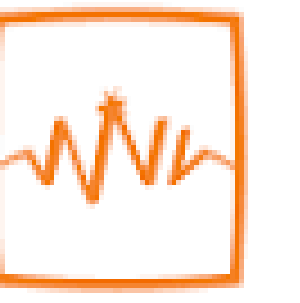




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# Improve Utilisation of MRI Slots in 3T Scanner for Research Subjects Using Pre-clinic Questionnaire



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## Background

Magnetic Resonance Imaging (MRI) uses magnetic field to create detailed images of the body and safety screening is important to identify implant. Research MRI is predominately done in 3-tesla scanner due to the ability for higher resolution imaging and its expanded capabilities on advanced techniques which are useful for brain function analysis. Hence, 3-tesla scanner requires more stringent screening compared to lower field scanner which many implants do not fit in the MR conditions due to the high specific absorption rate of research scanning parameters.

Poor screening results in research slots cancellation as the subjects are unable to do in lower field magnet due to rigorous research imaging requirements to conform to research technical factors and machine. Therefore, this translates into machine idle time, increased radiographers' workload in updating the research team, waste of volunteer's time, resulting in poor satisfaction experience.

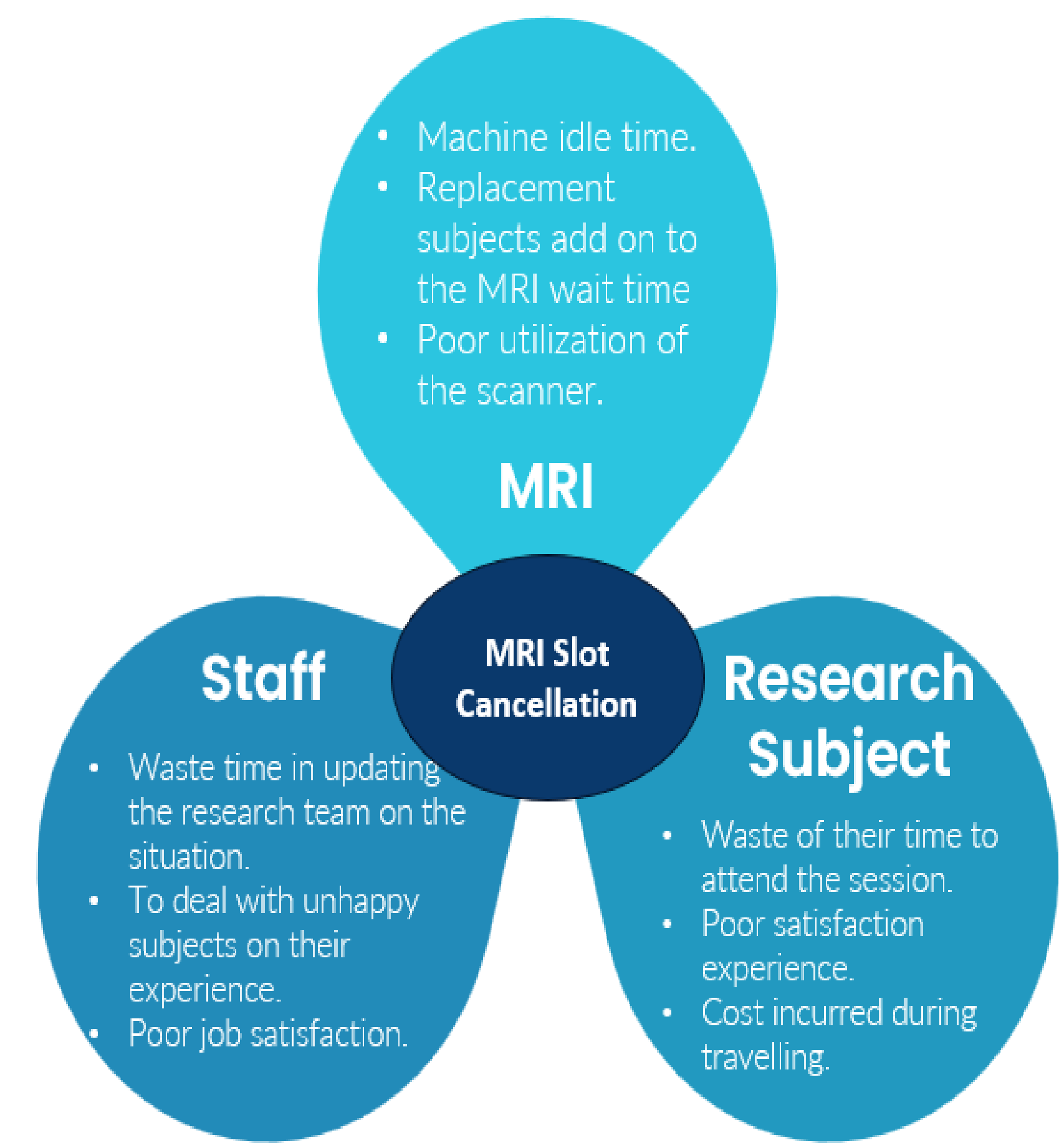


Figure 1: Impact on various stakeholders when the MRI needs to be cancelled due to undeclared implant.

## Aim

To improve implant screening process and reduce wastage of MRI slots in 3T MRI scanner, thus increase machine utilization using pre-clinic screening questionnaire.



## Methodology

A root cause analysis found that the research assistants (RAs) who do not have clinical backgrounds faced difficulty when screening patients. The poor knowledge of screening questions caused some implants to be omitted during the screening, coupled with limited resources also added to the challenges. Volunteer's conditions and understanding during screening also supplemented the implant undeclared situation.

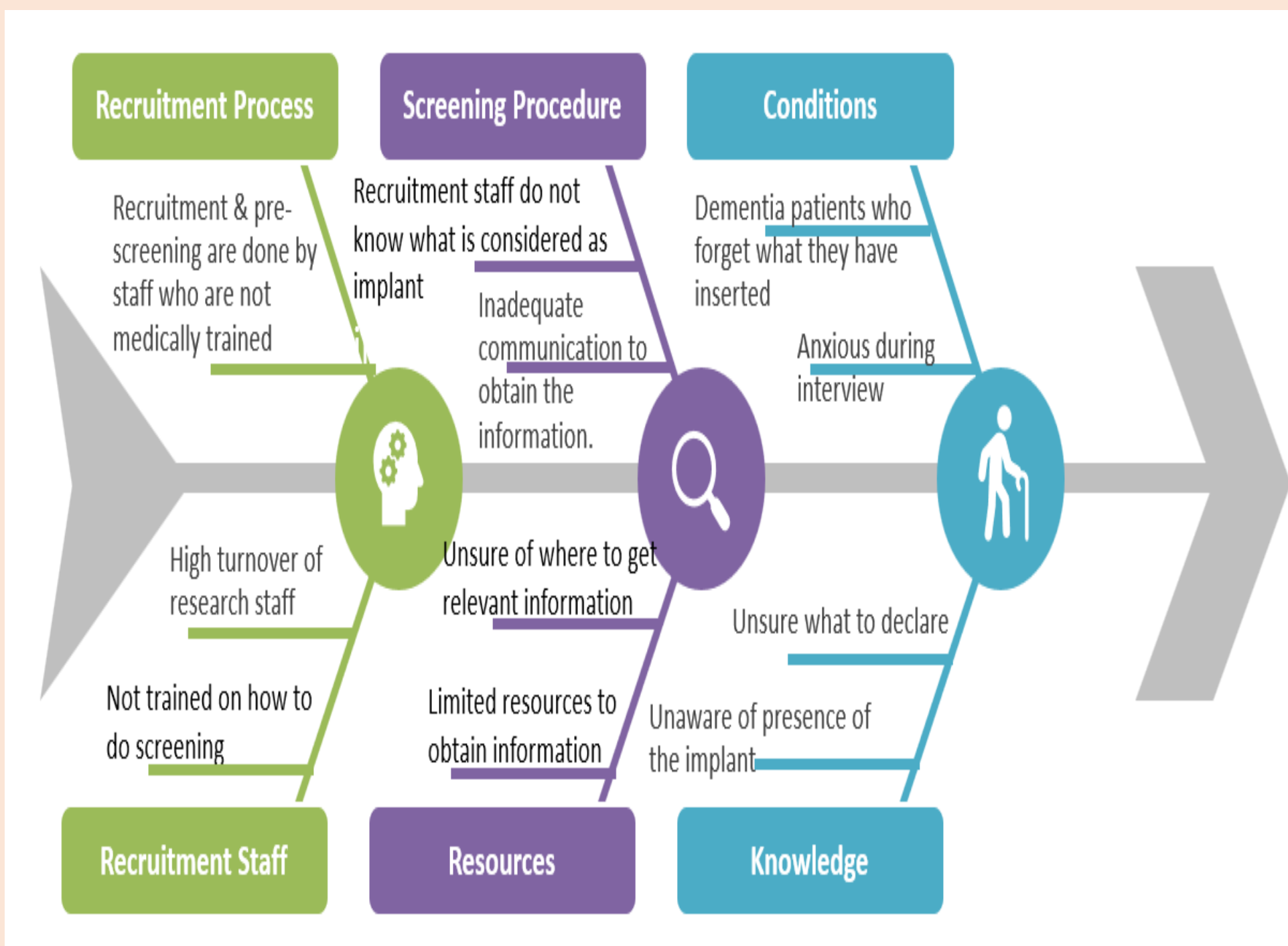


Figure 2: Root-cause analysis

The Plan-Do-Study-Act (PDSA) method was adopted in the improvement process. Screening questionnaire is sent via FormSG by the RAs to the subjects during recruitment where they can verify their implant status with family and complete the questions in a stress-free environment at their own pace to improve the declaration reliability. The reply is automatically sent to the research radiographers to screen before their arrival.

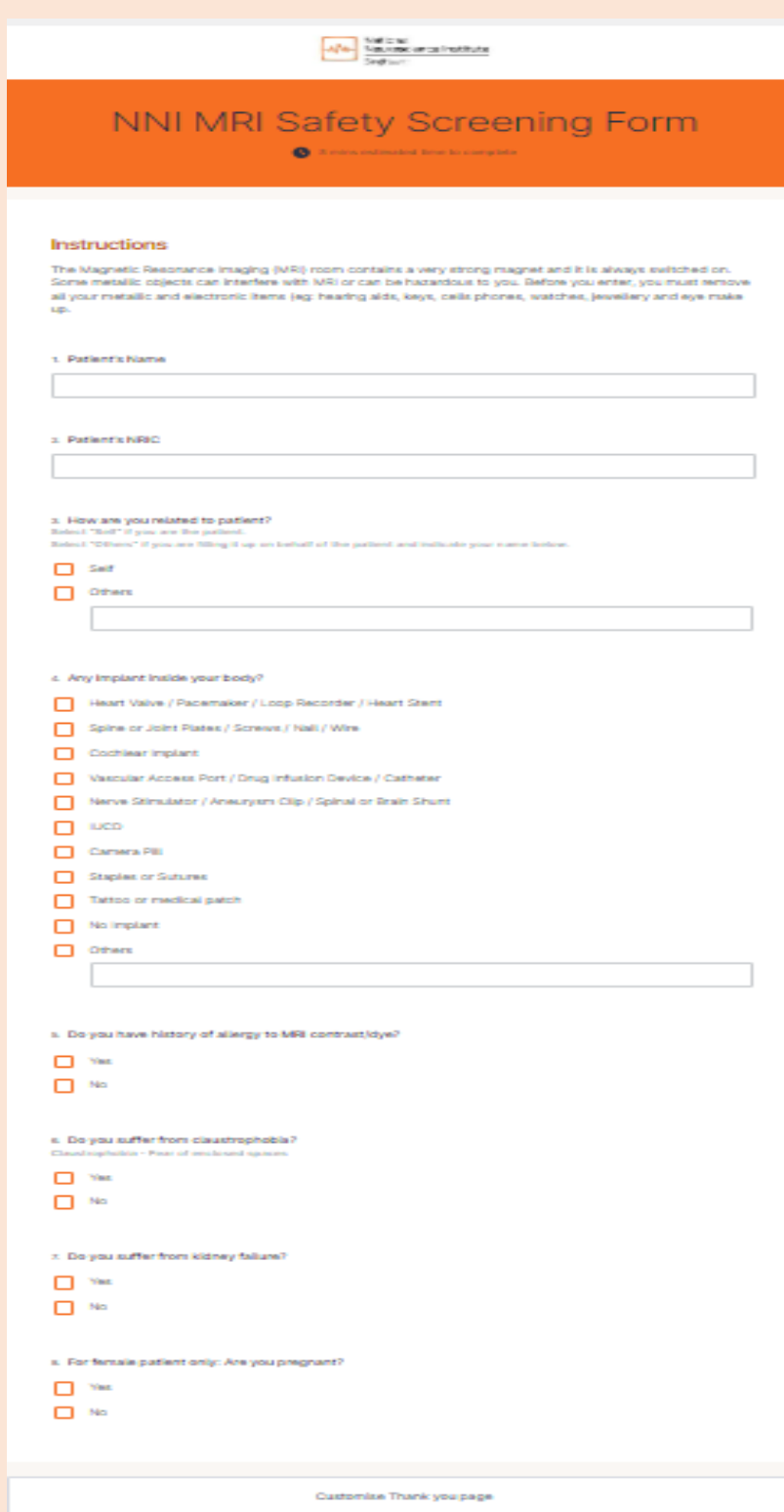


Figure 3: FormSG Questionnaire

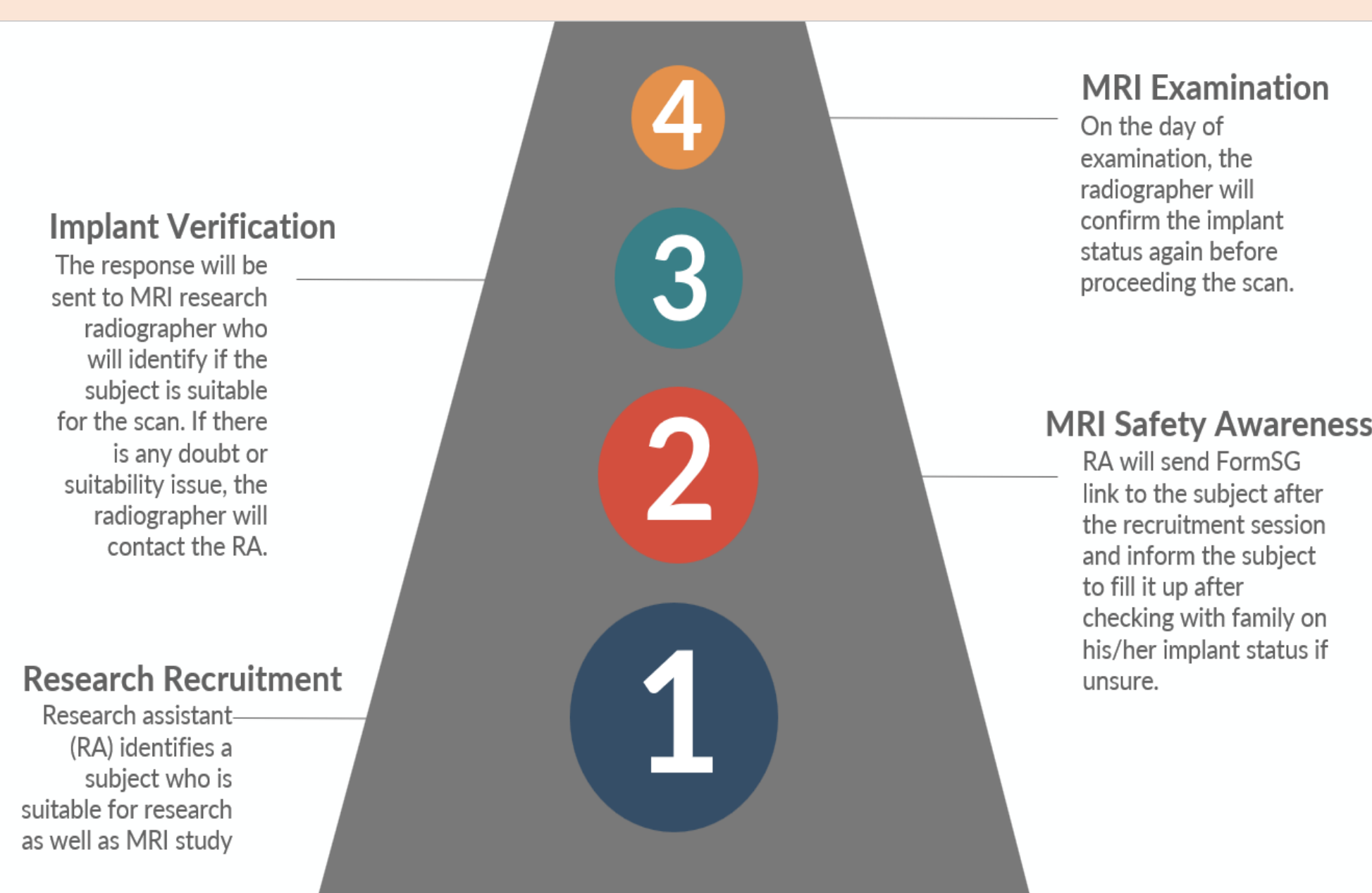


Figure 4: Implementation of pre-clinic questionnaire workflow

## Results

The pilot program was initiated on 1 November 2022 to 31 August 2023. 65 subject volunteers were given the FormSG link by the RAs. Before using the pre-clinic questionnaire, 10% of the subjects would need to cancel the examination due to the undeclared implant, however, with the implementation of the pre-clinic questionnaire, only 3 volunteers were required to cancel due to the presence of implants compared.

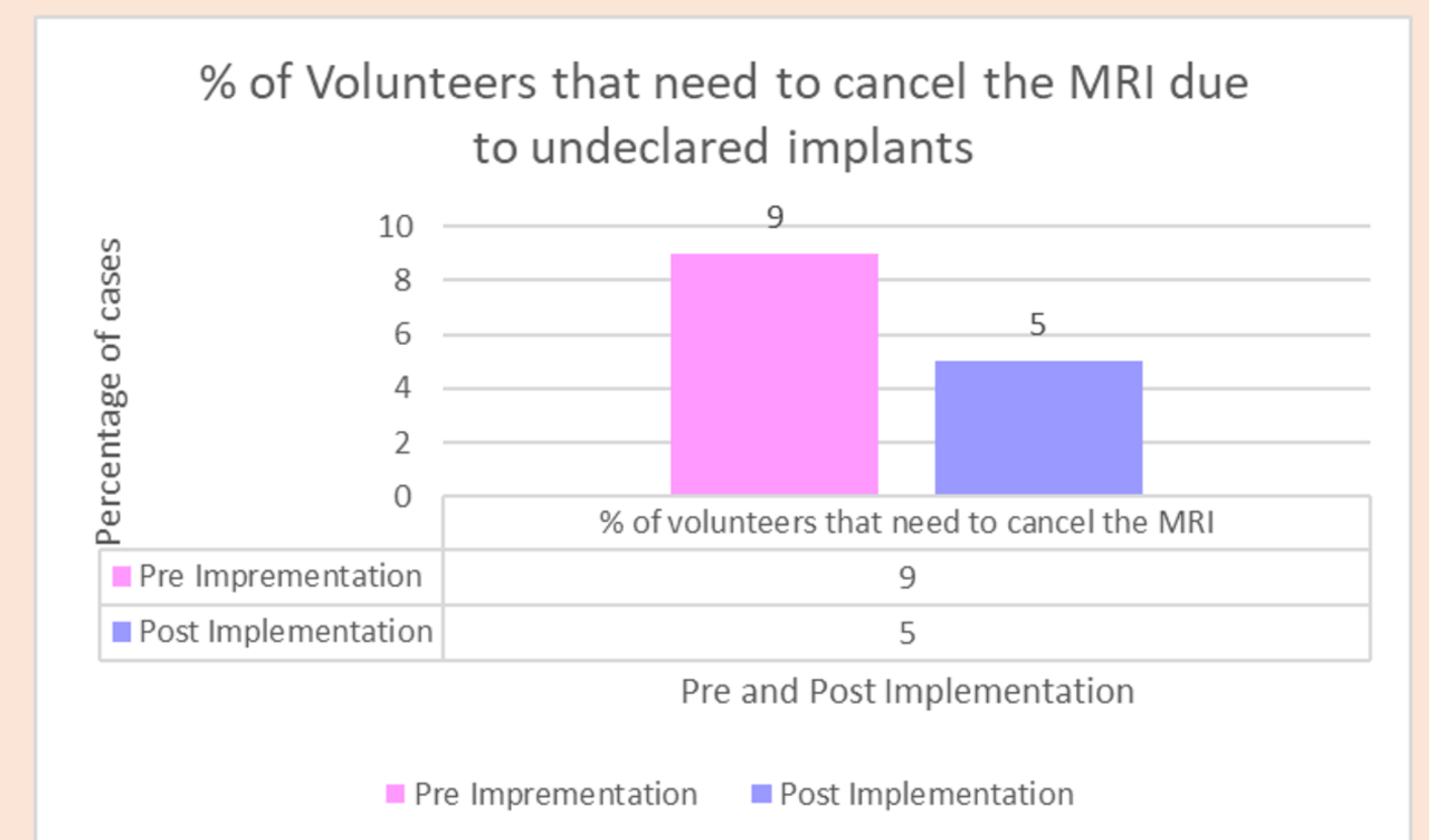


Figure 5: Reduce in cancelled study with post-implementation of pre-clinic questionnaire.

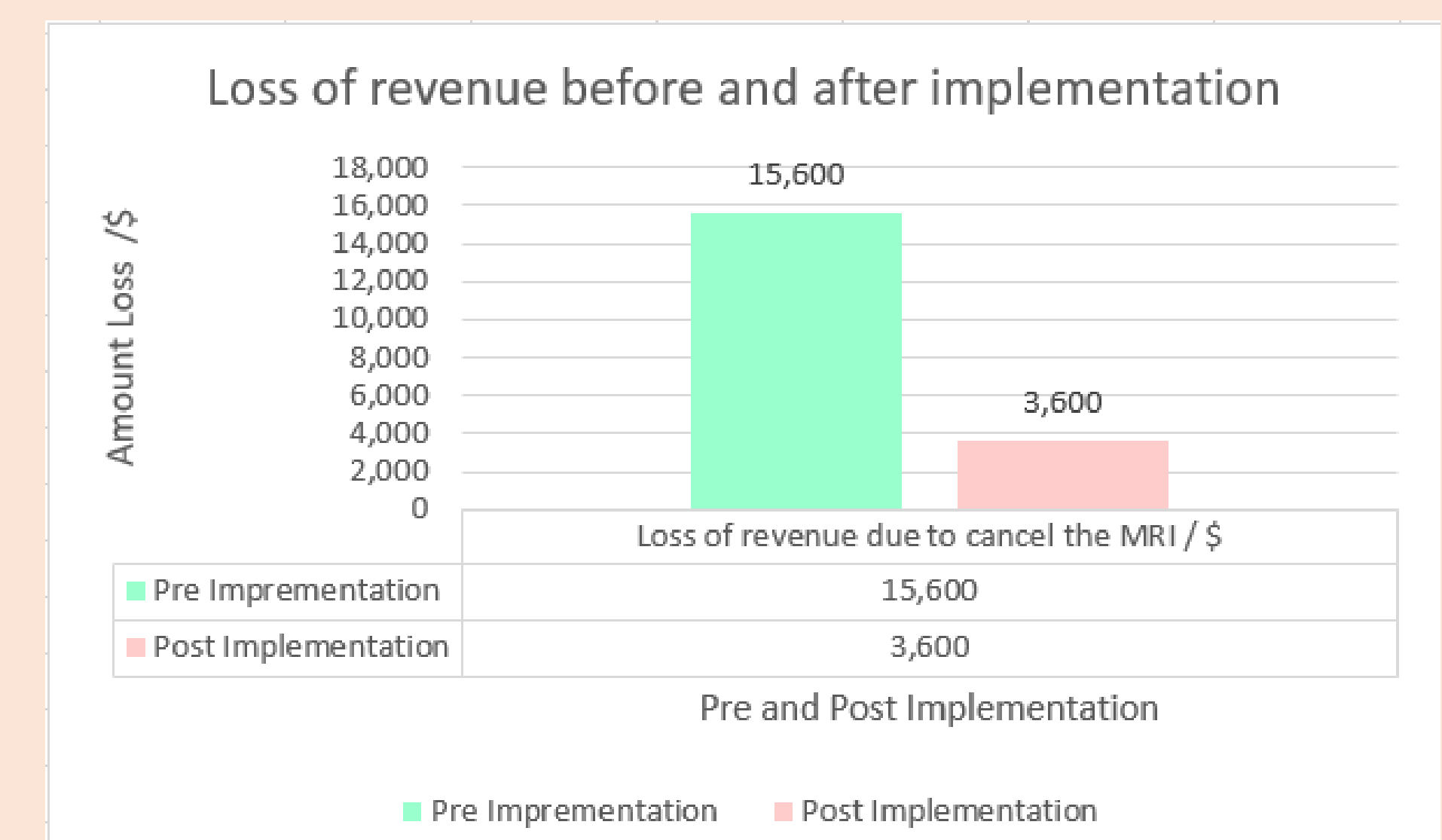


Figure 6: Reduction in loss of revenue post-implementation of pre-clinic questionnaire.



Figure 7: Impact on various stakeholders post-implementation of pre-clinic questionnaire.

## Conclusion

Continuous effort in looking at preventing ad-hoc cancellation of MRI slots is paramount to ensure seamless operation and drive to reduce the long wait time for an MRI appointment. In conclusion, the pre-clinic screening questionnaire improves the screening process and increases the efficiency of machine slot utilisation, which in turn also improves the subject's experience and service satisfaction rate. The form has since been incorporated into the daily operation as the benefits have significant impacts on the organisation, department, staff and subject volunteers.