# Let's reduce rejects!
## Reducing Reject Rate Percentage in General Radiography

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## Background

Reject rate (RR) is often used as a key indicator to ensure a balance in dose and image quality optimization. It can also be used as an indicator for efficiency in the imaging operation, as a **higher RR** translates to **more time wasted**, poor optimization of resources as well as **additional radiation dose** received by the patient.

## Current State

As a newly set up department, we needed time to set up our guidelines, work processes and quality control measures. Efforts to monitor RR in Department of Radiology (DOR) was disrupted in 2020 due to drastic change in our practices to combat COVID 19. As we stand down from the pandemic with a new normality in place, monitoring of our overall RR shows that it was at an average of 14% (figure 1), which is unacceptable. The high RR was also identified as a noncompliance during MOH licensing audit in June 2022. In an attempt to reduce the overall RR to 10%[1] , a literature review was done, and we could not find any articles related on potential cause of high RR and recommendation to lower RR. As such, a QI project team was formed to address DOR high RR.
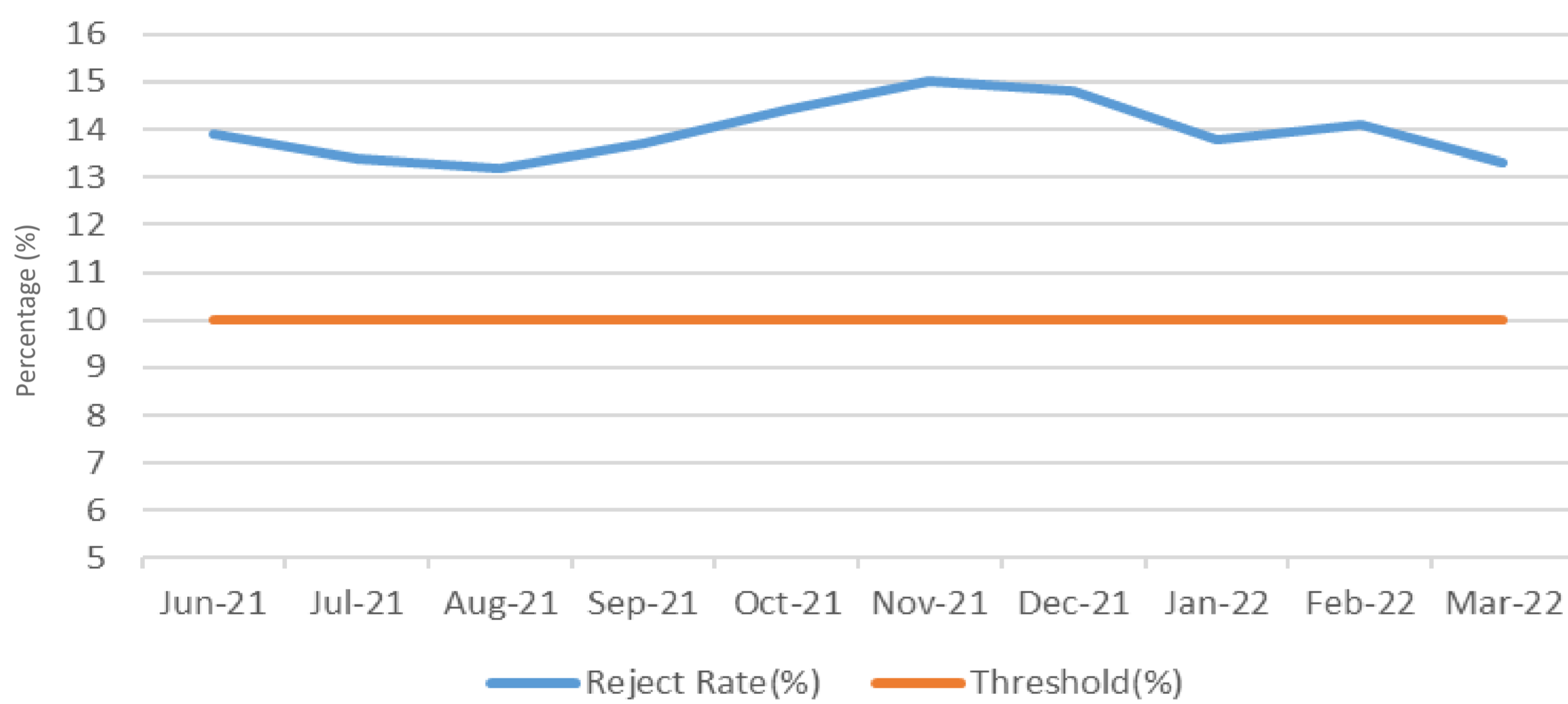

Figure 1: overall RR for DOR from Jun 2021 to March 2022

## Root Cause Analysis

A **cause-and-effect diagram** was used to perform our **root cause analysis**. We began by identifying the problem, which is high RR. Possible contributing factors were brainstormed and classified into 4 main categories: method, people, process and environment (figure 2). The "**5 Whys**" analytical technique was used to identify the root cause of each factor and a decision matrix was used for team members to vote for the root cause to be addressed – **Radiographers are unsure of the definition of a diagnostic image.**
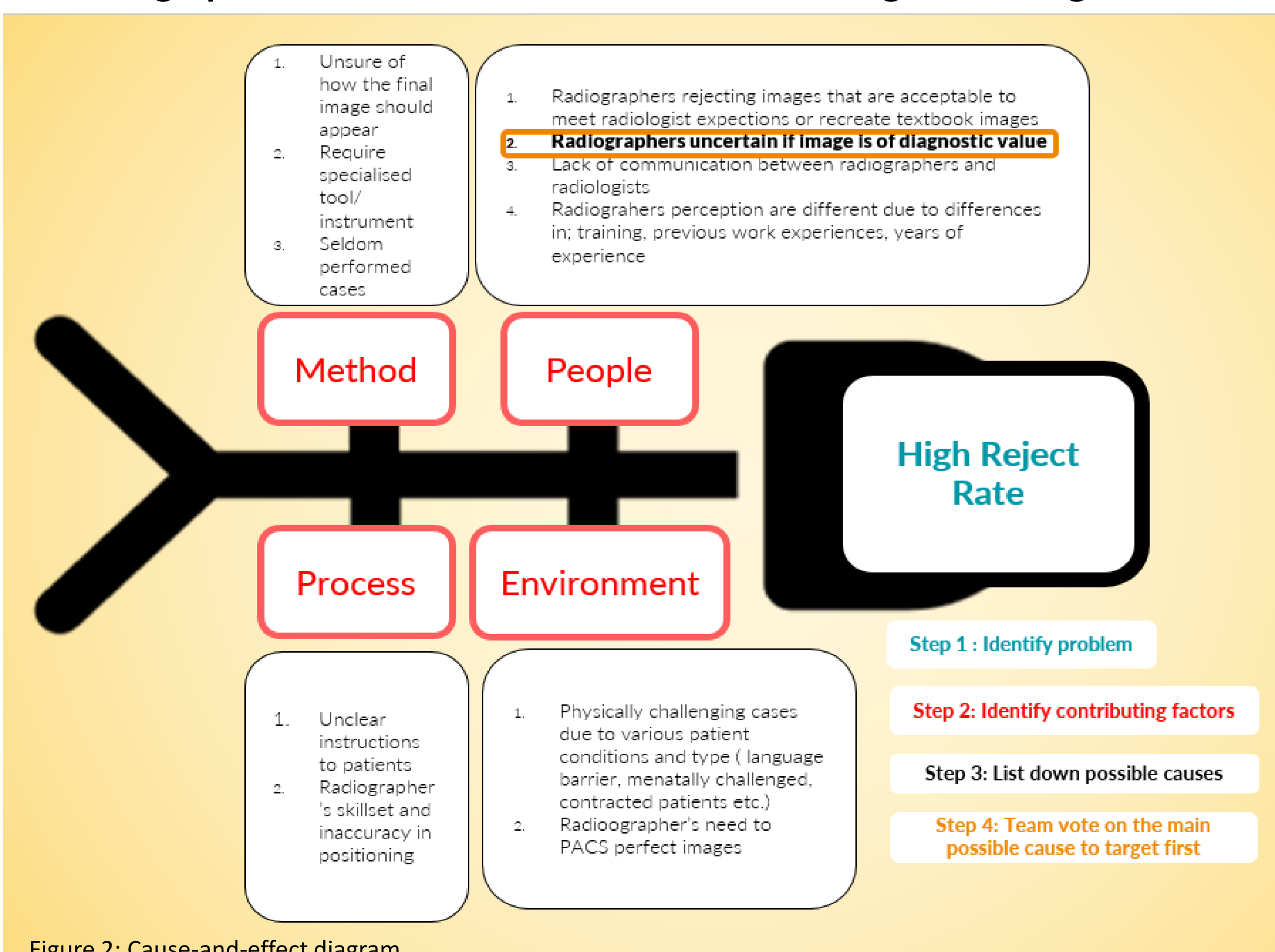

Figure 2: Cause-and-effect diagram

## Goals / Targets

The main goal of this project is to reduce the overall RR for Department of Radiology to **10%**[1] within **6 months**.

[1]Adopts the American Association of Physicists in medicine Task Group 151 recommendation of target reject rate of 8% with the threshold for corrective action at 10%.

## Interventions

**"Plan – Do – Study – Act " (PDSA)** cycle was used to test interventions.

**PDSA 1**: Awareness were raised to radiographers on the prevailing high RR during individual appraisal sessions and monthly general radiography meetings. A slight drop in RR to about 13% was noted after PDSA 1.

**PDSA 2**: An engagement session with the Junior Radiographers was held to ensure they understood that they should seek a second opinion from a senior Radiographer before they reject an image. **The RR drop to 10% after this measure was implemented.**

**PDSA 3**: A recalibration of the radiographers on the definition of a diagnostic image (figures 3 & 4) was done through an in-house training. **The RR drops to about 9% after PDSA 3.**


Figures 3 & 4: Sample slides of in-house training to recalibrate Radiographers on definition of diagnostic image

## Results

The RR for the following months post intervention were collated and it shows a steady decline –**below the threshold limits of 10% within 4 months** (figure 5). Anomaly for the RR in Nov 2022 could be the result of new radiographers still in training for general radiography. **The reject rate was maintained below 10% for subsequent months.**
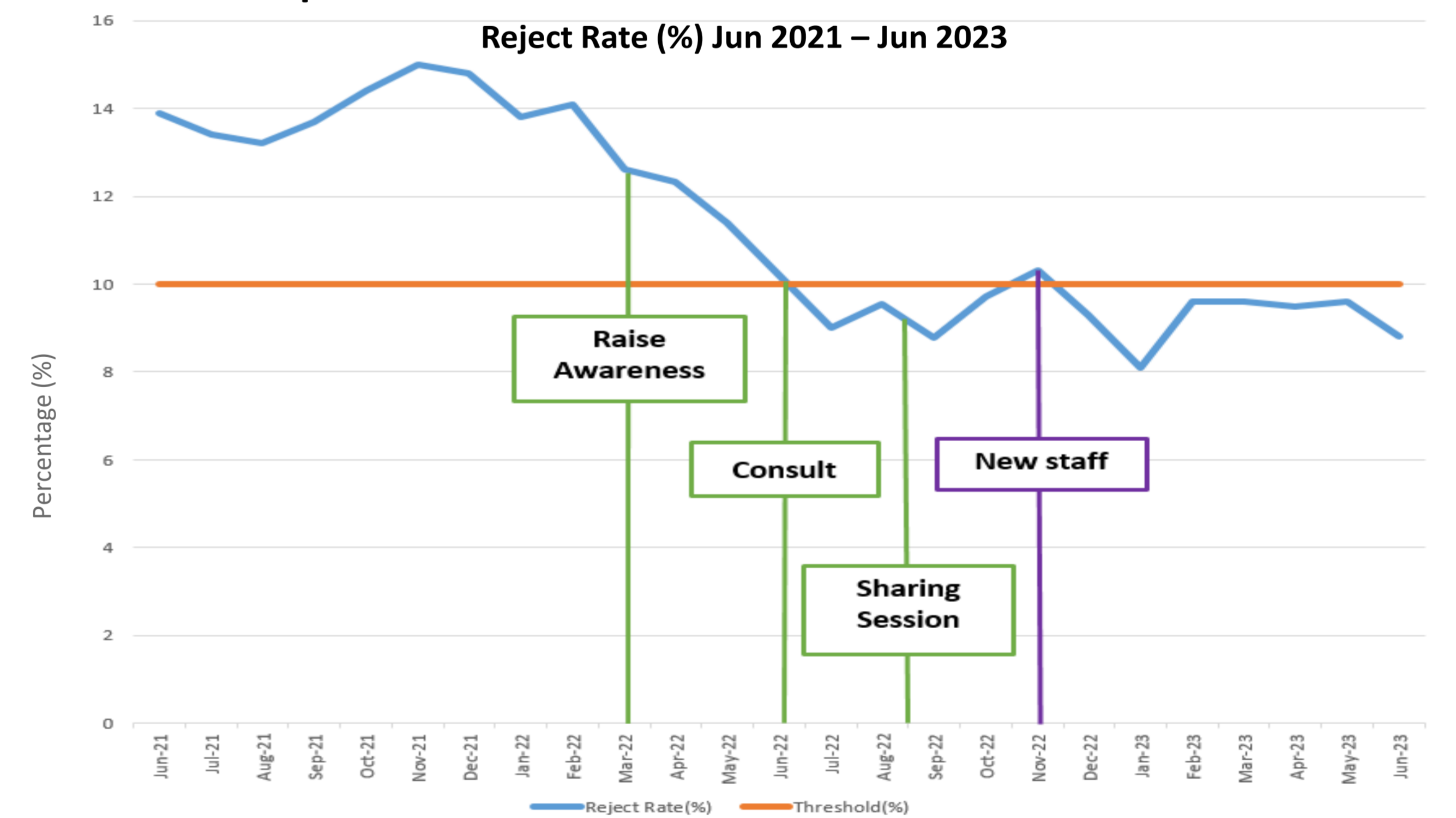

Figure 5: Overall RR for DOR from June 2021 to June 2023

## Impact

Our project has successfully reduced DOR overall reject rate, which translates to **lesser radiation dose to patients.** A lower RR translate to lesser repeats for patients and hence a better turn around time for DOR general radiography services for our patients. A better turn around time leads to better patients' satisfaction.

Radiographers have better clarity on the definition of a diagnostic image; hence they are able to better manage their personal RR to ensure they meet the department's KPI.

With the successful reduction of RR below 10%, DOR is able to **meet MOH audit requirements**, and also attain an **improved overall efficiency**.

## Future development

It will be beneficial to work with auditors and radiologists to highlight new cases that require attention. We aim to conduct consistent sharing session to disseminate information, while also allowing radiographers to share new problems they encounter in a dynamic environment. This project was presented at the 2023 Singapore Society of Radiographers Annual Scientific Meeting (ASM) and the RADSc ACP sharing session. It has gained significant interest across the Radiography profession, and we have been approached by other institutions who are keen to collaborate and explore further with us.