Radiological referrals - time for a new guideline?

Introduction

Dento-alveolar referrals make up a good proportion of OMFS hospital referrals. From third molar assessment to complex medical problems, radiographs are at the heart of each dentoalveolar referral. The radiographs are often taken by dentists in the community and attached with the referral clinical question to prevent the hospital having to prevent repeated radiographic exposure of the patient. In an ever evolving digital age, different formats are used to take radiographs and the subsequent quality of these radiographs can be very variable. It was noted across multiple trusts I was working that sometimes we were repeating radiographs as the quality of these radiographs was so poor that they were of no diagnostic use. Thus, the clinical question arose whether it was possible to improve the quality of radiographs in dentoalveolar referrals and prevent repeat radiographs from being taken.

Radiographs are produced by X-ray photos that act either directly or indirectly via free radicals to damage DNA. There are two main categories that classify the biological effects if ionising radiation which are deterministic and stochastic effects. Deterministic effects are non-cancer damaging effects to the body of the person exposed, that will definitely result from a high dose of radiation. Stochastic effects are those biological effects that may randomly develop any time a body is exposed to any dose of radiation. It has never been possible to establish a safe dose, where X-ray exposure that prevents stochastic effects. Thus there is no threshold dose and that every X-ray photon has the chance of producing a stochastic effect. The lower the radiation dose however the lower the chance the cells may damage.

Stochastic effects can cause both genetic defects as well as inducing cancer. The ICRP (international Commission of Radiological protection) regularly publishes radiation protection recommendations based on three principles of justification, optimisation and limitation. This aim is to limit the deterministic and stochastic effects on the body during X-ray exposure. The FGDPs 2013 selection criteria for dental radiography gives guidelines based on clinical history and examination to allow justification of radiographs as well as optimising and limiting exposure.

Thus IRMER 2010 states that all radiographs need to be justified. Dentists regularly send dentoalveolar referrals with attached radiographs to assist a hospital with making a diagnosis and treatment plan for their patients. These referrals can come through letters to online referral systems e.g. Repo with attached radiographs.The quality of these radiographs can be poor and the hospital will need to repeat the radiographs in order to make a diagnosis and treatment plan. Radiographs sent can come in film format to printed out digital radiographs of varying quality, which can lead to repeated radiographs, adding further radiation exposure to patients. This is 0.0027-0.038 effective dose of radiation for an OPG (2011 HPA publication Frequency and Collective Dose for Medial and dental X-rays examinations in the UK 2011).

So if every X-ray photon sent through the human body can cause stochastic effects, ideally repeat radiographs should be avoided where possible. The aim of this audit is to try and reduce these stochastic effects by preventing repeat radiographs by looking at dentoalveloar referrals and improving methods of communication as well as educating both referrers and recievers on the latest guidance from radiation protections authorities.

Methodology

My audit consisted of radiographic referrals from three hospitals, Queen Victoria East Grinstead, King’s College London and Northwick Park Hospital. Consent from local audit office was sought for each trust.

Referral letters and accompanying letters were analysed from each hospital and accompanying radiographs assessed for diagnostic quality.

My standard used was from the world health organisation that defines quality assurance of radiographs as " the organised effort buy the staff operating a facility to ensure that the diagnostic images produced by the facility are of sufficiently high quality so that they consistently provide adequate diagnostic information at the lowest possible cost and with the least possible exposure of the patient to radiation.'

Subjective quality rate criteria for digital captured images from Department of Health 2001 guidelines includes a grading from 1 to 3.

1. Excellent - no errors in the radiographic exposure process
2. Diagnostically acceptable - some errors in the radiographic exposure process but does not detract from the diagnostic utility go the radiograph
3. Unacceptable - errors in the radiographic exposure process which render the radiograph diagnostically unacceptable and cannot be improved by use of computer software to make it diagnostic.

The guideline also recommends targets to achieve a certain quality grading from radiographs taken (see table below).

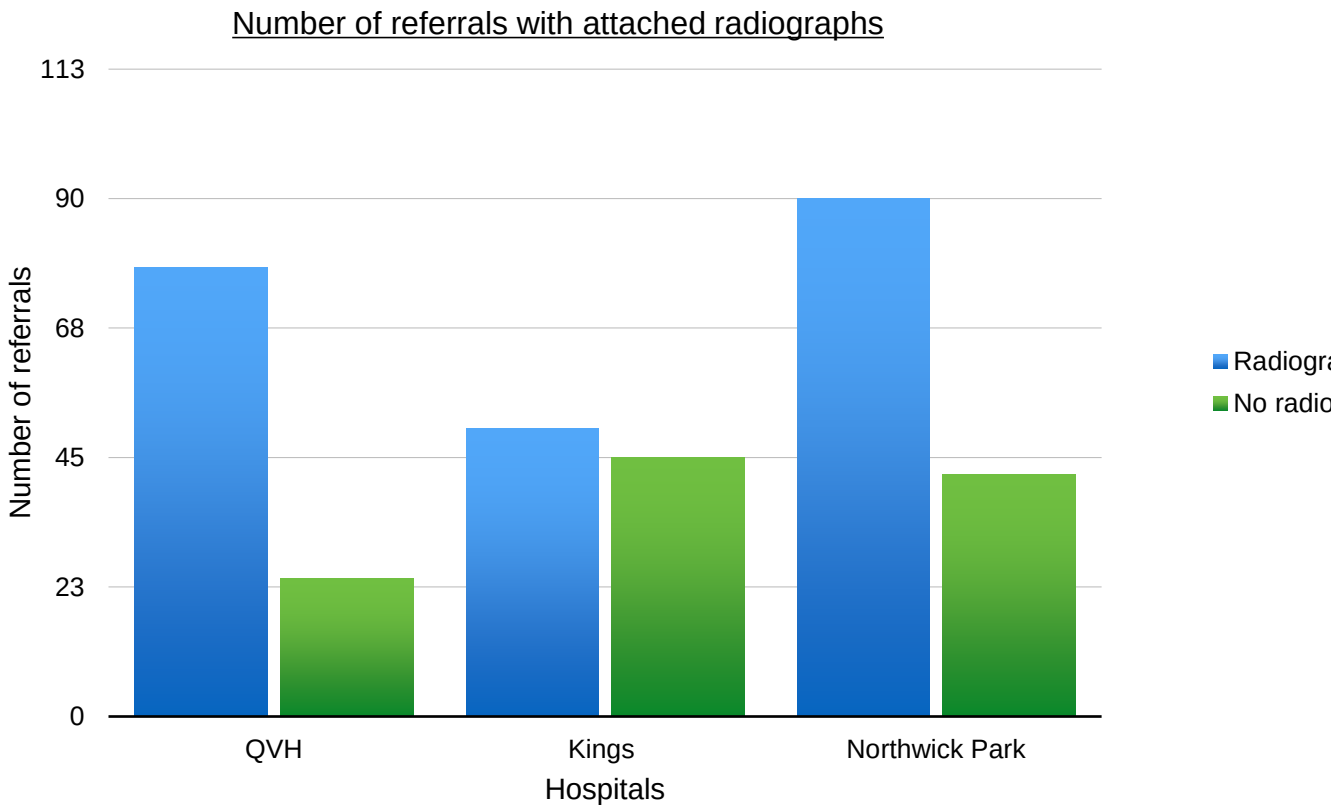
Rating	Target	Minimum
1	>70%	>50%
2	<20%	<40%
3	<10%	<10%

Data was collected from 329 patients over a 6 month period which 102 from QVH, 95 from Kings and remaining 132 from Northwick Park. The numbers were higher from Northwick Park hospital due to easier accessibility to dento-alveoloar referrals.

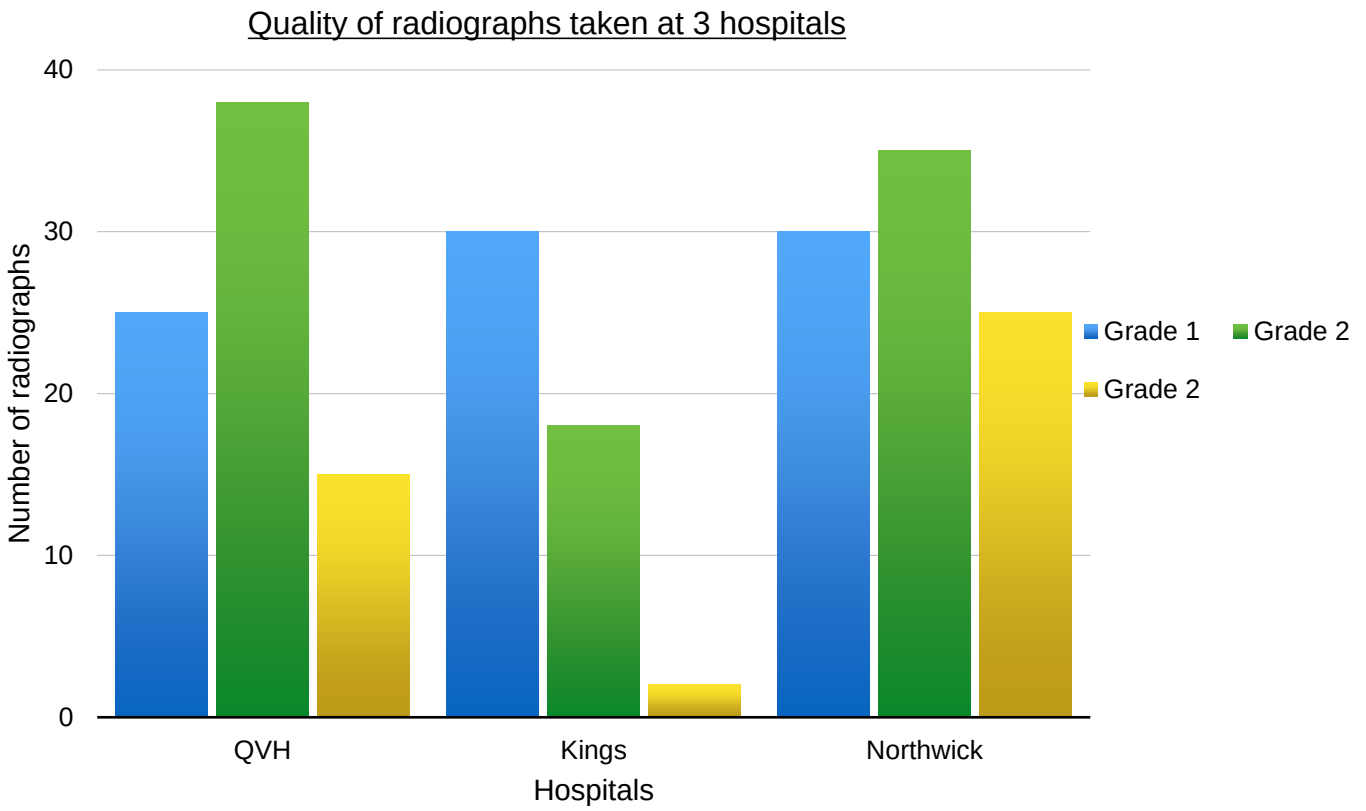
Results

Referrals were first assessed as to whether radiographs were included in the referrals. King's and QVH and Northwick park has paper referral forms. Northwick Park also had an online system called Repo.

The first table represents the number of referrals which included a radiograph from each trust. It is noted that many referrals did not include a radiograph from the dentist. Some of these were accounted for as the dentists remarked on no OPG facility to assess third molar teeth for extraction.

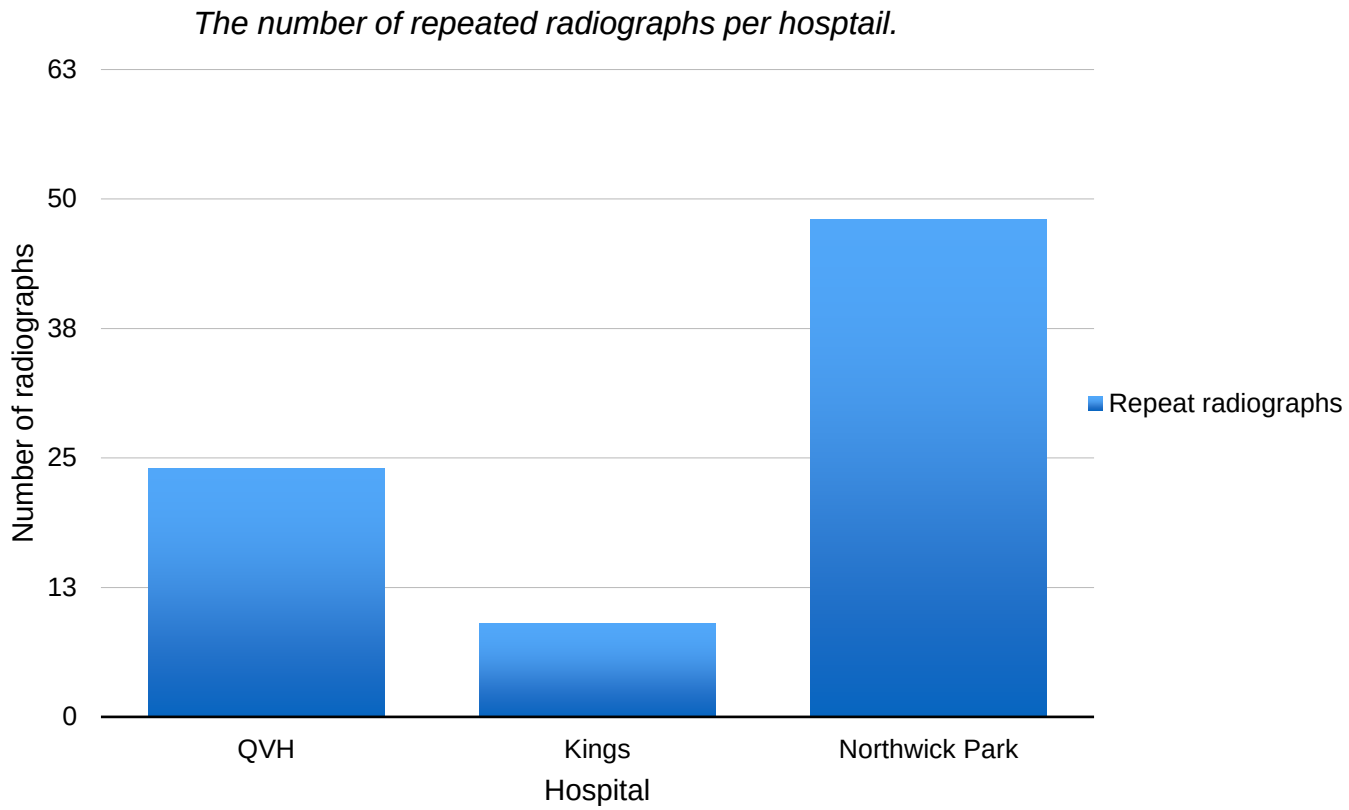


The radiographs that were attached to the referral forms were then assess according the the WHO quality grading.



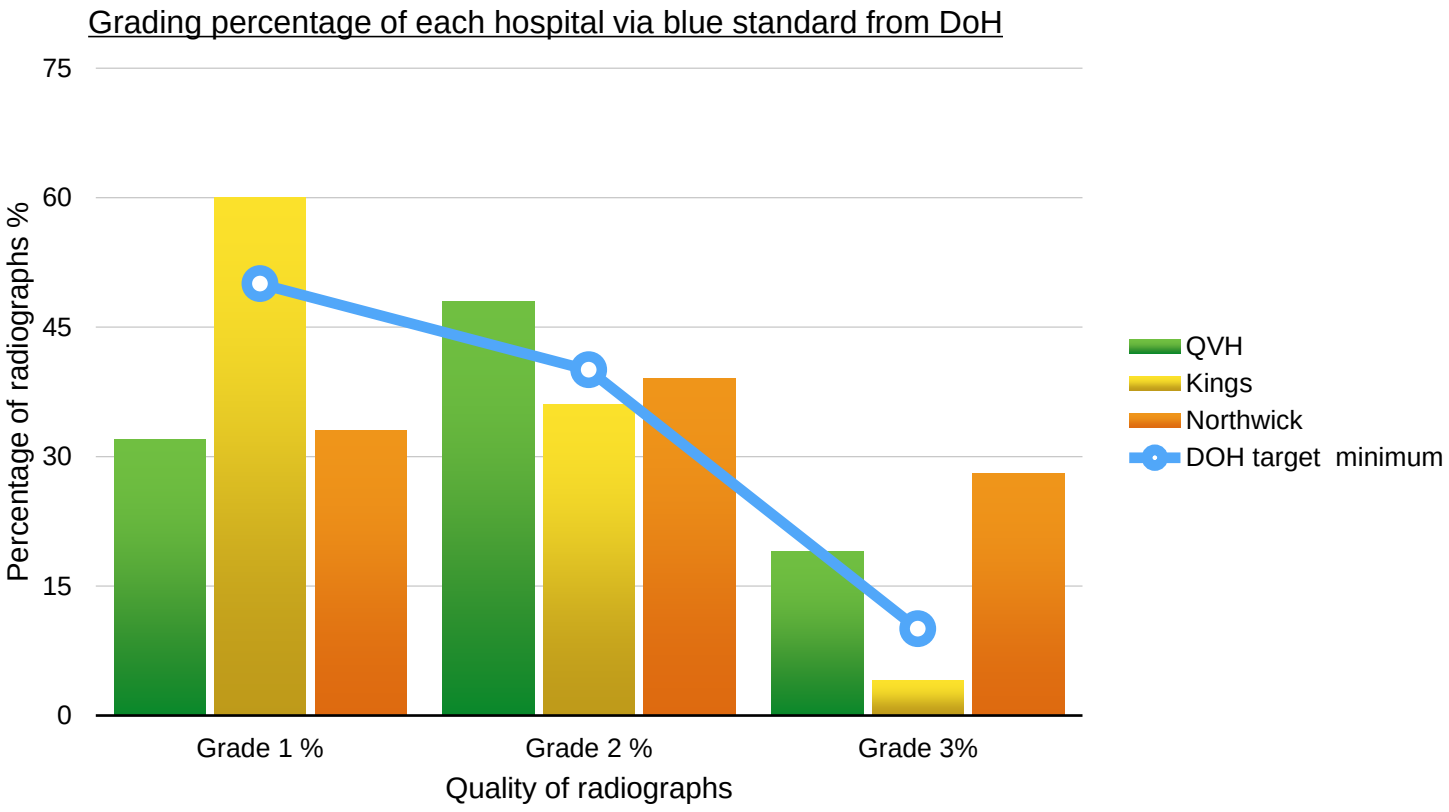
The referrals were then assessed for radiograph quality as per the Department of Health quality guidelines.

Grading quality in practice versus the Department of health 2001 targets



The number of radiographs in each quality bracket was turned into a percentage and then plotted against the blue line to indicate the minimum standard of radiographs.

Number or repeat radiographs taken in each hospital



An assessment was then made for the number of repeat radiogrpahs. In some cases this was due to grade 3 quality radiographs and others based on grade 2 radiographs but actually further radiographs were needed to be taken as a consequence of lack of diagnostic criteria to be made to make a clinical decision based on the referral clinical question.

Discussion

The results from each hospital show a high number of radiographs taken for referrals. It was noted that there is a wide range of quality radiographs sent with referral letters.

It is appreciated that sending radiographs is limited by the forma that the dentists has taken the radiographs in e.g. digital versus film. The trying to provide a copy of these radiographs probable reduces the overall quality of these radiographs e.g. printing out digital copies. This also limited the use of software to enhance the diagnostic image.

Interesting a number of repeat radiographs are having to be done at the hospital in order to answer the clinical question posed in the referral. Some of the referrals request lack of avliability of OPG machine and subsequent referral for further diagnostic tests especially in the assessment of third molar teeth.

The results also show a trend that there is a failure to meet the minimum requirement of radiographs quality as set by WHO. Factors such as printing digital radiographs maybe a factor.

Extension

Due to time constraints, it was difficult to send out a questionnaire to general dental practitioners to assess their opinions on the ease of referrals including radiographs. This will be the next extension of this project.

There is also further discussion with IT to improve the ease of sending radiographs in digital format through the IEP portal, which is now assessable across multiple trusts. With the increase in accessibility of software systems, it would be great to improve the ease of radiographs from both the general dental practitioner perspective as well as the ease of assessing radiographs from the hospitals. Thus taking the pressure of busy hospital clinics as well as saving hospital trusts money from repeated radiographs. Better still, it will reduce the stochastic effects of repeated radiographs to patients.

This pilot audit shows the issues surrounding radiograph referrals and highlights areas to be improved upon. With the use of GDP questionnaire and IT software development, the next objective is to establish a good quality referring system and then to re-audit the referrals. If an improvement is seen, then the long term plan is to implement the system into multiple OMFS units and establish a referral guideline.