Exploring the Translational Challenge for Medical Radiation Applications and Protection Research

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Purpose: To identify key barriers to the clinical translation of medical applications of ionising radiation and associated radiation protection research and inform the development of a framework with which to address the current lack of innovation transfer.

Methods: A Delphi methodology was employed to gain consensus. In the first Delphi round a multidisciplinary panel of 20 generated a range of statements regarding barriers to translation. The subsequent two Delphi rounds called upon a broader panel to rate the extent to which they agreed with each statement as a key translational challenge via a 6-point Likert Scale (from 1=Strongly Disagree to 6=Strongly Agree). Consensus was defined as median ≥4 with ≥60% of responses in the upper tertile of the scale. Stability of responses was assessed via Wilcoxon Matched Pairs Signed Rank Test. Data collection was facilitated through a series of online SurveyMonkey collection forms.

Panel Selection: In round one forty-six European leaders in medical radiation were nominated by the project Working Group to take part in statement generation from which 20 participated. For round two the online survey was disseminated via the EURAMED Rocc-n-Roll Consortium network and prominent medical societies specialising in radiological research to reach an estimated 350 professionals from which 130 participated. The same panel of 130 were asked to continue their participation in round three for which there was a highly satisfactory retention rate of 63.8%.

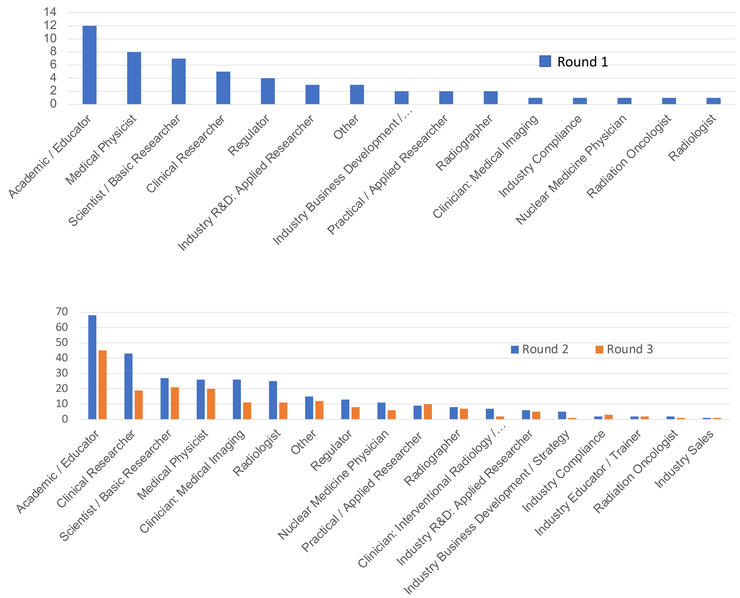

Figure 1. Frequency distributions of panelists' roles across Delphi rounds

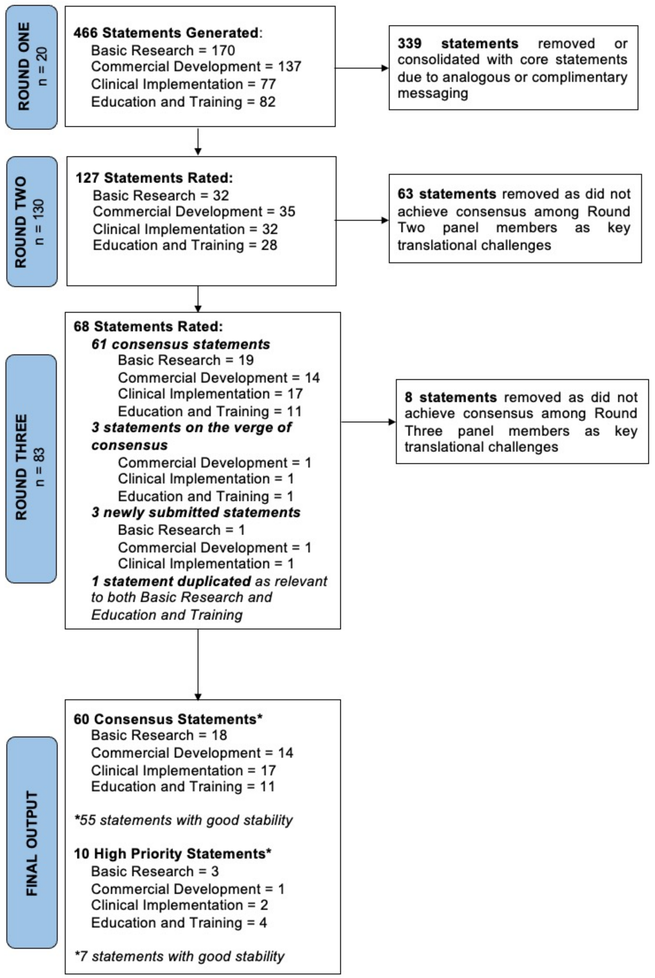

Figure 2. Flow diagram of the Delphi Process

Impact: Project findings will facilitate the development of a tailored innovation transfer framework for radiation research which addresses the identified challenges.

High Priority Translational Challenges Identified:

- Robust and efficient database structures that facilitate research across different repositories/platforms through secure data storage and information exchange are needed. [Basic Research]
- There is a lack of funding, as well as a lack of funding opportunities, particularly for basic radiation protection research. [Basic Research]
- *Commercial software is often a black box. When using clinical data (e.g., images) in basic research it is difficult to judge what happened to the data (e.g., post-processing effects), which can lead to biased study results*.* [Basic Research]
- Access to modern technology / up-to-date equipment in radiology, nuclear medicine, or radiotherapy is limited by financial factors due to high cost of resources, with end-users often lagging behind commercial development. [Commercial Development]
- The translation of novel research not only requires personnel (e.g., specialist clinical staff across multiple professions) but also access to high-end, or state of the art, imaging and/or radiotherapy equipment. Such conditions are heterogeneous in Europe, i.e., some research will only be conducted at very few institutes or with very few healthcare providers. [Clinical Implementation]
- *The clinical setting is usually very complex with multiple technologies, and software systems working together; correct integration and connections are crucial but often difficult** [Clinical Implementation]
- Experience and background knowledge varies greatly. [Education & Training]
- Adequate training is often a challenge as clinical demands minimise the number of staff and average time spent on end user training (often working around clinical work / examinations / procedures). [Education & Training]
- General awareness (by the public and other healthcare workers) of the benefits, risks, and applications of ionising radiation needs improvement. [Education & Training]
- *There is a need for multidisciplinary approaches to education and training that incorporate a team of educators with radiation protection expertise from a range of professions / disciplines.** [Education & Training]

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*Statement did not exhibit stability