anus
- Clip 19 - The Spine
- Clip 20 - The Feet
- Clip 21 - Hip Examination
- Clip 22 - Grasp Traction Moro Reflexes
- Clip 23 - Calming Technique
- Clip 24 - Summary & Parting

Følgende 25 videoklipp ble laget fra DVD-en ”The One-Year-Old – A clinical examination at the health centre”:

- Clip 01 - Introduction in groups with nurse
- Clip 02 - Group conversation with nurse
- Clip 03 - Weight - Height - Head Circumference
- Clip 04 - In office with the doctor
- Clip 05 - History – Eating
- Clip 06 - History – Sleeping
- Clip 07 - History - Sensory & Motor skills
- Clip 08 - History – Skin
- Clip 09 - History – Work & Daily Life
- Clip 10 - History – Language
- Clip 11 - History – Summary
- Clip 12 - Iron deficiency Screening
- Clip 13 - Development & Skills
- Clip 14 - Red Reflex
- Clip 15 - Test For Strabismus
- Clip 16 - Heart Auscultation
- Clip 17 - Lung Auscultation
- Clip 18 - The Abdomen
- Clip 19 - Femoral Pulse
- Clip 20 - The Fontanelles
- Clip 21 - Hip Examination
- Clip 22 - Otoscopy
- Clip 23 - The Throat
- Clip 24 - The Growth Chart
- Clip 25 - History – Immunization

Et av ønskene våre fra begynnelsen av var at instruksjonsvideoene skulle inneholde nyttige stikkord som dukket opp på skjermen mens filmen rullet.

Etter å ha redigert filmene i mindre sekvenser startet arbeidet med å analysere hvert klipp for å legge til lærerike stikkord. Utfordringen lå i å begrense lengden på teksten som dukket opp på skjermen, samtidig som tekstsnutten måtte oppfattes som meningsfylt.

Vi valgte derfor å legge tekstsnittene på en banner som dukket opp etter hvert som de ulike teamene ble omhandlet i filmen. Banneren som dukker opp er utformet i lyse og relativt anonyme farger, likeledes er fontene og fargen på teksten valgt med tanke på at de ikke skal ta fokus vekk fra selve instruksjonene i filmen.

Stikkordene skal kunne summere de viktigste momentene, samtidig som de skal kunne tjene som et talerør på PCer som ikke har tilgang til lyd/høyttalere, slik situasjonen er på de fleste terminalstuer ved Universitetet i Oslo.

Nedenfor følger ”teksten” med de ulike stikkordene til de to filmene.

Videoklipp fra DVD-en ” Examination Of The Newborn” med tekst for stikkord:

- Clip 01 - Introduction & information
 - Introduce yourself
 - Talk about the delivery
 - Pooped and peed?
 - Look through the charts
 - Be open for questions
- Clip 02 - The Charts
 - Examine the pregnancy record
 - Examine the delivery record
 - Apgar score
 - Check the growth chart
- Clip 03 - Hip Screening
 - Screening for risk factors
 - Family history of hip problems?
- Clip 04 - Malformations
 - Parental concern
 - Count finger & Toes
 - Position of the eyes & ears
- Clip 05 - Muscle Tone & Spontaneous Movement
 - Flexorpredominance
 - Symmetrical movement pattern
- Clip 06 - Skin Tone
 - Reddish tone = normal
 - Peripheral cyanosis = normal
 - Central cyanosis = abnormal
 - Pale - Anaemic?
 - Jaundice?
- Clip 07 - Breathing Pattern
 - Irregular breathing common
 - Flaring of the nostrils?
 - Intercostal retractions?
 - Accessory respiration muscles
- Clip 08 - Heart Auscultation
 - Locate the heart sounds
 - Listen to the 1. & 2. heart sounds
 - Split? Pure? Murmurs?
- Clip 09 - Lung Auscultation
 - Remember the back
- Clip 10 - Red Reflex
 - Light path in & out
 - Cataract?
 - Retina is attached
- Clip 11 - The Head
 - The shape of the head
 - Palpate the fontanelles
 - Palpate the suture lines
 - Septum deviation?

- Clip 12 - The Mouth
 - Inspect & palpate the palate
- Clip 13 - Neck & Clavicles
 - Palpate the sternocleidomastoideus
 - Torticollis?
 - Palpate the clavicles
- Clip 14 - The Pulses
 - Brachial pulse
 - Femoral pulse
 - Coarctation of the aorta?
- Clip 15 - The Hands
 - Crease pattern
- Clip 16 - The Abdomen
 - Inspect the umbilicus
 - Palpate the liver
 - Spleen palpable?
 - Any abnormalities?
- Clip 17 - External Genitalia
 - Large labia covering the minor
 - Secretion or blood = normal
 - Penis length
 - Hypospadias
 - Testicles descended?
- Clip 18 - The Anus
 - Centrally located opening
- Clip 19 - The Spine
 - Any misalignments?
 - Any dimples or pits?
- Clip 20 - The Feet
 - Grasp reflex
 - Aligned and not twisted
 - Range of motion
- Clip 21 - Hip Examination
 - Ortolani's & Barlow's
 - Place finger along femur
 - Finger tip on trochanter major
 - If dislocated the femoral head will be lifted back in acetabulum
 - Do not use force!
 - Use the fingers to lift
 - Barlow's : Push down before the Ortolani's
 - Barlow's
 - Ortolani's
- Clip 22 - Grasp Traction Moro Reflexes
 - Grasp reflex
 - Traction reflex
 - Moro / startle reflex
 - Pull, but not off the surface
 - Let go suddenly

- Clip 23 - Calming Technique
 - Roll in blanket
 - Talk gently and calming
- Clip 24 - Summary & Parting
 - Summarize for the parent
 - Be open for questions

Videoklipp fra DVD-en ” ”The One-Year-Old – A clinical examination at the health centre ”
med tekst for stikkord:

- Clip 01 - Introduction in groups with nurse – NOT USED
- Clip 02 - Group conversation with nurse
 - General update
 - Eating & sleeping habits
 - Discuss in groups, share tips
 - Be determinant
 - Breastfeeding status
 - End of pre-examination
- Clip 03 - Weight - Height - Head Circumference
 - NB! Subtract the weight of the nappy
 - Head against the board
 - At the largest circumference
- Clip 04 - In office with the doctor – NOT USED
- Clip 05 - History – Eating
 - Nutrition analysis
 - Vitamin-D supplement
 - Breastfeeding status
- Clip 06 - History – Sleeping
 - Sleeping pattern
 - Importance of common parental strategy
- Clip 07 - History - Sensory & Motor skills
 - Hearing & vision
 - Fine motoric skills
 - Gross motoric skills
- Clip 08 - History – Skin
 - Allergies?
- Clip 09 - History – Work & Daily Life
 - Work status & childcare
- Clip 10 - History – Language
 - Number of words
 - Understanding of words
- Clip 11 - History – Summary
 - Brief summary
 - Info about the examination
- Clip 12 - Iron deficiency Screening
 - Pale - iron deficiency?
 - Ask about the diet

- Clip 13 - Development & Skills
 - Pincer grip
 - Hand-eye coordination
 - Cognitive ability
- Clip 14 - Red Reflex
 - Distract with toy
 - Cataracts or retinoblastomas?
- Clip 15 - Test For Strabismus
 - Corneal light reflex
 - Cover-uncover test with light reflex
 - Cover-uncover test with toy as distraction
- Clip 16 - Heart Auscultation
 - Palpate the apex beat
 - Interact and be patient
 - Radiation to the back?
- Clip 17 - Lung Auscultation
 - Combine heart & lung exam
 - Pressing the thorax together may be helpful
- Clip 18 - The Abdomen
 - In parents lap
 - Distract with toy
 - Take nappy off
 - Palpate liver, kidney & spleen
- Clip 19 - Femoral Pulse
- Clip 20 - The Fontanelles
- Clip 21 - Hip Examination
 - Abduction ability
 - Legs should nearly touch the surface
 - On flat firm surface
- Clip 22 - Otoscopy
 - Perform at end of exam
 - Sideways with head & arms stabilised
- Clip 23 - The Throat
 - Stabilise the head & upper body
- Clip 24 - The Growth Chart
 - Weight for age
 - Head circumference
 - Weight for height
 - Height
 - Compare with parents height
 - Monitor possible problems
- Clip 25 - History – Immunization
 - Problems with vaccines

4.1 Grunnlaget for videre utnyttelse av nettsiden

Vi har tatt høyde for at nye tema eller oppdatert fagkunnskap skal kunne legges til. Nettsiden har et administrasjonsverktøy som etter en kort introduksjon kan administreres med enkelthet.

4.2 Utbyggelsesmuligheter

Ferdighetssenteret ved Rikshospitalet har pr.dags dato to stk ferdige DVDer som har blitt lagt til grunn for den audiovisuelle delen av nettsiden. Flere DVDer er under utarbeidelse, og vi har derfor tatt høyde for at nye audiovisuelle elementer vil bli lagt til i fremtiden.

Også samarbeid og linkdeling med andre nettsider av betydning har blitt tatt høyde for. Det er også mulighet for å legge hele eller deler av nettsiden inn lokalt på PCer eller på intranett.

5.1 HISTORY & INFORMATION

New born – Home visit

Introduction

- Brief the parents about the benefits of the health program and its content. – Underline the fact that the program is meant to be on the parents' terms.
- Give practical information regarding opening hours, contact persons and phone numbers.

Interaction

- How is the child's temper and its interest for its surroundings?
- Do the parents engage in dialog and lingual contact with the child?
- Is the child restless or cries often? Which one of the caretakers handles such situations best? Any technique that is better?

Sleep

- Discuss sleeping patterns, and the importance of the child sleeping on its back to prevent SIDS (Sudden Infant Death Syndrome). Highlight other risk factors for SIDS, such as smoking in-house and overheating.
- Inform the parents about the risk when sleeping in the same bed as the baby. Motivate the parents to let the child also sleep outdoors.

Nutrition

- Is breastfeeding the child's' only source of nutrition?
- How often is the child breastfeed during a day?
- How does the mother regard breastfeeding?
- Does the child show any signs of problems related to the diet? – Burping, diarrhoea, abdominal pain etc.

Family situation

- How is the mothers' mental and physical health?
- Any birth traumas? - How do the parents regard the birth?
- Have the mother contacted the hospital for her own 6-weeks examination?
- How does it feel being parents?
- How is the general mood among the family members?
- How is the work task regarding the childcare distributed among the parents?
- Social network – do the child have older brothers/sisters?
- How are other family members involved with the child?

Health information

- Child accidents: Always secure the child properly when driving. Never leave a child unattended on a caring table.
- Smoking: Underline the importance of a non-smoking environment. If the parents are smokers, make sure to inform them about methods and programs that can help them stop smoking.

6 weeks

Interaction

- How is the parent's expectations of the child – was the expectation realistic, and if so, is the situation as expected?
- How is the child's development regarding eye contact, sounds, smiling, and does the child interact when contacted?
- What causes uneasiness or make the baby cry? – Which one of the caretakers/parents is the best one to handle the baby in such situations?
- Underline the importance of body contact between parents and the child.

Sleep

- What is the total amount of sleep during 24 hours? Differences between day / night?
- Does the child fall a sleep by its self, or during breastfeeding/caring?
- Does the child sleep in its own bed, or in the parents' bed?
- In what position does the child sleep? On the back or on the stomach?
- What is the temperature inside and outside the house when the child is a sleep?

Nutrition

- How does the mother regard the breastfeeding status?
- Does she produce enough milk?
- Any pain during breastfeeding?
- Duration of the breastfeeding? Any difference between daytime and night?
- Recommend the usage of Vitamin D supplement, such as fish-oil (Tran).

Family situation

- How is the mothers' mental and physical status? – Her own views?
- Any experiences during labour that is still on the agenda?
- How is the mothers sleeping and eating patterns?
- How is the situation regarding contraception and intimacy?
- What do the parents feel regarding their new role as parents?
- How do the parents share the new tasks regarding childcare?
- How is the parents' social network?
- How did their relatives react to the new situation?

Health information

- Smoking: Importance of a non-smoking environment. If the parents are smokers, help them to adapt routines that will reduce the harm to the child.
- Immunization: Inform them of the national child immunization program, and the benefits of being a part of it.
- Child accidents: Never leave the child alone, and avoid interaction with the child when drinking hot coffee or tea.

3 Months

Interaction

- Do both parents have good interaction with the child?
- What type of activities does the child like?
- Any difference in the way the child cries?
- Which one of the caretakers is best at handling the child in such situations? Any technique that have been successful?
- How is the child's interaction with others; sisters/brothers, grandparents, strangers

Sleep

- The amount and quality – is there any difference in the sleeping patterns during day or night-time?
- Do the child fall a sleep by its self? It is important du underline the importance of good sleeping habits.

Nutrition

- How does the mother regard breastfeeding?
- Is the breast milk the only source of nutrition? If not, go trough the usage of other sources.
- When and how often do the meals occur?
- Does the child get a daily supplement of Vitamin D?

Family situation

- What part does the father play regarding nursing and caring?
- How is the cooperation regarding the childcare?
- How is the general spirit at home? – Level of stress, intimacy?
- Do the parents get time off, and are they able to take care of their relationship?

Health information

Inform the parents about the benefits of the immunization program, and the risk of not participating in it. Be also open about the possible downsides about the program, and engage in an active dialog regarding the parents concerns.

6 Months

Interaction

- What makes the child smile or laugh?
- Does the child use its voice to be noticed?
- It is important that the parents communicate with the child, and take part in the child's world.

Sleep

- How is the child's sleeping patterns?
- Where does it sleep? – day-time vs. night-time
- Does the child fall a sleep by itself?
- Does the parents feel any problems related to the child's' sleeping patterns?

Nutrition

- Have the child started eating regular food? – If so, what kind of products?
- How often does the child receive Vitamin D supplements?
- Remind the parents that breast milk is still a recommended source of nutrition, and could easily be combined with other sources of nutrition.
- Does the child eat at night? – Any problems related to this?
- At this age the child can start practicing on drinking from a cup.

Family situation

- Do the parents have time to spend on each other?
- How do they regard their daily life?
- Intimacy and sexual behaviours should be back to normal by now. How is the situation? – Are both parents on the same level?
- Do the parents treat the child the same way? Same rules and limitations?
- In case of other family members; how do they feel about the newborn demanding more and more of the caretaker's attention?

Health information

Inform the parents about the benefits of the vaccination program, and the risk of not participating in it. Be also open about the possible downsides about the program, and engage in an active dialog regarding the parents concerns.

8 Months

Interaction

- Does the child explore its surroundings with the parents as safe guardians?
- How do the parents react when the child tries to do something dangerous? – Discuss times of limitations, and proper reaction to violation of these.
- Underline the importance of having clearly defined rules, and the importance to be involved in a positive and guiding dialogue with the child.

Sleep

- How is the child's sleeping patterns? – Regularity?
- Do the child sleep trough the whole night? – How is the response from the parents if it awakes?
- Do the parents have any challenges regarding the child's sleep?

Nutrition

- How often does the child eat?
- Does the child participate in regular dining schedules?
- Does the child receive vitamin D supplement?
- What does the child drink and eat?
- Is the child able to use a cup, or is it still bottle-fed?
- Any problems regarding the child's nutrition status or intake of food?

Family situation

- Does the father plan to get permission from work, and stay home with the child for a period? What will the mother do in this period? – Any special plans?
- How is daily life? – Working load on each parent, and caretaker help from outside?
- How do other family members regard the situation?

Health information

Child accidents: Inform the parents about the need to use child safety seat in cars. Also remember to buckle up the child when placed on pushchairs.

12 months

Interaction

- How do the parents try to influence and educate the child?
- What kind of activities does the child like engaging in with the parents?
- How would the parents describe the child? - Temper, anger, etc

Sleep

- How is the child's sleeping patterns? – Regularity?
- Do the child sleep through the whole night? – How is the response from the parents if it awakes?
- Do the parents have any challenges regarding the child's sleep?

Nutrition

- Is the child still breastfed? If so, how often? – Make a plan on how to slowly stop this habit.
- Does the child eat ordinary food, as the rest of the family?
- Does the child engage in regular dining with the rest of the family?
- Does the child get the opportunity to eat on its own?
- Inform the parents about the fact that the child now can drink cow milk, but not more than 6dl a day.
- If the child still uses bottle, start training on the cup usage.
- Does the child get enough supplement of vitamin D?

Family situation

- Is the mother returning back to her work? – If so, who will take care of the child?
- What part do the mother and father play in raising and educating the child?
- Do the parents have the opportunity to spend some time alone?

Health information

- Child accidents: At this age the child can travel further and further, therefore stress the importance of a secure home.
- Dental health: How often do they brush the child's teeth? How is the usage of toothpaste containing flour?
- The child should only drink water in-between the meals. Even milk contains sugar, which will damage the teeth.

18 months

Interaction

- What kind of activities does the mother/father and the child enjoy doing together?
- How does the child express its own will? – How do the parents respond to this?
- Does the child engage in activities on its own? – How and what?
- How does the child interact with other children and family members? –Empathy, caring for others, jealousy?

Sleep

- How is the child's sleeping patterns? – Regularity?
- Do the child sleep trough the whole night? – How is the response from the parents if it awakes?
- Do the parents have any challenges regarding the child's sleep?

Nutrition

- How many meals does the child eat during a day?
- Does the child eat or drink in between the meals?
- How much milk products are consumed? – 6dl is a maximum.
- How is the child's appetite? – If the child rejects eating, how do the parents react?
- Does the child get enough vitamin D supplements?

Family situation

- What part do the mother and father play in raising and educating the child?
- Do the parents have time to spend on each other?
- Do the receive help from the outside to take care of the child? – Babysitters etc.
- Do the parents agree on the education and questions regarding raising the child?

24 months

Interaction

- How do the child and the parents react to conflict of interest?
- Do the parents agree on the limits the child has to follow?
- How do the parents handle the child's aggression? Any difference between the way the mother vs. the father in such situations?
- How does the child interact with other children?
- What do the child and the parents enjoy doing together?

Sleep

- Does the child still feel the need to sleep during daytime?
- Does the child fall a sleep on its own at night, and if so at what time?
- Does the child wake up at night?
- Any problem regarding the child's sleeping patterns?

Nutrition

- How many meals do the child eat during a day and when?
- Does the child dine with the rest of the family?
- How is the child's appetite? – If the child rejects eating, how do the parents react?
- Does the child get enough vitamin D supplements?

Family situation

- How do the parents regard the social situation at home? Any conflicts?
- What part do the mother and father play in raising and educating the child?
- Do the parents have time to spend on each other?
- Do they receive help from the outside to take care of the child? – Babysitters etc.
- Do the parents agree on the education and questions regarding raising the child?
- Any problems with jealousy between the child and other family member

5.2 SKIN

General

Examine the skin thoroughly; emphasising on revealing skin disorders that can appear as birthmarks, such as haemangioma and large congenital nevi. Do not forget to assess the general appearance as well; is the child bluish (cyanosis) or yellowish (jaundice)?. Bruising may be due to birth trauma, but extensive bruising and/or petechia may be caused by a coagulation disorder or thrombocytopenia.

Congenital nevi

Large congenital nevi appear among 1 % of all newborns. Due to the fact that these nevi can develop into malignant melanoma, it is advised that they are removed before puberty. If the nevi is larger than 1,5 cm, it is recommended that it is removed immediately with the usage of a special technique. Classification of congenital nevi:

- Small < 1,5 cm
- Medium 1,5 – 20cm
- Large > 20cm

Haemangioma

There are three types of haemangioma; Capillary haemangioma, Naevus flammeus and Cavernous haemangioma

Capillary haemangioma are common among newborns. They are generally located over the base of the nose, on the eyelids and on the neck, often referred to as stork bite. If the haemangioma interferes with development of normal vision, feeding, breathing or other vital functions, surgical treatment can be necessary. The facial marks often disappear, while the marks on the neck tend to stay.

Naevus flammeus is a more intense red/blue red type of haemangioma. Its borders are clear and well defined. As they child grows, they intend to grow larger and become darker. Treatment, such as laser surgery, can be provided even for infants. If the nevus is located close to the eye, it can cause neurological disorders such as epilepsy (Sturge-Weber syndrome).

Cavernous hemangiomas (strawberry nevus) can appear anywhere on the body, and can develop as early as in the first weeks after birth. They can be located superficially and look like strawberries, or be found deeper in the tissue, appearing as blue tumours. Normally these hemangiomas tend to disappear after 1, 5 year. This degeneration process starts with a central collapse of the haemangioma. If the hemangiomas are located near eyes, nose, mouth, vulva or the perianal area, they should be treated with laser surgery or steroids.

Café au lait spots

These lesions are well defined hyper pigmented spots with great variation in size and a typical café au lait colour. This phenomenon is quite common, and is present in as many as 20% of all infants. Usually there are up to three separate spots. If one observes more than three spots, the possibility and risk for a neurocutaneous syndrome, such as neurofibromatosis, is present.

Cyanosis

Cyanosis occurs when oxygen saturation drops below 80- 85% ($N > 95\%$). There are many different causes for such a drop, reduced oxygen uptake in the lungs (lung pathology) or reduced blood flow through the lungs (heart pathology)

Newborns normally have a pink skin tone. It is also normal to observe mild blue colouring of the fingers and toes, peripheral cyanosis (acrocyanosis). This is a result of vasoconstriction and relative polycythaemia. Central cyanosis is best observed on the tongue and mucous membranes. Therefore remember to remove dummy or pacifier (smokk) when examining the child. A central cyanosis may indicate an underlying cardiorespiratory problem.

Jaundice

Physiological jaundice is seen in 50% of the newborns after the second day, continuing into the second week. Most commonly appearing between day 3 and 5. Newborns have high levels of haemoglobin, while their red blood cells (RBC) have a short lifespan. This results in a great workload on the liver, that tries to conjugate the bilirubin which is unleashed when the RBC are broken down. This again results in higher levels of bilirubin in the blood, which can be observed as jaundice.

Non-physiological jaundice can be caused by 3 mechanisms:

- 1) Extensive haemolysis
- 2) Non-adequate conjugation
- 3) Reduced excretion of conjugated bilirubin

Even mild jaundice present on the first day after birth may suggest haemolysis. If there are pale stools, dark urine or failure to thrive, then a pathological hepatic or an obstructive cause is more likely. Remember that bilirubin in the urine always requires further investigation. Unconjugated bilirubin can cross the blood-brain-barrier, and is neurotoxic.

5.3 EYES

The surroundings

Start off by looking for signs of infection or structural problems with the eyes, such as malformations, cataracts or tumours. The palpebral fissures (the slits through which the eyes look) are normally slightly slanted. If this slant is exaggerated it is described as upward slanting, as may be seen in trisomy 21 (Down's). A downwards slanting can also indicate the presence of a syndrome.

Red reflex

Inspect the eyes with an ophthalmoscope, and look for a clear red reflex. An absence of the reflex can indicate a cataract, corneal cloudiness or retinal pathology (tumour). This requires urgent expert assessment.

Strabismus

It is common for children under the age of six months to have episodes of strabismus (squinting), especially when tired. If this persists beyond the age of six months, or if squinting is present all the time regardless of age, it is a sign for concern. It is possible to uncover strabismus by using a *corneal-light-reflex-test* or *cover-uncover-test*. If the child show signs of frequent strabismus, this could be a sign of one of the eyes being suppressed. The suppressed eye must be treated within the first five years to avoid it to become blind.

In a *corneal light reflex test* a light is projected on to the child's eyes from a distance. By observing the reflection of the light on the cornea (in relation to the pupils) it is possible to evaluate their alignment. Normally one should see the reflection symmetrically and slightly nasal to the pupils. In case of strabismus one will observe an asymmetry in the light reflection.

The *cover-uncover-test* will differentiate between manifest strabismus (tropi) and latent strabismus (fori). The child focus on an object with both eyes uncovered. If one of the eyes deviates, the eye that did not deviate is covered. If the eye that first deviated fixates and focuses on the object, a manifest strabismus is confirmed. If this is difficult to observe the deviation, one can use the *cornea-light-reflex-test* in combination with the cover-uncover test. In the case of latent strabismus, one aims to uncover deviation of the non-dominant eye. When covering the non-dominant eye, it will deviate behind the cover while the dominant eye still focuses on the object. This deviation of the non-dominant eye will be exposed as you uncover the eye. The eye will reposition it self back to a focusing position.

Remember to test both eyes.

Eye contact

Newborns are nearsighted (myopi), and do not evolve full vision before the age of three. Steady and sure eye contact should be obtained within six weeks. If a six weeks old child still lacks this ability, its more likely caused by a late development of the eyes, rather than impaired vision. Blindness at this age usually reveals its self trough eyes that move rapidly from side to side (nystagmus).

A child older than six weeks should be able to focus on a object and follow it when its moved around. Keep in mind that children are easy to distract, and that a child that is tired can fail on this test. Remember to always confirm your findings with the parents, and reveal if similar findings has been observed before.

Vision test

A standard vision test can be preformed as early as three years of age, with special child charts. The main eye test is done as a part of the five-year-old examination prior to school start. At this age the child can start cooperating with the examiner, which is vital for a reliable result. The standard Snellens letter chart can be used, but picture cards are useful also. The distance is 6 meters. A 6/6 score is satisfactorily. Test each eye separately and be patient. Look also for squinting in this age.

5.4 Ears

Malformations

Examine the position of the ears and look for possible malformations. A line from the outer cantus towards the occipital edge should cross the upper helix of the earlobe horizontally. If the horizontal line crosses above the ear, the ears are described as low set. The ears could also be rotated vertically, and will in such cases be described as rotated. In addition look for malformations, especially poorly developed helix. Such deformities may suggest a syndrome, but are quite often isolated findings.

Risk assessment

There are several risk factors for a child being born with impaired hearing. The Joint Committee on Infant Hearing (JCIH) has defined these risk factors:

- 1) Family history of sensorineural hearing loss.
- 2) In utero infections, such as herpes, rubella toxoplasmosis, and cytomegalovirus.
- 3) Postnatal infections, such as bacterial meningitis.
- 4) Parental concern regarding hearing, speech, language, and/or development delay.
- 5) Head trauma.
- 6) Recurrent or persistent otitis media with effusion lasting for at least 3 months.
- 7) Craniofacial malformations including pinna and ear canal.
- 8) Syndromes associated with progressive hearing loss such as osteoporosis, neurofibromatosis, and Usher syndrome.
- 9) Neurodegenerative disorders, such as Hunters syndrome, or sensory motor neuropathies, such as Charcot-Marie-Tooth syndrome.
- 10) Conditions requiring the use of extracorporeal membrane oxygenation (ECMO).

Hearing test

At birth a child should have a well developed hearing. In newborns one can see the child reacting to sudden and unfamiliar noises such as sound of a bell. The reaction is typical; the child blinks, stops sucking, freezing in motion or holding his breath. At the age of six-seven months, one should expect the child to react to sounds by turning towards the source of the sound.

Remember that all children, even those who are hearing-impaired, make sounds. The difference is first uncovered when children are expected to start imitating sound and develop language. This happens typically around at the age of six to seven months. It is therefore paramount that tests are performed, and possible hearing disorders revealed. In Norway an OAE hearing test is performed as standard, and ERA test on further indications.

Ear infections

Otitis can affect the inner (media) or the outer (external) part of the ear. The condition is further divided into acute or chronic. Recurrent acute otitis can develop into chronic otitis media with effusion. These children must be examined for possible tuba auditiva malfunction. Therefore it is important to follow up these patients 6-8 weeks after an undergone and treated otitis. If the problem persists, a surgical intervention is most likely needed (adenoid removal and/or a drainage tube).

Otoscopy

Is performed as in adults, but with special straining technique to keep child calm (see video).

5.5 MOUTH

Cleft palate

Cleft palate and cleft lip is seen in 2 of 1000 children, and it is often associated with genetic disorders, but can also appear as an isolated defect. The defect can be both unilateral and bilateral. The cleft can involve different areas of the mouth, such as the lip, the jaw and the roof of the mouth and nose. Depending on the degree and location of malformation, the child can have problems with eating, talking and experience recurrent ear infections.

The palate must be inspected and palpated for clefts. Use one of your fingers and feel the palate along its length. An assessment of the degree of malformation must be made.

The condition is treated with surgery; cleft lip being closed around two-three months, while cleft palate is usually treated at the age 1-2. Even after surgery, the child can experience linguistic-, dental- and infectious ear problems.

Rooting reflex

By stroking the cheek on one side will make the infant turn towards the side that is stroked and begin to make sucking motions. This primitive reflex gradually disappears by the first month. It taught that the reflex assist the infant in nursing. The confirmation of the reflex should be followed up by a nursing history from the mother. Read more about the primitive reflexes in the chapter about Development & Social Skills.

Teeth

It varies greatly when the first tooth appears, but it is normal to expect to see the first tooth by the 6th month. By the age of 2 ½ years, it is expected to see all 20 primary teeth in place. The teeth do not interfere with breastfeeding, as the child doesn't bite but rather sucks him in position when nursing.

The Throat

Use otoscope or other source of bright light. Inspect the oral cavity. Look for tonsillar hypertrophy and uvula deviation or swelling.

5.6 NECK & CLAVICLES

General

Start off by inspecting the proportions of the neck and look for abnormalities, such as asymmetries, twisting, short neck, low hairline and tumours. Judge the range of motion in the neck and see if the child is keeping the shoulders parallel to each other. Look also for any asymmetry in the movement of the arms around the shoulder.

The sternomastoid muscle

Locate the musculus sternocleidomastoideus on both sides of the neck. Palpate the length of the muscle; look for signs of swelling, tumours or knots. Such tumours can arise from birth trauma with consequent haemorrhage during labour.

Torticollis

There are two main reasons for this condition. One is the baby laying with his head in a stressed position in the uterus, the other being damage of m.sternocleidomastoideus during labour. Damage during labour will give a haemorrhage in the muscle that later turns into a scar tissue. This scar tissue will eventually shrink, reducing the muscle length and result in a twisted posture of the neck, known as torticollis. This shortening of the muscle will be reversed by time, but the parents are advised to stimulate the child to use its neck.

The Clavicle

The clavicle can occasionally get fractured during labour. By palpating both clavicles, one can reveal existing and past fractures. An existing fracture will be felt as a unstable structure, while a freshly healed bone will be felt as a small node (callus). The clavicle will heal normally within weeks.

5.7 HEART

General

Small children are often afraid of the stethoscope. It is therefore important to establish an alliance with the child before starting the examination. The hearth auscultation should be preformed early in the examination, while the child is calm. From a technical view, it is better to use the back (bell) of the stethoscope on a small chest, rather than using the membrane used on adults.

Pulse

The pulse is examined in both armpits (brachial pulse) and in both groins (femoral pulse). First step is to assess the pulse rate and rhythm of both pulses. Large volume pulses are found with a patent ductus arteriosus. Weak or absent femoral pulses can indicate a coarctation of the aorta. Compare the pulse rate you found with the chart on this page.

Inspection

Start the examination by observing the child. Look for possible signs of cardiovascular disease. This topic will be touched later on in this chapter. Percussion in small infants gives no valuable information apart from locating the heart.

Palpation

Palpate the precordium for the presence of an apex beat. A hyper dynamic precordium can be caused be an increased cardiac output that can be seen in a large left-right-shunt. If the apex beat is felt stronger to the left of sternum, it could be a sign of hypertrophy of the left ventricle, and if it is felt stronger in the upper epigastria, it is a sign of a hypertrophy of the right ventricle.

Auscultation

Auscultation should begin with listening for the heart sounds in the four parts of the chest (aortic-, pulmonic, tricuspid- and mitral areas), and on the back. Note their location which will define the position of the heart.

Then go on with listening to the first and second hearth sound. The first sound is produced when the mitral and tricuspid valves are closing, and is usually not split. The second sound is made when aortic and pulmonic vales are closing, and a split is normal here. This split is prolonged during inspiration or in situations with pulmonary hypertension.

Murmurs are divided into to physiological and pathological. In order to correctly describe them you must try to hear and note the following things:

- 1) Position in the cycle (diastolic, systolic or continuous)
- 2) Punctum maximum (location on the chest)
- 3) Radiation (to neck, back, axils or apex)

Remember that it is common to experience murmurs in small children. Anatomical conditions and a thin chest wall often result in benign murmurs (physiological murmurs). These murmurs are amplified by rapid blood flow, for example during fever or anaemia. However, it's important to note that physiological murmurs are seldom noticeable on the back, they are grade I-II or lower and they are usually systolic.

Checklist murmurs

When investigating suspicious murmurs, go trough the following list:

- 1) Is the murmur physiological or pathological? Following findings indicate pathology:
 - a. Radiation to the back
 - b. Diastolic
 - c. Grade III-VI
- 2) Is the child cyanotic or non-cyanotic? Signs of central cyanosis
 - a. Blue colouring of the lips, tongue, mucus membranes, chest or/and nose.
- 3) Is the murmur diastolic, systolic or continuous, and where is the punctum maximum?
- 4) Signs and symptoms of heart failure:
 - a. *Breathing pattern*; tachypne, flaring of the nostrils, intercostal retractions, or using of accessory respiration muscles.
 - b. *Tachycardia*
 - c. Frequent *lung infections*
 - d. *Failure to thrive*; look at the growth charts
 - e. Reduced ability of breast feeding (*prolonged mealtimes*)
 - f. *Enlarged liver*
 - g. *Sweaty forehead* and tendency of early fatigue during activity
 - h. Peripheral cyanosis

Blood pressure

Infants and children under the age of two are measured with automated blood pressure machines. Children over the age of two are measured with normal equipment; however, remember that the cuff used must cover 2/3 of the child's arm.

5.8 LUNGS

General

The examination of the lungs and chest should take place as early as possible in an examination. This part can easily be combined with the inspection of the heart. A strategic distraction could be helpful to keep the child even calmer.

Inspection

A lung inspection should be systematic and cover following parts:

1. Shape of thorax (asymmetry, deformity, increased anterior-posterior-diameter)
2. Movement of the chest (symmetric?)
3. Breathing pattern (flaring of the nostrils, intercostal retractions, using accessory respiration muscles)
4. Abnormal breathing sounds (cough, wheezing, grunting, and stridor)
5. Respiration rate
6. Look also for clubbing of the nails and cyanosis.

Palpation

Palpation will let you further investigate the findings during inspection. Look also for eventual malformations and tumours. Confirm that the trachea is near the midline. Identify any areas of tenderness by palpating the ribs and sternum.

Percussion

Percussion on small children is seldom as effective as in adults, but can give some valuable information. Dullness of percussion can indicate consolidation, pleural fluid, fibrosis or collapse. Hypersonic percussion can indicate hyperinflation or a pneumothorax.

Auscultation

Auscultate from side to side, from top to bottom. Compare one side to the other, and note the location and quality of the sounds you hear. *Vesicular* breath sounds are signs of healthy lungs and are normally heard over all of the lung areas. Any additional sounds such as *wheezing*, *crackles*, *stridor* or *rhonchi* are abnormal, and should be considered pathological until proven otherwise.

Bronchial breathing sounds are a result of consolidation of the lung tissue (slime or infiltration). The abnormally dense lung tissue will transmit the breathing sounds without any reduction, while in healthy lungs this sound would have been dispersed and silenced in the air filled alveoli. Breathing sounds in general are reduced when the lungs are hyper inflated (emphysema or pneumothorax) or filled with fluid (pleural fluid).

Bronchitis

The inspiration is normally longer than the expiration. If this is not the case, one should consider the finding as pathological. Both asthma and bronchitis can give such a picture, as they are both obstructive conditions. Obstructions above thoracic level will result in stridor during inspiration, while narrow airways below thoracic level will result in expiratory obstruction.

At the 1 year old check up, one should emphasize on uncovering obstructive bronchitis, which is an inflammation of the trachea and larger bronchi. This bronchitis often comes after an undergone upper airways infection. Coughing is the single most prominent symptom. If the patient history reveals an undergone infection with persisting coughing, and you hear obstructive breathing sounds during auscultation, bronchitis is the most likely the cause.

5.9 ABDOMEN

Defecation

It is important to reveal if the child has defecated and/or peed. The meconium, the first green-blackish substance, should be passed within the first 24 hours. Ask about the colour, smell, volume and consistency of both. It's also appropriate to ask about the eating, if this has started and how the baby is reacting to the nursing situation. Remember that this is the first time the whole gastrointestinal tract is set to its proper use. If nothing has passed within the first 24 hours one must investigate further. Possible causes can range from an ileus or rectal atresia, to Hirschsprungs disease or cystic fibrosis.

Abdomen

The newborns abdomen must be examined systematically after birth. It is important that the child is calm during this part of the examination. An agitated and tense child is almost impossible to examine properly.

Inspect the abdomen for scars, hernia, hydrocele, varicocele or other swollen areas. The remnants of the umbilical cord must be investigated for signs of infection, such as redness or discharge.

Palpate the abdomen and feel for tumours, enlarged liver, spleen or kidneys. The liver is normally palpable up to 2 cm below the costal arch, but can be difficult to feel. The kidneys should be barely palpable, while the spleen should not be palpable at all. If the child is calm one may even feel lumps of faeces when palpating.

Anus

Inspect the anus and make sure to note that the anal opening resides in centre of the star shaped skin fold. A rectal exploration is only preformed on a specific indication.

5.10 GENITALIA

GIRLS:

Labia

Check if labium major is covering labium minor. Look also for possible fusion between the labia. Abnormal swelling of the labia may be testes; a further chromosome test to uncover gender could be indicated.

Hormonal influence

If mucus (white secretion) or blood is observed around 4 days after birth, this is normal, and is caused by maternal oestrogen withdrawal. Oestrogen influence during the intrauterine life may give some breast enlargement and lactation in both gender infants.

BOYS:

Penis

Inspect that the penis' length and size is normal. Then look for the urethral orifice. In some cases this opening can be found on the ventral side of the shaft (anywhere from glans to base), a condition known as hypospadias. Check the foreskin (prepuce) and make sure that it's not too tight. It's perfectly normal that the foreskin isn't retractable and this should not be tried either. But if the urine stream is decreased or the foreskin expands during peeing, such a narrowing is called phimosis and must be treated. The condition is associated with high risk of infections. Any problems with the urine stream should also be assessed; most common malformation is defect valves in the urethra.

Scrotum

Finally palpate the scrotum to confirm that the testicles have descended. 1-2% of all infants born at term have retentio testis. Usually this condition only affects one of the testicles and resolves by its self within the first 12 months. In these "benign" cases, you should be able to palpate the non-descended testicle in the groin. If not, one should do further investigations, such as with ultrasound and/or chromosome test. The latter is to reveal true gender. A non-descended testicle could by time be irreversibly damaged; therefore such patient must be treated surgically by the age of two. Testes size is usually not measured before later on the boy has started school.

5.11 SPINE & HEAD

Head shape

Take a look at the child's head and determine if the shape is normal. Asymmetry of the skull can sometimes show a developmental abnormality.

Examine for visible or palpable swellings. These can be a result of birth trauma, due to the heads passage through the birth canal, with consequent oedema. This kind of swelling crosses the sutures and can be quite large. Another kind of swelling is caused by a bleeding between a bone of the head skull and its periosteal membrane. This kind of haematoma doesn't cross suture lines and is therefore limited to the area of the affected skull bone.

Fontanelles and sutures

Palpate the anterior and posterior fontanelle. Assess the size and feel for possible tension, which may be a result of increased intracranial pressure. A low tension on the other hand can be caused by dehydration. The posterior fontanelle closes first, around the age of 6 weeks. The anterior fontanelle will have closed in most infants by 18 months age.

Trace the sagittal and metopic suture lines from front to back and the coronal sutures from side to side. These sutures are located between the different skull bones' growing edges. The sutures fuse together gradually and are completely closed at the age of 6. If they close too early the brain will stop growing, with mental retardation as a consequence. The early closing will also affect the shape of the head. When in doubt and if there's a question of possible early suture closing, an x-ray of the skull may help.

Head circumference

Occipitofrontal circumference is measured with a measuring tape. Measure three times and use the largest size obtained. Plot the size in the appropriate centile chart. If the size falls and crosses one centile on the growth chart or if the circumference is abnormally small, one should consider impaired brain growth. A large head on the other hand is not as alarming, especially if the condition is familiar, usually with the father having a big head. But if the growth starts crossing two or more centiles or if the circumference is larger than the 97, 5 centile, an abnormal enlargement of the brain must be suspected. Most often the cause is a developing hydrocephalus, with the accumulation of cerebrospinal fluid. Haematomas, both subdural and epidural, can also give a megalencephaly.

Remember that in the early weeks of a newborn's life, it is normal that the results crosses centiles on the growth chart. It takes some time before the child develop a regular growth pattern.

Back & Spine

Examine the child's back. In small infants this is done while the baby is lying, while for elder children this can be done standing. The spine should be straight without any misalignments or asymmetries. Palpate the whole length of the spine and feel for any abnormalities. Look for dimples, pits or patches of hair along the spine, especially around the sacral part. Such findings may indicate an underlying spinal defect, such as spina bifida occulta. But remember that sacral dimples are very common. Further investigation is only indicated if the bottom of the dimple is not visible when the skin is gently (and carefully) parted. Likewise swelling or abnormal hair growth in relation to a dimple should give suspicion.

5.12 HIPS & EXTREMITIES

Extremities

Start off by looking at the child's feet. Check for the grasp reflex in the toes by pressing your thumbs on the feet just below the toe line. The baby will then grasp around your thumb with his toes. This reflex is present from birth till the age of 9-10 months. Read more about the primitive reflexes in the chapter about Development & Social Skills.

Then inspect if the feet are properly aligned without any twisting or forced posture. Judge the range of motion and flexibility in the ankle joints by gently flexing the feet dorsally and later rotating them so that the toes face medially. Some infants hold their feet inverted, this may look like a clubbed foot (talipes equinovarus). But if it is possible to manipulate the foot into a normal posture, a true clubbed foot is not likely. Inspect the toes for any deformities such as fusion, webbing or extra digits.

Move on to examining the hands. Start off by inducing the grasp reflex of the hands with pressing your finger in the infant's palm. The grip will intensify as you try to pull your finger out. This primitive grasp reflex is present from birth till the age of 2-3 months.

Then examine the crease pattern in the child's palm. The creasing should be as in adults. If there's only a single crease line or if you find any other abnormalities, you should suspect a possible syndrome such as Downs. Check also for possible webbing or fusion between the digits, and in addition look for any accessory digits (polydactyly). Finish the examination of the arms by testing for the Moro reflex. This is done with the infant laying on his back and gently lifting him up by pulling on his arms/hands. Don't let the head lift from the surface beneath. Then suddenly release your grip on the child's hands. This will provoke a reflex where there is a startling outward motion of the arms, opening of the palms and extension of the legs. The Moro reflex is present from birth till the age of 4-5 months.

The brachial and femoral pulses also have to be examined. Learn more about these in the chapter concerning the cardiovascular system.

Hips

Two out of every 100 newborns have unstable hip joints. In these children the femoral head can easily be manipulated out of its acetabulum (hip socket). Sometimes the acetabulum is so flat that the femoral head doesn't even stay in it at rest. The condition is called congenital dislocation (developmental dysplasia) of the hip. Girls are five times more prone to have the disease, and the risk is even bigger if one of the parents has had the same hip problems. In addition breech presentation is associated with higher risk of congenital dislocation. The latter being a result of stress on the hip joints, so that they don't develop properly.

A dislocated hip on one side will result in a difference in leg lengths. By holding the legs gently together this discrepancy can be easily visible. But the main diagnostic test is the Ortolani's procedure. This procedure is done on both legs at the same time. Place your middle finger along the femur so that the tip of your finger presses down on the major trochanter (felt like a prominence at hip level). Now gently bend the legs out (abduct) while holding your grip

on the knees and finger tips on the femoral head. If the hip happens to be dislocated the femoral head will be behind the acetabulum (hip socket). By bending the legs outward, the femoral head will move into its socket. This action will be felt as a “clunk” by your fingertips.

An addition to the Ortolani’s is the Barlow’s test. If you suspect that the hip isn’t completely dislocated during examination or the findings with Ortolani’s are inconclusive, the Barlow’s test is indicated. Hold the legs as in Ortolani’s, but this time apply a vertical pressure down along the femur axis before performing the same bending motion as in Ortolani’s. The mission with this pressure is to press a possibly unstable femoral head out of its socket before engaging in a regular Ortolani’s procedure. The same “clunk” will be felt if the test is positive.

If these clinical tests give an inconclusive result or if some of the risk factors mentioned earlier are present, an ultrasound of the hips must be performed. The treatment consists of a stabilising of the hips in an abducted posture before the age of 3-4 months. This is done by using a special harness for a 12-16 weeks period.

These tests should be performed up to the age of 6 weeks. The results are reliable up to the age of 2 weeks, and after this age one should pay more attention to any reduction in the infants’ hip-abduction ability. This can be assessed with a heel-buttock-test, which uncovers a dislocated hip joint. In this test the child lays on his stomach while the heels are moved towards the baby’s buttock. If the hip is dislocated the affected side’s heels will cross the midline without reaching the back. Normally the heels do not cross the midline during this movement. Children with suspicious findings during heel-buttocks-test must be checked with ultrasound (up to the age of 4-5 months) or x-rayed if elder.

After infancy the hip examination should consist of measuring the length of the legs, to uncover any difference between them. Look for any asymmetries in the folding pattern of the skin on the legs. As soon as the child has started walking the examination should also include an inspection of the walking pattern. Look for any limping or abnormal movement patterns.

5.13 DEVELOPMENT & SKILLS

General

The child’s ability to develop and in which rate this development emerges is dictated by genetics and the social atmosphere during the child’s upbringing. There’s great diversity in the time span in which the different skills develop. If only one of the skills is late, there’s no reason to worry. But if two or more skills are late a developmental disturbance should be considered. Chronically sick children are often a bit late, but they will gradually close the gap as they grow. On the other hand, some neurological conditions first show themselves as the child grows.

The most important source of information about the development of the child is his parents. Make a habit of probing this topic with in-depth questions to the parents. Be direct in asking about for instance which words the child actually uses or how many steps he walks. Try to make up a picture of how the parents feel regarding the growing and developing of their child. A parental concern alone is often enough to consider further investigations. But show respect, the wish of having the child achieving a certain skill, must not jeopardise the child’s sense of safety, self respect or confidence.

Bonding

Infants respond to their mothers from birth. This effectively results in a bonding between the child and mother, which is eminent in giving the baby a safe and healthy environment. A failure in this bonding process can result in long term emotional problems between the mother and child.

The one week old infant will respond to loud noises by stopping in motion, as if he is startled. During this time the baby will manage to fixate on and momentarily follow large brightly coloured objects. By 3-5 weeks of age the infant will follow faces and even smile as a response. These developing social skills will further enforce the bonding process between parents and child.

Primitive reflexes

The primitive reflexes must be lost before the child can manage to perform conscious movement of the limbs. The presence of an infantile reflex after the age at which the reflex normally disappears, can be a sign of brain damage or damage to the nervous system.

Reflex	Description	Debut	Disappears
Rooting	Stroking the cheek will make the infant turn towards the side that is stroked and begin to make sucking motions	Birth	1 month
Sucking	Sucking motion when area around mouth is stimulated	Birth	
Grasp	By placing a finger in the infants open hand, the hand will close around the finger. The grip tightens if you try to pull your finger out.	Birth	2-3 months
Moro	The infant on his back is pulled gently up without lifting the infant off the surface. Then suddenly release your grip on the child's hands. This will provoke a reflex where there is a startling outward motion of the arms, opening of the palms and extension of the legs.	Birth	4-5 months
Step	Stepping motions when soles of feet touches hard surface while the infant is held upraised.	Birth	3-4 months
Tonic neck	When the head of a infant laying on his back is rotated to one side (be gentle), the baby takes a fencer's position, with the nearest arm extended straight out from the body and the other arm flexed with closed hand.	1 month	6-7 months
Foots grasp	By pressing your thumbs on the feet just below the toe line, the infant will grasp around your thumb with his toes.	Birth	9-10 months
Parachute	If you hold the infant face down, and make a sudden motion like as if he is going to fall, the arms extend as if to break a fall	10-11 months	Persists

The summary is based on Trond Markestads figure 3.3 in his book “Klinisk Pediatri”

The skills

The skills are divided into gross and fine motor skills, language and social skills. The Norwegian Paediatricians Association (Norsk Barnelegeforening) has made a good summary of all the different skills and the age they should be achieved. Observe the child while it's playing and you're talking with the parents. Pay special effort to assess the child's ability to make contact. Special concerns to have in mind when examining the child and asking the parents:

1. Has the child lost a prior achieved skill?
2. Are there any asymmetries in skill achievements?

Age in months	Gross motor skills	Fine motor skills	Language skills	Social skills
1-2	Lifts head when laying on abdomen	Can move hands to the midline	Response to sound	Smiles to faces
4	Supports on arms when laying on abdomen. Stable head while holding in lap.	Grasps after objects	Starting to make baby noises	Smiles spontaneously
6	Rolls around	Moves a toy from one hand to the other	Turns towards voices	Puts crumbs in mouth
8	Sits up	Thumb against whole hand	Daddy or mummy inconsequently	Afraid of unfamiliar faces
10	Pulls him self up to standing position	Hits toys against each other	Understands simple words	Claps
12	Stands. Walks without support.	Good pincer grip	Daddy/Mummy with meaning	Drinks from cup
18	Walks up stairs	Puts cubes up on each other	Says 2-3 words	Eats from spoon
20	Throws a ball	Draws straight lines	Puts together two words	
24	Runs	Can unscrew a large lid		Puts on some clothes
36	Stand on one leg 3s	Copy an O figure	3-4 words in sentence	Can part from mother
48	Skip on leg	Draws humans in three parts	Recognises 3 of 4 colours	Gets dresses by him self

5.14 GROWTH

General

A normal growth is one of the best and easily measurable parameters of good health. The most convenient way of keeping record of the growth is by growth charts. These charts are based on the epidemiological data from large populations.

The most important factors governing the growth are genetic disposition, nutrition and hormonal influence. But psychosocial factors also play a part in a child's growth. In general children grow by 2cm pr month the first couple of months. By the age of three the growth rate has been reduced to about 0,5cm monthly. From this age on both girls and boys grow in average about 6 cm pr year. A length prognosis can be made on the basis of the height of the child's parents. This method is accurate within a range of +/- 10cm:

- For boys: $[\text{fathers height} + (\text{mothers height} + 13)] / 2 = \text{height in cm}$
- For girls: $[\text{mothers height} + (\text{fathers height} - 13)] / 2 = \text{height in cm}$

Methods

The weight, height and head circumference is measured according to an interval given by Statens Helsestilsyn. For head circumference (occipitofrontal) please look at the specific chapter on Spine & Head. For children up to the age of two the height measurement is taken laying on a special board. The child is gently stretched with the legs together and the head firmly resting on the board. For elder children the height is measured standing along the wall. Be sure to measure all the children the same way, with shoes off, legs together and the head straight with the child looking straight forward. The weight is measured with no clothes on; later as the child gets older underwear may be left on. Remember that a wet nappy can weigh a lot.

The findings are plotted in growth charts. Head circumference is routinely measured and plotted in relation to the weight up to the 1 year mark. *Weight in relation to height* is a very reliable parameter and is used well into the school age. This is a much better indicator of growth than for instance *weight in relation to age*, which only shows if the child is thin or overweight, not if the growth has stagnated.

Growth charts

The growth charts have outlined on them different centiles. The middle centile, the 50-centile, is the median value for the actual parameter in the given population. The lowest centile is the 2, 5 centile, while the highest is 97, 5. A height measurement on the 97, 5 centile for example indicates that child is higher than 97, 5% of the other children in the same age, or said in another way that only 2, 5% are higher.

The height, weight and head circumference are expected to follow their channel on the growth chart. A channel is the area between two centiles. If the height for instance is on the 10-centile the first months, it's a good guess that the height will follow this centile in the future also.

There are some exceptions to this rule though:

1. The measurements at birth are dictated by the intrauterine conditions. A climbing through the chart, crossing centiles, could occur as the height tries to achieve its genetically potential.
2. The head circumference at birth may be misleading due to transitory deformity due to the passage through the birth canal.
3. The height may flatten a period if the puberty onset is late, or it may increase sharply too soon if the puberty onset is too early. If the puberty starts too early it could have an adverse effect on the final height.

What to look for

A warning signal is if one of the parameters start to cross (either fall or rise) more than two channels on the growth chart. Likewise should extraordinary values either over 97, 5% or below 2, 5% raise concern and action. It's always important to relate the findings with those of the child's parents and siblings. Another good rule is to undress the child and look at the proportions.

5.15 SCREENING

Phenylketonuria

Phenylketonuria (PKU) or Føllings disease is a congenital metabolic disorder. An enzyme that is crucial in the conversion of phenylalanine (Phe) into tyrosine is inactive. If the Phe levels get too high they may damage the brain and cause mental retardation. In Norway all infants are screened for this disorder. Diagnosing the disease early is essential in limiting brain damage. Since Phe is a protein the treatment is a diet of low protein foods. An early treatment onset lets the child develop normally.

The screening is performed on a blood sample taken from the heel within 72 hours after birth. The test detects the level of circulating Phe. If unsure, take a second test. Approximately 4 infants are born with PKU in Norway every year.

Congenital Hypothyroidism

Congenital hypothyroidism is the second disease that all infants born in Norway are routinely screened for (TSH-screening). Approximately 15 children are born with this condition in Norway every year. If left untreated beyond 2-3 months of age, it results in physical and mental changes. The changes consist of dwarfed stature, mental retardation, dystrophy of the bones, and low basal metabolism. These changes are termed Cretinism. The mental changes are irreversible.

The glandula thyroidea in these infants is not developed properly, thus not producing the hormone thyroxin. Sometimes the thyroidal gland is totally missing, other times it's located another place in the body (ectopic). The test is simple and is performed on a small blood sample from the heel. The circulating TSH levels are greatly elevated in congenital

hypothyroidism. In addition it's possible to measure the circulating levels of T4 (thyroxin). This is of value in those rare cases of congenital hypothyroidism where there's a central cause due to failure to produce TSH (in which TSH levels will be low).

Haemoglobin (HgB)

At the 1 year consultation you should check for signs of anaemia. This is especially important if the child has not been on an iron enriched diet or if he is pale. In addition a history of recurrent illness should trigger an investigation on HgB levels. Children from countries outside our western world should also be screened for HgB levels at the 1-year old control. In general an HgB test should be performed on quite liberal indications.

Children with HgB < 8 g% must be sent to a specialist for further investigations. The same goes for children who do not respond adequately to a treatment with iron enriched diet. The anaemia could be caused by other factors in these cases.

Hyperlipidaemias

Hyperlipidaemias can be caused by congenital genetic disorders. The most common being familial hypercholesterolemia (FH) or familial combined hyperlipidaemia (FCHL). But hyperlipidaemias can also come secondary to obesity, hypothyroidism, nephritic syndrome, cholestasis, anorexia nervosa, steroid therapy and diabetes mellitus.

Moderately elevated cholesterol levels in children give high risk of early coronary artery disease. This screening is performed on 2 year old children when the history may indicate it.

5.16 FURTHER INVESTIGATION

General

Here are some small reminders of when to investigate further in relation to the different consultations. The neonatal check-up is the most thorough one, and most often done at hospital shortly after birth. The focus is on the different organs and that they don't show any signs of abnormality. The newborn needs some time to settle down and let the different systems of his body get started. Some irregularity is not uncommon, but in most cases they normalize as time passes. The list below is based on the recommendations given in Helsestajonsboka (Misvær & Oftedal). The list summarizes some of the indications to put in motion further investigation. As a main rule; parental concern or your worry as examiner about the child or family must lead to a more in depth investigation.

At the 6 weeks check-up

- No red reflex, no sure visual contact or smile/attentiveness
- Suspicious murmur or symptom/sign of heart disease
- Doubt about the ability to abduct the hips
- Suspicion of a foot deformity
- Asymmetry in the movement pattern or torticollis
- Distinct hyper- or hypotonic
- Jaundice, pale stool and/or conjugated serumbilirubin
- Paternal concern
- The examiners worry about the child or family

At the 3 months check-up

- Doubt about the child's ability to react to sound
- Restrictions in the abduction motion of the hips
- The child doesn't follow object with his eyes
- The child doesn't lift his head from laying on the stomach
- Paternal concern
- The examiners worry about the child or family

At the 6 months check-up

- Uncertainty about ability to make contact, no smile or laughter
- Doubt about the child's ability to react to sound
- The child doesn't reach after objects with both hands
- The child doesn't show interest in trying to move around or lifting himself off the surface (straighten arms from stomach position or lift the head and shoulders from laying on the back)
- Doubt about the ability to abduct the hips
- Visible strabismus
- Suspicious murmur or symptom/sign of heart disease
- Paternal concern
- The examiners worry about the child or family

At the 8 months check-up

- Uncertainty about ability to make contact, no smile or laughter
- Doesn't tell apart familiar faces from strangers
- Doubt about the child's ability to react to sound
- The child doesn't easily change a toy from one hand to the other
- The child doesn't use both hands in the same degree
- The child doesn't show interest in trying to move around, doesn't roll around
- Changes in muscle tone, asymmetrical movement patterns
- Paternal concern
- The examiners worry about the child or family

At the 1 year check-up

- Uncertainty about ability to make contact, language and make sounds
- Doubt about the child's ability to react to sound
- The child haven't developed a pincer grip
- The child doesn't stand without support
- The child doesn't crawl or move along the floor far
- Doubt about the ability to abduct the hips
- Visible strabismus

- Suspicious murmur or symptom/sign of heart disease
- Paternal concern
- The examiners worry about the child or family

At the 18 months check-up

- Doubt about the child's ability to use words single words with meaning
- Doubt about the child's ability to react to sound
- Still a lacking ability to play and interact in social games
- Doesn't have a precise pincer grip
- The child doesn't stand up and walk along the furniture
- Strabismus
- Paternal concern
- The examiners worry about the child or family

At the 2-3 years check-up

- Lacking words and the ability to understand
- Doubt about the child's ability to react to sound
- The child isn't able to "keep up with" equally aged children
- Strabismus, uncertainty about the child's ability to see
- Paternal concern
- The examiners worry about the child or family

5.17 IMMUNIZATION

The Norwegian Child Immunization Program

The Norwegian Child Immunization Program (Barnevaksinasjonsprogrammet) is dictated by the Norwegian Institute of Public Health (Folkehelseinstituttet). None of the vaccines in the program are mandatory and the parents can choose to not let their child undergo immunization. The program is constantly updated and for the time being it consists of the following vaccines:

- DTP = Diphtheria, tetanus, pertussis → introduced in 1952
 - DT = Diphtheria, tetanus → introduced in 1952
 - HiB = *Haemophilus influenzae* type B → introduced in 1992
 - IPV = Poliomyelitis/Polio → introduced in 1956
 - MMR = Measles-Mumps-Rubella → introduced in 1983
 - BCG = Tuberculosis → introduced in 1947
 - Hep B = Against Hepatitis B *
-
- For children with parents from countries with high prevalence of Hepatitis B

For children born up to and during 1997

Age	Vaccine
3 months	DTP, HiB, IPV
5 months	DTP, HiB, IPV
11-12 months	DTP, HiB, IPV
15 months	MMR
6-8 years	IPV
11-12 years	DT
12-13 years	MMR
Approx 14 years	BCG, IPV
0-18 years	Hep B *

For children born in the years 1998 – 2005

Age	Vaccine
3 months	DTP, HiB, IPV
5 months	DTP, HiB, IPV
11-12 months	DTP, HiB, IPV
15 months	MMR
7 years	DTP, IPV
12-13 years	MMR
Approx 14 years	BCG, DT, IPV
0-18 years	Hep B *

For children born from 2006 and onwards

Age	Vaccine
3 months	DTP, HiB, IPV
5 months	DTP, HiB, IPV
12 months	DTP, HiB, IPV
15 months	MMR
7 years	DTP, IPV
12-13 years	MMR
Approx 14 years	BCG, DT, IPV
0-18 years	Hep B *

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