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WORKSHOP:

RADIATION PROTECTION FOR PREGNANT WORKERS IN HEALTHCARE

NSFS Conference, 28th August 2025

Welcome to workshop!

Presented by radiation protection officers Tanja (OUS),
Kari (SUS) and Karolina (HNT), Norway

Workshop objectives:

1. Pregnant employees and ionizing radiation – key challenges
2. Literature review – what research tells us
3. Current practice in Norway – short overview
4. Flowchart – proposed approach
5. Discussion in groups & reflection



Literature Review – 2024/2025

International Consensus

- Pregnant employees can continue working in areas with ionizing radiation

Threshold Doses (Deterministic Effects)

- CNS effects / IQ reduction at 100mGy (week 8-25) and severe mental retardation at 1000mGy (week 8-25)
- Cancer risk increases slightly even at low doses

Dose Limits

- IAEA/ICRP: 1mSv for the remainder of pregnancy
- NCRP (US): 5mSv for full pregnancy, max 0,5mSv/month
- National limits vary (1-4mSv e.g. Spain, Japan, Canada).
- In Norway 1mSv, which equals approximately 3 months of natural background radiation in Norway.
No clear guidance on estimation of fetal dose from dosimeter readings

Literature Review – 2024/2025

- **Protective equipment & dosimetry**
- Standard apron (0.35–0.5 mm Pb eq.) gives sufficient protection ($\approx 95\%$ reduction)
- Double aprons or extra lead inserts: minimal benefit, but \uparrow musculoskeletal strain
- Best practice:
 - Dosimeter at waist level under apron
 - Consider electronic dosimeters with alarm/shorter monitoring intervals

Norwegian guidelines

All hospitals relate to the dose limit of **1 mSv** , and (as a general rule) the pregnant worker should not stay inside the room during **fluoroscopy/CT-scanning**.

Some restrictions related to work tasks at **NUK** (high levels of activity).

As a general rule, the pregnant woman should not be inside the **MR**-room during scanning.

Radiation therapy: pregnant women should avoid working with brachytherapy.

- The leader must perform a risk assessment; and if necessary, do adjustments (ex: double lead coats, double-badging, electronic dosimeters..)
- Some hospitals have opened up for certain work tasks involving radiation, if the pregnant woman wish to/is comfortable with this.



Ill: Shutterstock

No wish of sharing early pregnancy

How to assess risk/potential exposure?

Exclusion from work tasks may delay education/training (LIS/doctors in specialization)

Various considerations

Challenges for employer/other colleagues

Should we relate to ALARA or dose limits?

Pregnant worker losing benefits

Lack of accurate knowledge/misconceptions may lead to concern

Challenges

- Different needs that must be met, both for leaders and employees
- Employees experiencing different routines at different hospitals (and within the hospital)
- New technology/equipment leads to lower radiation exposure for personnel, but changing routines in line with new knowledge takes time



EXAMPLE:



Ill. Landauer

Employee with the highest reading on personal dosimeter in OUS in 2024 (interventionist):

28 mSv outside lead apron.

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Estimated effective dose (5-10%) = ~1.4-2.8 mSv

Dose to fetus (~25%) = ~0.35-0.7 mSv

Estimated fetus dose, corrected for number of months (12 to 8 months):

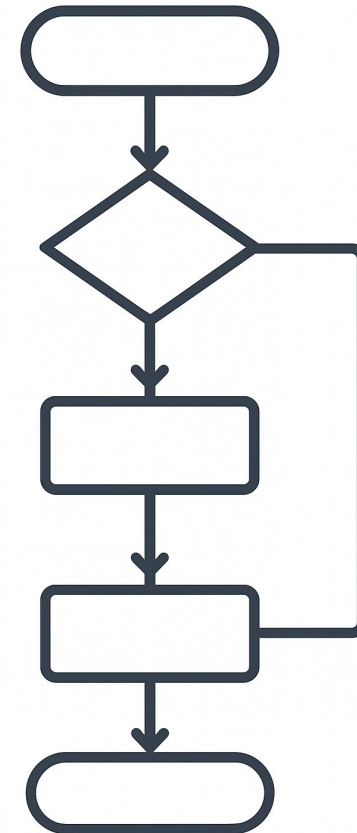
0.23-0.47 mSv

ICRP 84: If the dosimeter has been worn outside a lead apron, the measured dose is likely to be about 100 times higher than the fetal dose: ~0.28 mSv

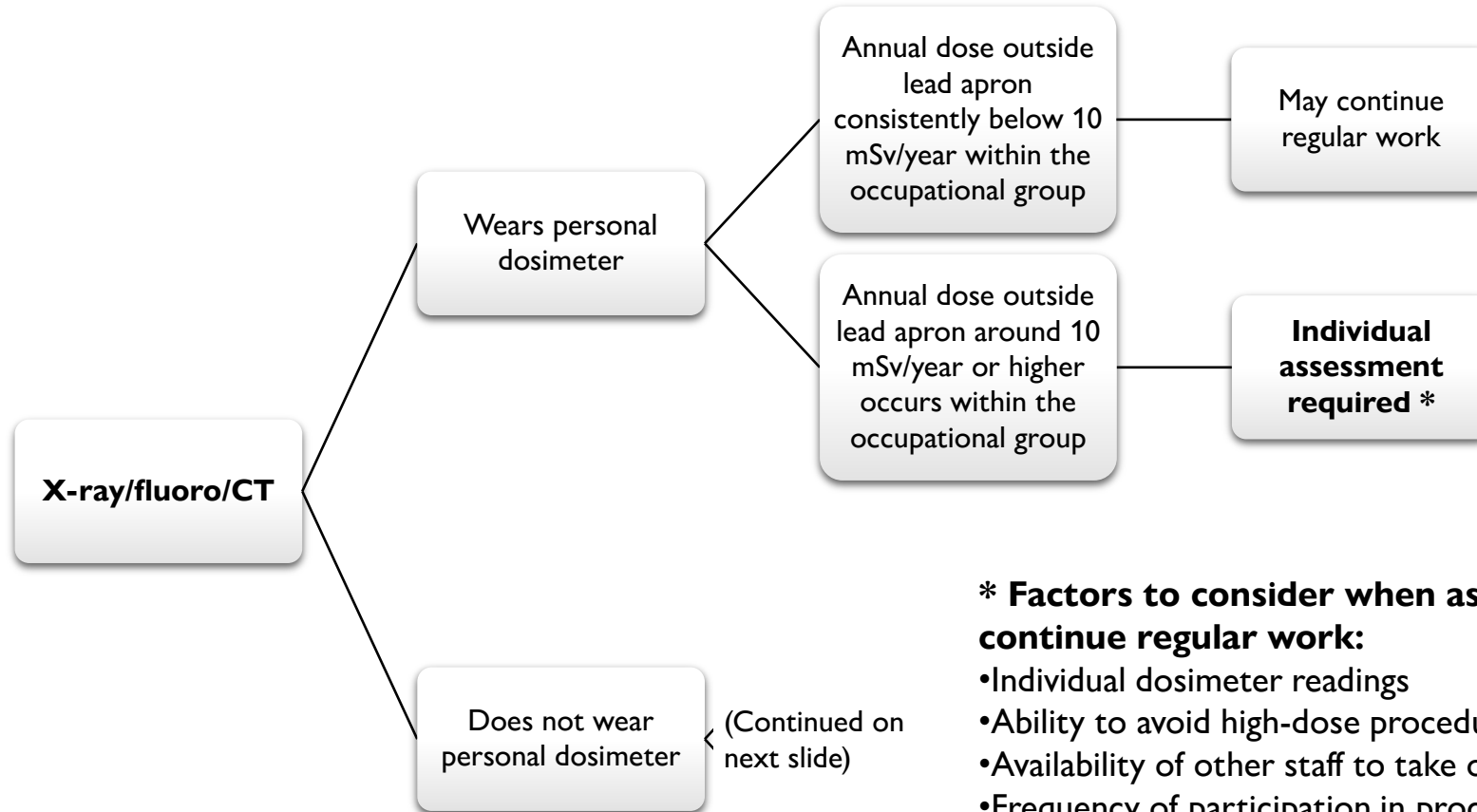
Can a pregnant employee continue regular work?

Draft flowcharts

- Providing specific recommendations for pregnant employees is challenging
- Flowcharts as a tool in assessing whether a pregnant employee can continue regular work
- Different fields
 - **X-ray/fluoro/CT**
 - Nuclear medicine
 - Radiation therapy
 - MRI



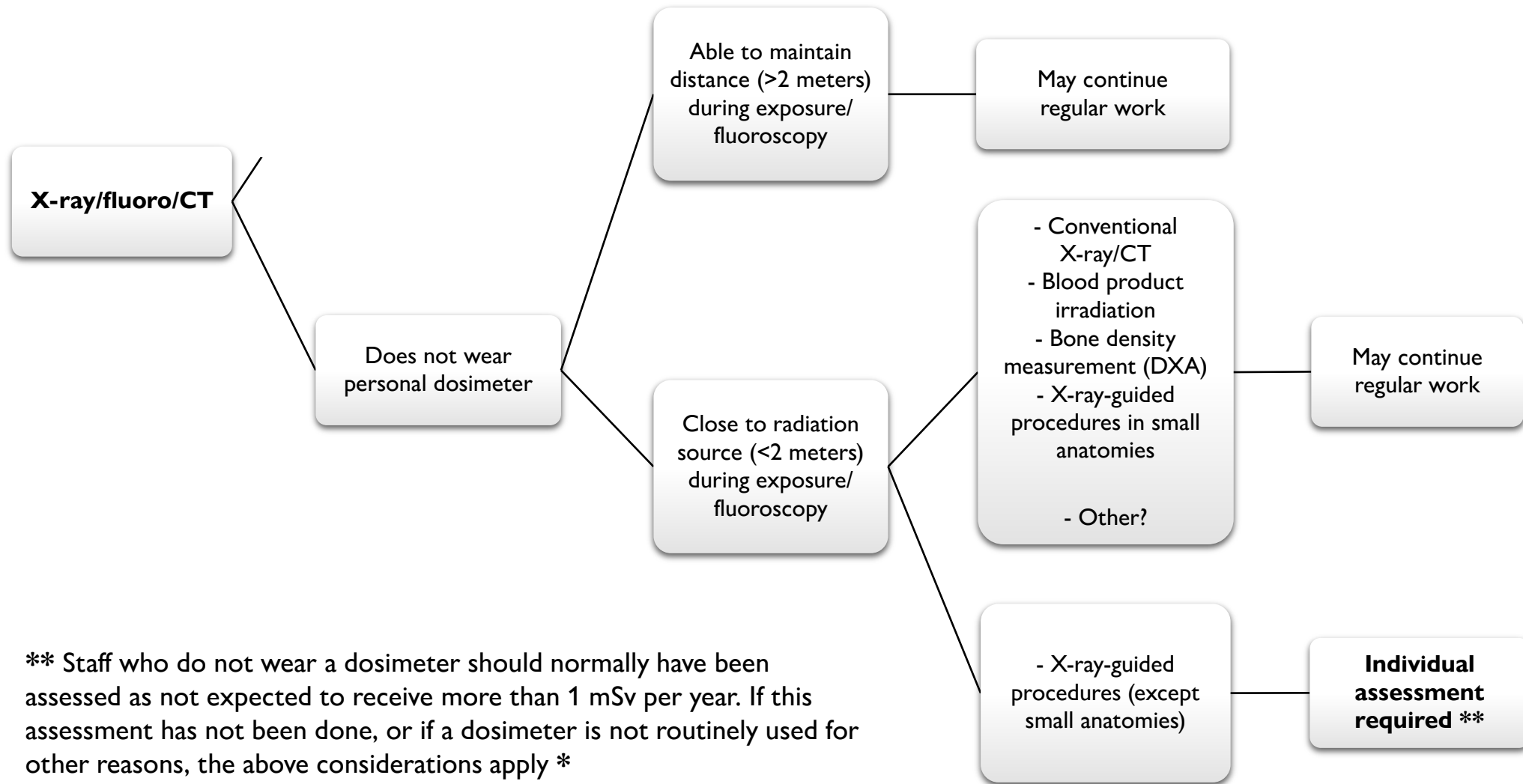
Pregnant workers in X-ray/fluoro/CT (draft)



*** Factors to consider when assessing if a pregnant employee can continue regular work:**

- Individual dosimeter readings
- Ability to avoid high-dose procedures (e.g. large patients, long/complex cases)
- Availability of other staff to take over in high-dose or emergency situations
- Frequency of participation in procedures
- Access to proper lead shielding
- Use of fluoroscopy only, or also serial exposures/image acquisitions
- Possibility for real-time dose monitoring, optionally with double badging
- Employee's competence, experience, and confidence in radiation safety

Pregnant workers in X-ray/fluoro/CT (draft)



** Staff who do not wear a dosimeter should normally have been assessed as not expected to receive more than 1 mSv per year. If this assessment has not been done, or if a dosimeter is not routinely used for other reasons, the above considerations apply *

Group work/discussion (20 minutes)

- 1. How is risk assessment of pregnant women's work tasks carried out at your workplace?**
- 2. How do we communicate risk to pregnant workers in a balanced way?**
- 3. What are the main issues/challenges related to this issue, in your opinion?**
- 4. Input to draft flowchart? Do they appear practical and useful?**

➤ Prepare 1–2 key points for plenary discussion

Plenary discussion (15 minutes)

Closing up

- There is a need of better understanding the risks, in order of avoiding potential discrimination/unnecessary constraints and reducing concerns.
- Avoid stigma both ways. Emphasize that it must be in line with what the pregnant woman is comfortable with/no pressure.
- Create awareness, build competence.