### Appendix e1  Chapter structure, task forces and key questions.

<table>
<thead>
<tr>
<th>Chapter/topic complex</th>
<th>Task forces (spokespersons in bold)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Task force I  Education and training</strong></td>
<td></td>
</tr>
<tr>
<td>- What should be the content of the education program for physicians in radiation protection?</td>
<td>Ruiz Lopez, Sans Merce</td>
</tr>
<tr>
<td>- How should education of personnel (other than physicians) be organized for radiation protection?</td>
<td></td>
</tr>
<tr>
<td><strong>Task force II  State of knowledge</strong></td>
<td></td>
</tr>
<tr>
<td>- What are the deterministic and stochastic effects of radiation?</td>
<td>Struelens, Damilakis, Dumonceau</td>
</tr>
<tr>
<td>- What is the order of magnitude of the skin dose for an average patient?</td>
<td></td>
</tr>
<tr>
<td>- What is the average dose – area product (DAP) delivered for the standard procedures?</td>
<td></td>
</tr>
<tr>
<td>- What is the scattered dose at the staff positions during the procedure?</td>
<td></td>
</tr>
<tr>
<td>- What are the dose reference levels (DRLs) for ERCP procedures?</td>
<td></td>
</tr>
<tr>
<td>- What is the effect of the positioning of the tube, under/over the table?</td>
<td></td>
</tr>
<tr>
<td><strong>Task force III  Dosimetric aspects</strong></td>
<td></td>
</tr>
<tr>
<td>- How should the medical and nonmedical staff be monitored?</td>
<td>Vanhavere, Carinou, Donadille</td>
</tr>
<tr>
<td>- Should the DAP meter always be available to monitor patient dose?</td>
<td></td>
</tr>
<tr>
<td>- Is access to a medical physicist needed?</td>
<td></td>
</tr>
<tr>
<td><strong>Task force IV  Radiation protection measures</strong></td>
<td></td>
</tr>
<tr>
<td>- What are the correct positions of staff with respect to the patient?</td>
<td>Tsapaki, Paraskeva, Dumonceau, Garcia-Fernandez</td>
</tr>
<tr>
<td>- What are the radiation protection measures to be used by the staff in the examination room?</td>
<td></td>
</tr>
<tr>
<td>- What is the effect of positioning RP shielding above and/or below the table?</td>
<td></td>
</tr>
<tr>
<td>- What signs and warnings must be used in the examination room?</td>
<td></td>
</tr>
<tr>
<td>- Has the room been appropriately selected in terms of radiation protection needs?</td>
<td></td>
</tr>
<tr>
<td>- Should the pregnant worker continue with her workload?</td>
<td></td>
</tr>
<tr>
<td><strong>Patient</strong></td>
<td></td>
</tr>
<tr>
<td>- What should be the correct positioning of the patient with respect to the tube and image detector?</td>
<td></td>
</tr>
<tr>
<td>- What should the fluoroscopy parameters be?</td>
<td></td>
</tr>
<tr>
<td>- What are the advantages of using copper filtration?</td>
<td></td>
</tr>
<tr>
<td>- How should the patient be informed about radiation risks?</td>
<td></td>
</tr>
<tr>
<td>- Should all patients be treated identically?</td>
<td></td>
</tr>
<tr>
<td><strong>Task force V  Quality assurance</strong></td>
<td>Mouzas, Valatas, Verdun</td>
</tr>
<tr>
<td>- What should the legal requirements be concerning quality assurance of the equipment?</td>
<td></td>
</tr>
<tr>
<td>- Which values should be recorded for each examination and how should they be analyzed?</td>
<td></td>
</tr>
<tr>
<td>- Who should be involved in the choice of the radiological system for endoscopy?</td>
<td></td>
</tr>
</tbody>
</table>

ERCP, endoscopic retrograde cholangiopancreatography; RP, radiation protection

<table>
<thead>
<tr>
<th>Topic complex</th>
<th>Number of initial references according to the predefined key questions/keywords</th>
<th>Number of relevant references for the guideline after evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task force I</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>Task force II</td>
<td>48</td>
<td>13</td>
</tr>
<tr>
<td>Task force III</td>
<td>53</td>
<td>31</td>
</tr>
<tr>
<td>Task force IV</td>
<td>273</td>
<td>57</td>
</tr>
<tr>
<td>Task force V</td>
<td>9</td>
<td>4</td>
</tr>
</tbody>
</table>

### Appendix 2  Evidence table.
## Appendix 3  Radiation data for ERCP in pregnant women.

<table>
<thead>
<tr>
<th>First author, year</th>
<th>n</th>
<th>Type of procedure</th>
<th>Pregnancy</th>
<th>Delivery</th>
<th>Shielding</th>
<th>Fluoroscopy time</th>
<th>KAP, Gy·cm²</th>
<th>ESD, mGy</th>
</tr>
</thead>
</table>
| Jamidar, 1995 [e90] | 29 | – 26 Therapeutic  
– 3 Diagnostic | – 1st trimester, 15  
– 2nd trimester, 8  
– 3rd trimester, 6 | – 1 abortion  
– 1 neonatal death | n.a. | n.a. | n.a. | n.a. |
| Farca, 1997 [e91]  | 11 | – Therapeutic,  
– Stenting without endoscopic sphincterotomy  
– Short-burst fluoroscopy  
– No films | – Median 19 weeks  
– 1st trimester, 3  
– 2nd trimester, 5  
– 3rd trimester, 3 | – All at term and healthy | Lead apron (5 mm) under patient | 45 seconds | n.a. | 0.18 |
| Howden, 2001 [e92] | 22 | Therapeutic | – 1st trimester, 5  
– 2nd trimester, 11  
– 3rd trimester, 6 | – 9 at term and healthy  
– 1 premature delivery and healthy  
– Rest n.a. | Lead apron under patient | 93 seconds | n.a. | 2.05 |
| Güitrón-Cantú, 2003 [e93] | 7 | Therapeutic | – 1st trimester, 1  
– 2nd trimester, 4  
– 3rd trimester, 2 | – 7 at term and healthy | Lead apron around pelvis | 26 seconds | n.a. | n.a. |
| Tarnasky, 2003 [e94] | 6 | – Therapeutic  
– Wire-guided cannulation  
– Bile aspiration | Mean 16 weeks | – 3 at term and healthy  
– 1 emergent cesarean fetal distress  
– 1 lost to follow-up  
– 1 not delivered yet | No fluoroscopy  
No fluoroscopy  
No fluoroscopy  
No fluoroscopy | No fluoroscopy  
No fluoroscopy  
No fluoroscopy  
No fluoroscopy | No fluoroscopy  
No fluoroscopy  
No fluoroscopy  
No fluoroscopy |
| Tham, 2003 [e95]  | 15 | Therapeutic | – Mean 25 weeks  
– 1st trimester, 1  
– 2nd trimester, 5  
– 3rd trimester, 9 | – 11 at term and healthy  
– 4 not delivered yet | Lead apron around pelvis | 3.2 minutes | n.a. | – Mother, 190  
– Fetus, 3.1  
– Rest n.a. |
| Kahaleh, 2004 [e96] | 17 | Therapeutic | – Mean 18.6 weeks  
– 1st trimester, 4  
– 2nd trimester, 9  
– 3rd trimester, 4 | – 2 pre-eclampsia labor induced  
– 1 post-term  
– 1 still gravid  
– All newborn healthy | 0.5 to 1.0 mm lead apron abdomen and pelvis | 14 seconds | 0.40 |
| Simmons, 2004 [e97] | 6 | – Therapeutic  
– Wire-guided cannulation  
– Bile aspiration | Mean 16 weeks | – 2 at term and healthy  
– 1 premature delivery and healthy  
– 1 premature delivery low weight  
– 2 lost to follow-up | No fluoroscopy  
No fluoroscopy  
No fluoroscopy  
No fluoroscopy | No fluoroscopy  
No fluoroscopy  
No fluoroscopy  
No fluoroscopy | No fluoroscopy  
No fluoroscopy  
No fluoroscopy  
No fluoroscopy |
| Gupta, 2005 [e98]  | 18 | – Therapeutic  
– Ultrasonography guidance  
– Bile aspiration | – 1st trimester, 4  
– 2nd trimester, 6  
– 3rd trimester, 8 | – 17 at term and healthy  
– 1 premature delivery and healthy | Lead apron around pelvis | 8 seconds | n.a. | n.a. |
| Shelton, 2008 [e99] | 21 | – Therapeutic  
– Wire-guided cannulation  
– Bile aspiration  
– 5 cholecdochoscopy | Mean 19 weeks  
– 1st trimester, 7  
– 2nd trimester, 7  
– 3rd trimester, 7 | – 17 at term and healthy  
– 1 premature delivery and healthy  
– 1 lost to follow-up  
– 2 not delivered yet | No fluoroscopy  
No fluoroscopy  
No fluoroscopy  
No fluoroscopy | No fluoroscopy  
No fluoroscopy  
No fluoroscopy  
No fluoroscopy | No fluoroscopy  
No fluoroscopy  
No fluoroscopy  
No fluoroscopy |
| Daas, 2009 [e100] | 17 | Therapeutic  
– Wire-guided cannulation  
– Bile aspiration | Mean 20 weeks  
– 1st trimester, 6  
– 2nd trimester, 5  
– 3rd trimester, 6 | – 16 at term and healthy  
– 1 elective abortion | Lead apron around pelvis | 8 seconds  
(6 cases) | n.a. | n.a. |
### References


92. **Howden J.** Endoscopic choledocholithiasis (CDL) during pregnancy: safety and efficacy of endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic sphincterotomy (ES). *Gastrointest Endosc* 2001; 53: AB96


112. **Columbia University Environmental Health and Safety.** Quality assurance programs for diagnostic radiology facilities. Available at: www.ehs.columbia.edu/QA.PDF Accessed December 11 2010