Ethical Aspects of Non-Medical Human Imaging

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Overview

• Relevant ethical principles and values
  › medical, public health, societal
• Ethical implications regarding where and how radiation exposure occurs
  › Inside or outside medical institutions
• Examples of ethical implications of non-medically indicated radiation exposure
  › Ethical obligations of all parties
Weighing risks and benefits

- Individual harms
- Community harms
- Moral distress

- Individual benefits
- Community benefits
- Employer benefits
- Shareholder benefits
- Justice (legal)
Key ethical concepts

- Justice
- Autonomy
- Beneficence / Non-maleficence
- Privacy & Confidentiality
- Prudence and precaution
- Weighing risks & benefits
- Transparency
- Respect
- Proportionality

-> Ethical policies enhance public trust
Informed consent

- Based on principle of autonomy
  - Minors
  - No capacity
- Necessary information
  - Information that is understandable and tailored to individual and scenario
  - May include what is proposed, how it will be done, associated risks, consequences of consent, consequences of refusal to consent
- Voluntary consent
  - Freely consent without undue influence or coercion
  - Opportunity to refuse or withdraw consent
- Explicit vs. implicit consent
Prudence and precaution

• Limited evidence about harm of low dose radiation
  • Should not trivialize risk
• Prudence suggests assessing potential and likelihood of harm
  • Obligation for oversight? – who?
  • How to monitor?
  • What limits to set?
• Avoidable harm
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<th>Clinical ethics</th>
<th>Foundational Principles and Values</th>
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<td>• Informed consent and patient agency</td>
<td>Autonomy</td>
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<td>• Confidentiality</td>
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<td>• Risk:benefit</td>
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<td>• Vulnerable populations/uninsured</td>
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<td>• Screening</td>
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<td>• Big Data</td>
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Adapted from: Baum et al., Glob health Law, Ethics and Policy, Winter 2007
### Ethical principles and values in other scenarios where Radiation is used (public)

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<tr>
<th>RELEVANT ISSUES</th>
<th>ETHICAL PRINCIPLES</th>
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<td><strong>Public security</strong></td>
<td>&lt;ul&gt;&lt;li&gt;Airport screening&lt;/li&gt;&lt;li&gt;Museums&lt;/li&gt;&lt;li&gt;Conference centers, events&lt;/li&gt;&lt;li&gt;Hotels&lt;/li&gt;&lt;/ul&gt;</td>
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Conflicting goals

- Individual rights vs. community needs
- Efficient use of public resources vs. individual needs
- Employer obligations and business interests vs. employee rights
Framing questions

• Is imaging done within a medical setting or outside?
• What is the nature of the relationship between the provider of the imaging and the individual?
• And what implications does that have on the ‘care’ the individual receives?
Scenarios - location

Medical equipment and medical staff

- Immigration X-rays to identify TB
- X-rays to determine age of refugees without documentation
- X-rays for employment purposes
- Scanning of suspected drug smugglers?

Non-medical equipment and non-medical staff

- Cargo screening to detect humans at border
- Security scanning at airports
- Imaging of mine employees for theft detection
- Scanning of suspected drug smugglers?
Scenarios – potential ethical implications

Medical equipment and medical staff

• Informed consent – individual interaction
  • Can they decline?
  • Coercion?
• Therapeutic misconception
• Impact future trust in health system
• “Unnecessary” exposure of staff
• Moral distress in staff
• Confidentiality of incidental findings?
• Follow-up of incidental findings – at whose cost? 
  Responsibility?
• Archive of findings for future medical use? – privacy and confidentiality
Scenarios – potential ethical implications

Non-medical equipment and non-medical staff

- Human rights impact?
- Presumed consent when all well informed
- How much individual latitude vs. efficiency
- Presumption of guilt in case of “screening for theft” – disrespectful
- Risk to those handling radiation – who monitors standards, equipment?
- Individual risk vs. benefit of another (employer, society?)
- Obligation to quantitate total dose? – who has oversight?

https://www.doctorramey.com/lets-talk-x-rays/
e.g. Immigration X-rays: detection of active or past disease

- Active TB – required to test and treat before arrival
- Justified on basis of population health
  - ? children, pregnant women?
- Screening for latent TB infection?
- Voluntary consent?
- Discrimination?
- Incidental findings?
  - Follow-up?
  - Costs?
  - Impact on immigration/refugee application?
e.g. X-rays for age determination

- Consent – voluntary and consequences of not giving consent
- Justification – alternatives?
- Harms – radiation, mental/emotional
- Confidentiality and privacy – who owns the results and how will they be used?
- Physician’s perspective – medical exam without medical reason, obligations and relationship to minors
- Accuracy – sensitivity & specificity?
  - Influenced by nutritional status? Genetics? Gender?
  - Different standards for different countries/socio-economic status/ethnicity?
e.g. Security screening at airports

- Justified on basis of air travel safety
- Implicit consent?
- Airport workers – increased exposure
- Privacy concerns – largely addressed where stick figures are used and images immediately deleted
e.g. Cargo screening to detect humans

- Justification on basis of cost and efficiency
- No consent – signs may be displayed but cannot be seen or read by occupants
- Vulnerable populations (e.g. children, pregnant women etc.)
- Competing principles – individual rights and border security
- Could save lives?

In cold blood: How people-smuggling gangs use refrigerated lorries to hide their human cargo from port officials' thermal cameras - Mail Online Oct 24 2019
e.g. Other non medical imaging scenarios

• X-rays to assess fitness for employment, e.g. sport or corporate positions
  • Voluntary consent?
• Scanning for suspected drug smugglers
  • Consent?
  • Justification
  • Number imaged vs number of detections?
• Need for targeting!
e.g. Imaging of mine employees

- Justified by employers on basis of (high?) incidence of diamond theft – X-rays may detect and/or deter
  - Could this be tackled in a more “civilized” way? – improve working conditions, remuneration
  - Random scanning?
- Employee rights vs. commercial interests
  - What are alternatives?
- High frequency, daily exposure
  - Mining itself poses risk of lung disease and cancer -> risk exacerbated by screening?
  - Accountability of companies for life-long health consequences?
- Number needed to screen to detect one case?
  - Risk of false positive -> Human rights violations?
- Voluntary participation/ informed consent? Can employees refuse? What are the alternatives?
  - “Physical” screening worse?
Central ethical considerations in use of non-medical radiation

- Individual interest vs. the common (public) good
  - Medical and non-medical
- Balance of system “efficiency” (safety, financial) vs. individual medical and social risk?
- What level of risk is acceptable?
  - Radiation exposure – dose, duration, frequency?
  - Data collection, storage
  - Quality of radiation equipment?
- How much coercion is justifiable?
  - Occupational screening
- How to ensure adequate transmission, comprehension of information?
  - Informed consent – Required? How operationalized? Can someone decline?
- Potential medical consequences
  - Follow-up if abnormality detected
  - Exposure during pregnancy
  - Radiation exposure may exacerbate an already increased occupational risk
  - Therapeutic misconception and erosion of trust
Conclusion: key issues

• Ethics is integral and relevant, not an “add-on” or “nice to have”
• Ethically acceptable balance between risks and benefits for individual and the public is necessary
• Information is always possible and an ethical requirement
• Justice – use of public resources
• Confidentiality of health and personal information is key
• Ethical implications in business/industry is fraught with conflicting priorities
• Should not trivialize risk

• Ethical standards will facilitate trust and public safety
References


