



***Radiation Protection Update  
Training for Dental Professionals  
and University Staff/Students***


***Experiences with  
Online vs Face-to-Face Options***

***Graham Hart***  
*Independent RPA/LPA/MPE*






# Introduction

- Although this presentation is principally about dental radiation protection training courses, it also covers training in the University sector, and hopefully has clear relevance to RP training for other groups
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# Background - Dental

- There has not been a lot of published work regarding the knowledge levels of dental staff on RP issues
  - However, what data there is shows understanding is at best variable...
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# Background

- A Belgian questionnaire study of postgraduate general dental practitioners showed
  - 32% didn't know what kV they used
  - 75% didn't know what mA they used
  - 47% didn't know what 'collimation' meant!

Aps, DMFR (2010) 39, 113–118. doi: [10.1259/dmfr/52763613](https://doi.org/10.1259/dmfr/52763613)






# Background


- A Welsh study of postgraduate RP CPD testing of general dental practitioners showed very low test scores
  - 2.4% - 4.9% of GDPs reaching the pass mark for CPD courses in 2003-2007

Absi. et.al., DMFR, (2009) 38, 127–133. doi:  
10.1259/dmfr/78885709






# GDC Requirements

- In the UK, Dentists & other Dental Care Professionals must be registered with GDC
  - CPD on RP matters was compulsory with GDC but was changed to 'recommended' in 2018
  - Staff should do at least 5 hours CPD on radiography & radiation protection in each 5-year CPD cycle
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# GDC Requirements

- Recommended syllabus for RP CPD training given by GDC
  - GDC require CPD providers to ensure active participation takes place and to have QA measures in place for any training they provide
    - may include discussion, feedback forms and/or testing
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# The Questions

- How do you encourage learning rather than merely requiring attendance?
  - How do you demonstrate that learning has taken place?
  - How do you recognise areas with poor understanding to improve future training?
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# Attendance

- If mere attendance is required then there is no guarantee that any learning has taken place
  - All that may matter is receiving the CPD certificate
  - Increased radiation safety awareness or improved practice may not happen
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# Discussion

- Discussion used as the primary method for assessing participation has some problems
    - Can be intimidating for those who are naturally shy or in the presence of a more senior colleague
    - Tends to be dominated by a few individuals, often with their own agenda
    - Can derail course progression
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# Feedback

- Feedback used as the primary method for assessing participation also has some problems
    - Can be dominated by non content issues (catering, parking, heating, etc.)
    - Difficult to assess whether specific areas or issues have been adequately addressed
    - Does have a place to deal with concerns or necessary amendments to content
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# Demonstration of Learning

- Our approach was to use pre- and post-training course multiple choice questionnaires
  - 10 pre-course questions
  - 30 post-course questions
  - The pre-course questions were a sub-set of the post-course ones
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# MCQs

- There was no fixed time limit to answer the questions
  - Participants were told that many of the questions had more than one correct answer (but not how many were correct for any one question)
  - Course notes were allowed to be used for the post-course questions
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# MCQs

- Participants were told that marks would be deducted for incorrect answers to the multiple choice questions in an attempt to eliminate guessing
  - 8 of the 30 questions required written input rather than checking an MCQ box (or boxes)
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# F2F Questionnaire Results

	Pre % MCQ sub-set	Post % MCQ sub-set	Post % All Questions
Mean	51.1	76.5	67.0
Range	5-92	51-95	22-91
Mean % Improvement		18.7	15.9
Participant Improvement		93.0	88.0
n = 178			

Both Post-Pre improvements significant  $p < 0.001$   
using the Wilcoxon Signed-Rank Test

# Feedback Forms

Feedback forms had set questions as well as free text


## Feedback about the Session

Was the speed of delivery of the session....?	much too slow	little too slow	ok	little too fast	much too fast
	<b>1</b>	<b>10</b>	<b>215</b>	<b>12</b>	<b>1</b>
Was the level of the information presented...?	much too easy	little too easy	ok	little too hard	much too hard
	<b>0</b>	<b>0</b>	<b>206</b>	<b>32</b>	<b>3</b>
Did the session cover the material expected...?	a lot missing	a little missing	ok	exceeded expectations	
	<b>0</b>	<b>1</b>	<b>197</b>	<b>24</b>	
Did the delivery of the session maintain your interest...?	much too boring	little too boring	ok	quite interesting	very interesting
	<b>2</b>	<b>29</b>	<b>132</b>	<b>41</b>	<b>15</b>
Do you feel that the content was relevant to you...?	Yes	No – <i>your explanation will help with future courses</i>			
	<b>216</b>	<b>10</b>			
Do you feel that this course has....	Increased your knowledge base	Increased your understanding of your existing knowledge base	Left you with some areas of confusion	Had little overall effect	
	<b>121</b>	<b>99</b>	<b>16</b>	<b>1</b>	
How did you find the assessment questions...?	much too easy	a little too easy	ok	a little too hard	much too hard
	<b>1</b>	<b>1</b>	<b>104</b>	<b>109</b>	<b>14</b>
What is your view on doing an assessment...	somewhat useful		very useful	somewhat of a waste of time	
	<b>111</b>		<b>92</b>	<b>21</b>	






# Feedback Quotes

- Some of the free text feedback related to the testing
  - Some also demonstrated specific learning points that had been gained
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# Feedback Quotes

- “Found that the quiz before useful to get me thinking about radiography and jog my memory about forgotten information”
  - “Pre- and post-course testing helped improve my self-awareness of my knowledge of the topic”
  - “Will undertake updated risk assessments”
  - “Very difficult to do a test at the end of a long day listening – do at lunchtime?”
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# Feedback Quotes

- Other comments were received in the days following the course
  - These indicated that participants had taken on board course content:
  - “Have updated our local rules since attending course and have also ordered radon testing kit”
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# Feedback Quotes

- “I now move my patients to the nurse's chair to take intra-oral radiographs as before I would have had to walk through the X-ray beam to reach the main switch in an emergency shut off”
  - “I have now lowered the exposure time to our patients after the course”
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# Course Amendments

- The test results were analysed to find those topics that generated the most incorrect answers
  - Course content / delivery was modified to try and rectify this for future courses
  - The lecture order was modified to see if this would also improve understanding
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# Online Dental Courses

- During the Covid lockdowns, all dental RP CPD training was moved online





# Online Dental Courses

- The same format was followed
    - Video attendance was a requirement
    - Pre-course MCQs were emailed at the start of the Zoom session & were returned prior to commencement
    - Post-course MCQs were emailed after the course & were returned before the end of the session
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# Questionnaire Results – Post-Amendment


	Pre % MCQ sub-set		Post % MCQ sub-set		Post % All Questions	
	<i>F2F</i>	<i>Online</i>	<i>F2F</i>	<i>Online</i>	<i>F2F</i>	<i>Online</i>
Mean	51.1	39.6	76.5	72.0	67.0	66.8
Range	5-92	19-62	51-95	48-97	22-91	38-96
Mean % Improvement			18.7	30.4	15.9	25.0
Participant Improvement			93.0	97.7	88.0	97.7
n = 44 (online)						







# Conclusions - Dental

- Pre- and post-course testing has enabled us to demonstrate learning has taken place
  - Questions with many incorrect answers have been used as pointers to change the order and content of the lectures to aid greater understanding
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# Background - University

- All non-clinical staff and students at the University where I act as RPA are required to attend a ~2hr radiation safety awareness course if they intend to use any form of x-ray generator
  - Pre-course testing was not carried out as no *a priori* knowledge was expected
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# Background - University

- Course content covers
    - Ionising radiation doses & effects
    - Radiation protection principles
    - Relevant legislation
    - Practical safety issues concerning the University's x-ray equipment & its use
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# Feedback

Face-to-face attendees completed feedback forms

Had closed and open questions

1. What was your overall assessment of the event?	Excellent	Very Good	Good	Average	Poor
	34	12	-	-	-
2. How effective were the facilitators / presenters?	Excellent	Very Good	Good	Average	Poor
	38	7	-	-	-
3. How well were the event objectives met?	Excellent	Very Good	Good	Average	Poor
	30	16	-	-	-
4. How useful were the materials / resources supporting this event?	Excellent	Very Good	Good	Average	Poor
	29	17	-	-	-
5. Opportunities to network and share knowledge / ideas	Excellent	Very Good	Good	Average	N/A
	20	7	4	3	6
6. Did the event meet your expectations?	Exceeded	Met	Partially Met	Barely Met	
	19	27	-	-	
7. To what extent has your level of understanding of the event topic increased? (4 being greater than 0)	0	1	2	3	4
	-	2	1	18	25
8. If you notified us of any additional requirements, were these accommodated? If 'NO', please provide details:	YES	NO	N/A		
	10	-	30		
9. Would you recommend this event to a colleague? If 'NO', please state why:	YES	NO	N/A		
	34	-	7		
Attendees:	50	Evaluations:	46		

#### 10. Which part(s) did you find most useful?

- I enjoyed the whole presentation: it was extremely useful
- All of it x3
- Everything, very enjoyable and informative
- Safety x2
- How dangerous x-rays can be
- Proper explanation of procedures and legal guidance/regulations
- Learning about the risks and precautions to take
- Examples. How to avoid accidents
- Finding out about the different types of radiation exposure
- X-ray radiation rules for safety and dangers
- The reference to average exposure / prevention methods
- X-ray safety, regulations, procedures
- Levels of radiation to how dangerous it is
- Graham was very engaging making a dry (sorry!) topic interesting
- The structure was very clear
- PPE and how to avoid exposure
- Legislation & where radiation exposure can be found day to day
- The rules of safe work with radioactive sources
- How much radiation actually is harmful
- Understanding how x-rays work
- Health and Safety aspects
- X-ray burns
- How to minimise risk
- Causes to health due to poor knowledge
- Dangers of x-ray based on university machines
- How to avoid radiation
- Risk Assessment and personal safety
- The personal safety sections as these are most relevant to me
- Safety steps, contingency plans and restriction to exposure
- Advice on limitation of exposure
- Images of consequences to radiation
- How to stay safe from radiation exposure
- The bit about putting radiation into perspective
- Different types of machines and practical examples

#### 11. Which part(s) did you find least useful?


- N/A x 11
- Nothing x 5
- Everything was very useful
- A bit more into actual writing of risk assessments?
- Would like links to more resources
- Legal part
- Background information could be toned down a little
- Regulations that University providers have to follow when introducing new equipment etc (less relevant to me)
- Digressions (but at least they were fun)

#### 12. If you have any further comments or ideas for improvements, please list them here:

- Great, enthusiastic teacher, thank you
- Geezer is a comedian



# University Online Courses

- During the Covid lockdowns, all safety awareness training was moved online
  - Some students did not have (or did not use) 'camera/video on', so there was no visual contact with some participants
  - Made engagement much more difficult
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# Overall Conclusions

- Using the testing regime and feedback has enable improvements to course content and delivery to be made
  - Moving the dental courses online did not result in any loss of course value
  - Requiring active video and participation appears to be important to ensure engagement
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