

Widening access to Whole-Body MRI for early diagnosis of myeloma: creating a multicenter clinical and research-ready capability across 10 centers in a cancer network

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1. Introduction

Myeloma is the most common primary bone cancer and late diagnosis results in end-organ damage i.e. bone destruction⁽¹⁾. Despite guidance that Whole-Body MRI (WB-MRI) should be first-line imaging for early myeloma diagnosis and annually monitoring for smouldering myeloma^(2,3), a 2021 national survey⁽⁴⁾ indicated that only 27% of centres used WB-MRI.

Barriers to implementation included: radiographer training (40%); protocol optimisation (30%) and radiologist training (45%).

This 18-month project was initiated to address the unmet need of radiographer training as well as to optimise each site’s scanner to run the standardised protocol recommended by MY-RADS⁽⁵⁾.

Figure 1: Example of a Maximum Intensity Projection (MIP) of a b900 WB-DWI scan from a myeloma patient.

2. Methodology and resources

With support of a grant from RM Partners Cancer Alliance, this project was supported by a Clinical scientist (0.4 FTE) and a Senior Radiographer (0.2 FTE). The activities are detailed in Figure 2.

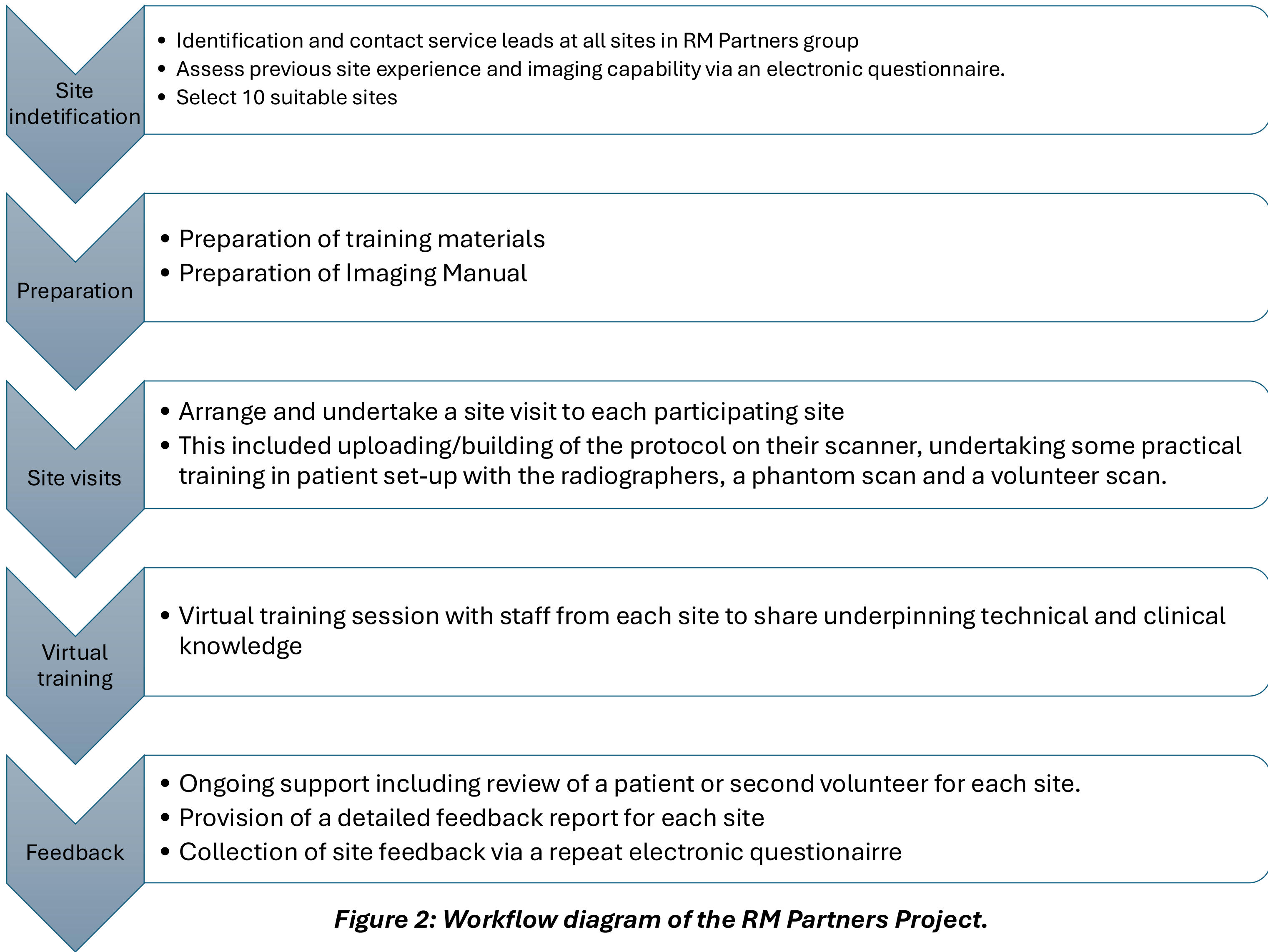


Figure 2: Workflow diagram of the RM Partners Project.

3. Technical Impact

- A standardised WB-MRI protocol was successfully set-up at 10 UK sites involving 3 vendors systems and 10 scanners. Image quality was comparable between sites.
- Phantom experiments were completed at each site demonstrating a relative ADC measurement error of less than 10%, which is considered very satisfactory and reassuring should a site in the project wish to undertake quantitative measurements from their imaging for research purposes.



Figure 3: Standard WB-MRI patient set-up (Siemens scanner).

- Healthy volunteer image assessment demonstrated good diagnostic quality imaging.
- With some minor adaptations, the protocol can be utilised for other applications including cancer screening in high-risk populations.

4. Service Impact

Staff reported an increase in confidence in both theoretical (Chart 1 & 2) and practical (Chart 3 & 4) knowledge and skills required to undertake WB-MRI after this project.

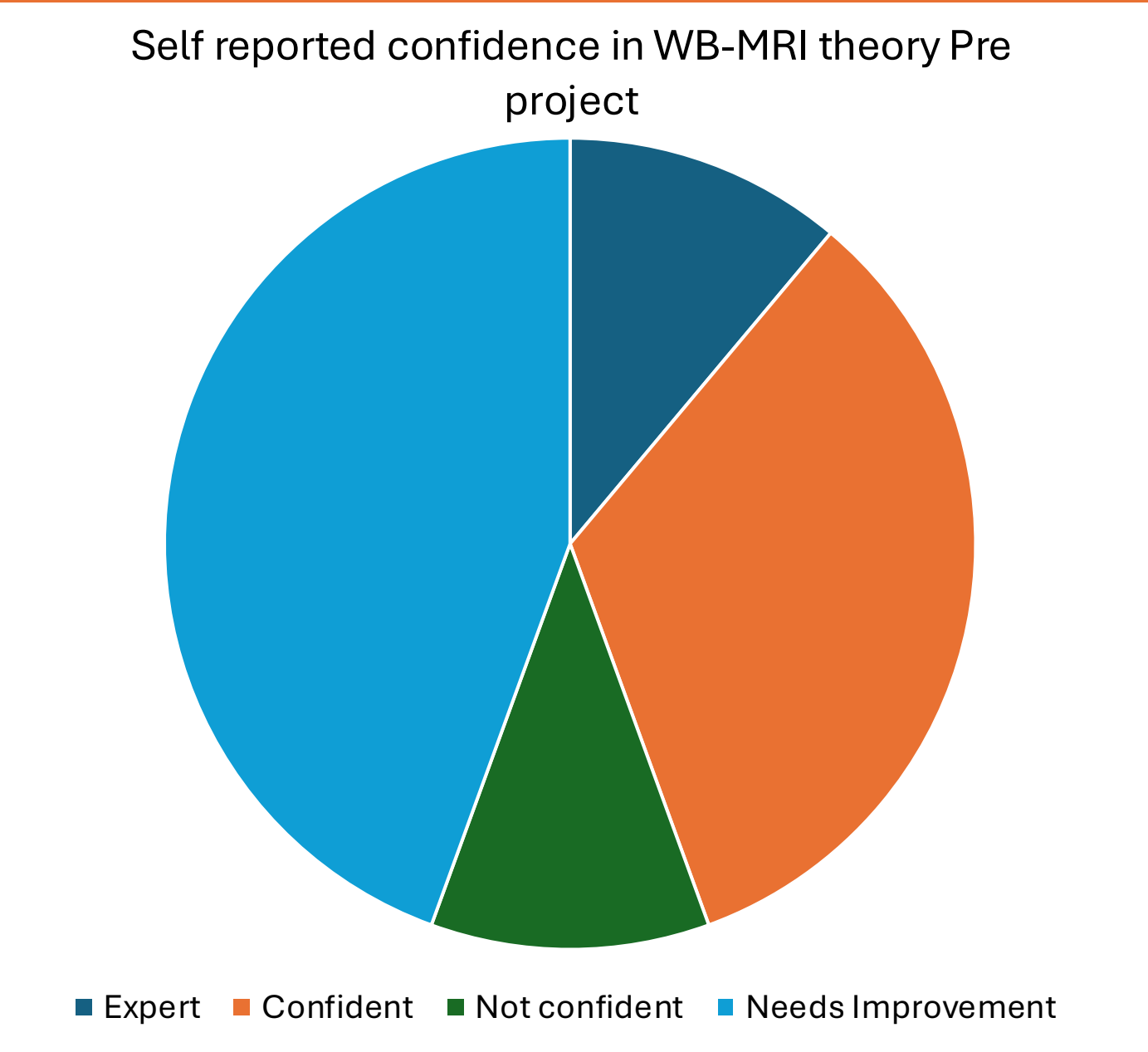


Chart 1: Self reported confidence in WB-MRI theory pre project.

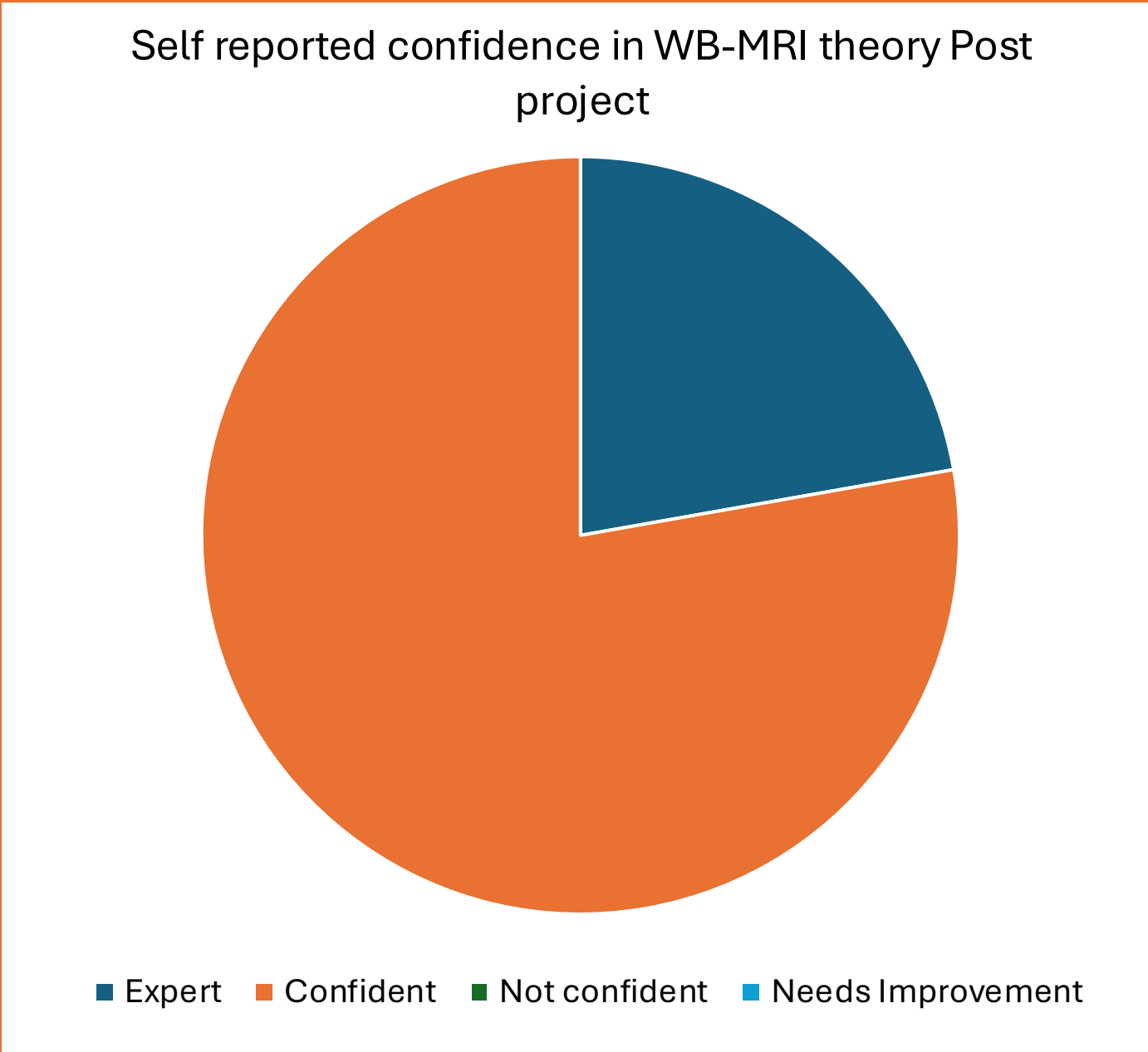


Chart 2: Self reported confidence in WB-MRI theory post project.

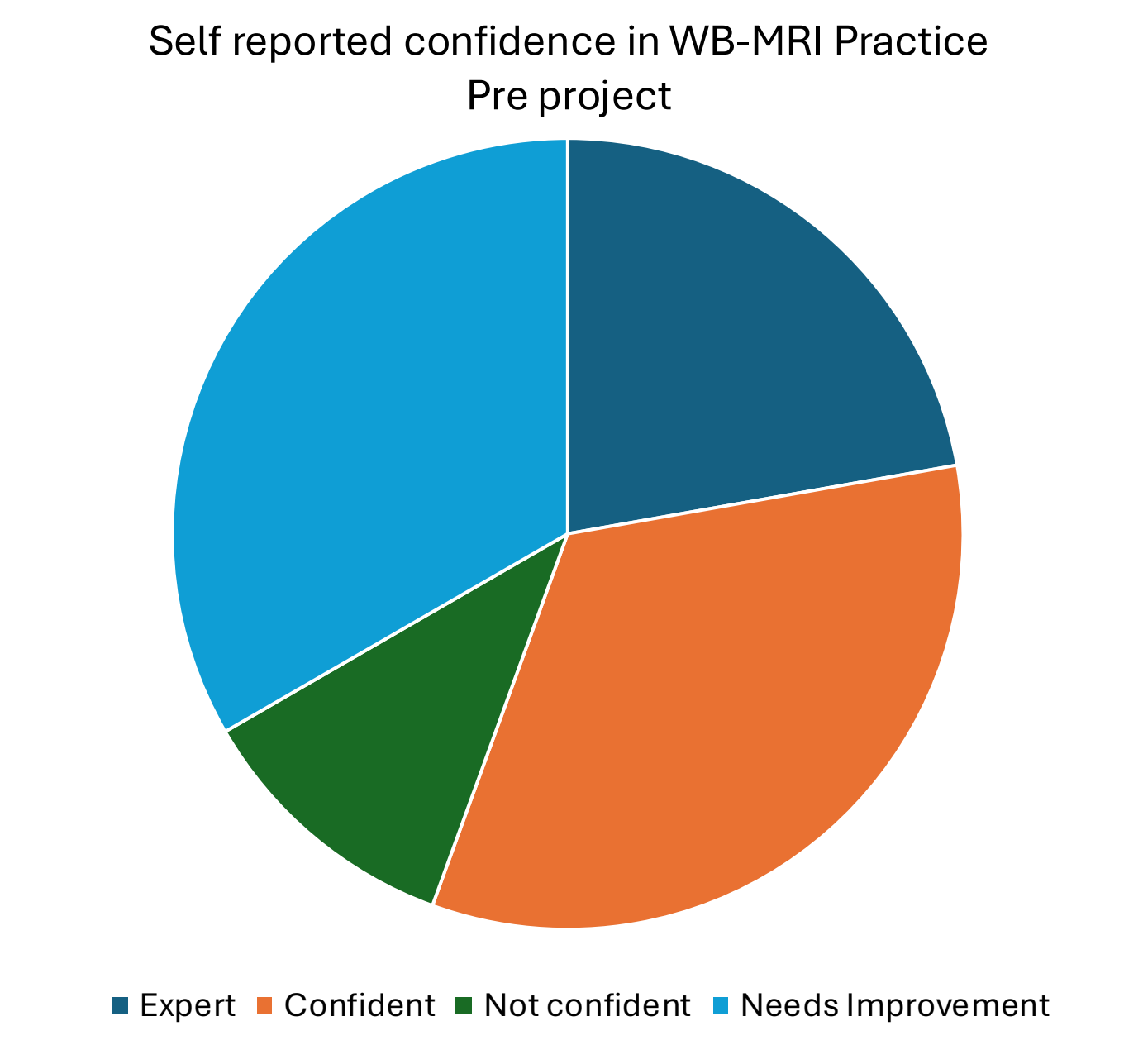


Chart 3: Self reported confidence in WB-MRI practice pre project.

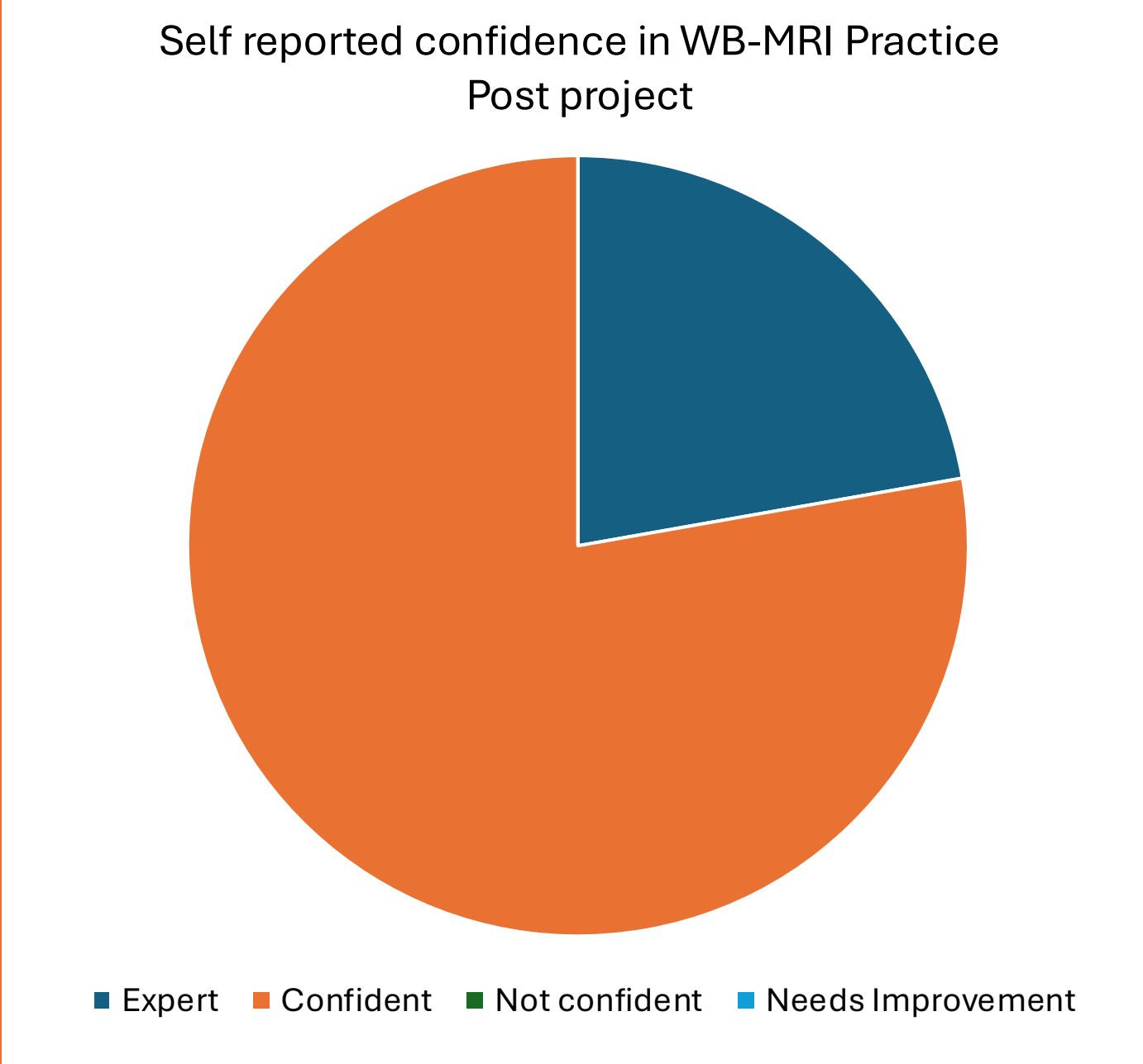


Chart 4: Self reported confidence in WB-MRI practice post project.

- The project has led to new WB-MRI service provision for myeloma diagnosis in three centers as well as improved theory and practical capabilities in all sites.
- The site visit proved most beneficial as it provided practical training and offered a valuable opportunity to develop relationships opening communication channels for knowledge sharing.
- Providing electronic training materials has allowed ongoing cascading of training locally.
- The WB-MRI protocol, with some minor adaptations can be utilised for other applications including cancer screening in high-risk populations.

5. Feedback from sites

“We found both the on-site visit and educational materials were extremely useful especially when we have to share our knowledge and skills that we learnt to our radiographer colleagues who are interested in learning how to perform WB-MRI.”

“Amazing project that really helps in District General Hospitals, harmonizing protocols across sites is valuable to shared patient care.” “The site visit was vitally important so that staff could actively engage with the researchers and invest in the research project.”

“The site visit is paramount to maximise time and image quality, being able to ask questions while preparing and chatting with people who knows makes a difference. Positioning tips also made a difference for us.

6. Challenges

- Hardware and software variations were challenging but possible to overcome.
- There were some technical issues sharing training materials across NHS trusts.
- Some sites had different strategic directions or scheduling constraints that were difficult to influence.

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