**Assess diagnostic quality of multiparametric prostate MRI scans using PIQUAL scoring system**

**Descriptor:**

Recent development of prostate image quality assessment system (PIQUAL) and consensus by uroradiological societies stresses importance of including this score in standardised mpMRI reports of prostate.

**Background:**

PIQUAL is a standardised scoring system for evaluating scans against a set of objective technical and visual  quality criteria developed by Giganti et al. Technical criteria for a scan (imaging planes, slice thickness, FOV, Bvalue, in plane and temporal resolution) are assessed as per locally adopted mpMR imaging protocol.

Visual scoring on T2W, diffusion (DWI) and dynamic contrast seuence (DCE) are done separately based on objective identification of certain antomical structures and presence or absence of artefacts.

Final scoring is done on a 1 to 5 scale where scores of 1 and 2 represent suboptimal or non diagnostic quality studies, a score of 3 is diagnostic quality and scores of 4/5 represent high quality studies.

A mpMR scan with at least 2 sequences of diagnostic quality would score 3 whereas studies with only one or no sequences of diagnostic quality would score as suboptimal(score1/2) and a study with all diagnostic quality images fulfilling the visual criterias and technical parameters would score as 4/5.

The aim of this audit is to assess diagnostic adequacy of mpMRI prostates by PIQUAL score and its impact on reporting and biopsy results.

## The Cycle

**The standard:**

Technical requirements for multiparametric prostate MRI  should be standardised according to PI-RADS v. 2.1 guidelines.Assuming all mpMRs are acquired using set technical parameters adherent to PIRADS v2.1 guideline, for practical purposes , considering time constraints ,  this audit only scores  diagnostic quality of mpMR study taking into account only visual parameters laid down in  PIQUAL  study.

After checking technical parameters in a scan, visual scoring for diagnostic quality images are done as follows:

1. On T2W sequence: clear delineation of: prostate capsule, neurovascular bundle, seminal vesicles ejaculatory ducts and external sphincter and absence of artefacts.

2. On DWI sequence: adequacy of ADC map and absence of artefacts.

On DCE sequence: delineation of prostatic capsular and pudendal canal vessels and absence of artefacts.

To assess final PIQUAL score on 1 to 5 scale by each observer. Audit involves usually one radiology resident and two uroradiology consultants and scoring individually and then assessing interobserver agreement by kappa score.

To reach a consensus on interobserver agreement, for simplicity we have categorised 5 point PIQUAL score in to three groups of suboptimal (scores 1/2), diagnostic quality (score 3) and high quality (score 4/5) studies.

**Target:**

100 percent of mpMRI prostate scans should be of diagnostic or high quality studies (PIQUAL score > or = 3).

## Assess local practice

**Indicators:**

Exclusion criteria: Biparametric MRI, post operative scans.

Each scanned scored by junior resident (with knowledge of MRI anatomy of pelvis) and two uroradiology consultants. Interobserver agreement assessed and discrepancies reviewed to reach a consensus for a final PIQUAL score, based on which final results and analysis done.

**Data items to be collected:**

Techmical parameters assessed on T2W, DWI and DCE scans with visual assessment as per criterias as mentioned above.

Demographic details to be collected are as follows:

Age / PSA / Prostate volume / PSA density / Type of MR scanner used (1.5/3T) / Use of Buscopan / PIRADS score in report / Histology outcomes if biopsy done.

Kappa score between SpR and Consultant1, Spr and Consultant 2, Consultant 1 and 2 assessed.

Results tabulated on finally agred PIQUAL score as follows:

1. Perecentage of suboptimal (PIQUAL score1/2) , diagnostic (score 3) and high quality scans (score 4/5)

2. Percentage of negative/indeterminate calls (PIRADS score < or = 3) on these 3 subgroups of MR scans.

3. Percentage of patients with clinically significant prostate cancer with suboptimal MR scans (PIQUAL score <3) who went on to have a biopsy.

4. Most common artefacts encountered (rectal gas/metal implant).

**Suggested number:**

At least 50 mpMRI scans to be evaluated.

**Suggestions for change if target not met:**

1. Presenting audit findings to MR radiographers and uroradiology subspeciality meetings.

2. Identifying suboptimal studies and main cause for artefacts.

3. Reviewing technical parameters, adopting appropriate metal artefact reducing sequences if necessary, consistent use of buscopan unless contraindicated.

4. Training of MR radiographers, attending appropriate courses.

5. Encouraging fellow reporters to gauge diagnostic quality of a sequence  using visual parameters of PIQUAL score and understanding limitations of a suboptimal study on  PIRADS scoring.

6. Reaudit in 1 year.

**Resources:**

Data collection: 30 hours from PACS, RIS and ICE.

Data analysis: 6 hours.

Report writing: 6 hours.

**References:**

1. Giganti.F,Kirkham.A,Kasisvanathan.V,Papoutsaki.M,et al.Understanding PIQUAL for prostate  MRI quality:a practical primer for radiologists.Insights imaging(2021);12:59:1-19.
2. Karanasios E, Caglic I, Zawaideh JP, Barrett T. Prostate MRI quality: clinical impact of the PI-QUALscore in prostate cancer diagnostic work-up.Br J Radiol (2022) 10.1259/bjr.20211372.

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**Published Date:**

Friday 13 October 2023

**Last Reviewed:**

Tuesday 19 July 2022