IRISH SOCIETY OF UROLOGY

Teaching LDR Prostate Brachytherapy

Prostate Cancer Institute
NUI Galway experience

Prof. Frank Sullivan

UK Ireland Brachy User Group

May 2017

Training and physical simulation

- No requirements in UK and Ireland only recommendations for brachytherapy training
  - American Council of Graduate Medical Education (ACGME) requires only that residents treat 5 interstitial brachytherapy cases (non-specific) to graduate from a radiation oncology
- No specific competency based model to evaluate performance
- Surgical practice requires significant cognitive functions and high skill level to ensure safety of patient care.
  - Evidence of the benefit of simulation on performance quality and of skill improvement using simulation training in medicine[1]

[1] *McGaghie, WC., et al. "A critical review of simulation-based medical education research: 2003–2009." Medical education 44.1 (2010): 50-63.*

PCI Prostate Brachytherapy Programme (initiated at GUH)

- 2007-2015
- Multidisciplinary/inter-departmental effort
- Implanted 1400 patients to date (GUH+GC+HMC)
- Evidenced based approach (Stone & Stock et al)
- Single operator (FS) 2007-2012
- Graduated first national prostate brachytherapy Fellow (Dr. Jam Khalid)
- Run ahead for national programme

Technique and toxicities at a glance

- Outpatient/Minimally invasive
  - Under GA or spinal
  - 30-60 minutes (2-4 per session)
- MRI all patients
- LDR (Stone and Stock)
  - Iodine 125 seeds
  - T1/2 = 60 days
  - 1 Year life of implant
- Home same day/following
- 3-6 months urinary bother
- <5% any catheter use (mostly ISC up to 1 year)
- 0-1% incontinence
- 0.1% serious rectal injury
- 30% ED

RISK STRATIFICATION DEFINITIONS:

D'Amico:
Low Risk: cT1c-cT2a and Gleason</=6 and iPSA </=10
Intermediate Risk: >/=T2c and/or Gleason7 and/or iPSA >/=10 - </=20
High Risk: >/=cT2c and/or Gleason 8-10 and/orPSA>20

Galway (Modified D'Amico):
Low Risk: cT1c-cT2a and Gleason</=6 and iPSA </=10
Low Intermediate Risk: Gleason3+4=7 or iPSA >/=10 - </=20
High Intermediate Risk: Gleason 4+3=7 and/or iPSA >/=15 - </=20
High Risk: >/=cT2c and/or Gleason 8-10 and/or PSA>20

Galway Treatment Selection

	Low risk	Low intermediate	High intermediate	High
RRP	+	+	+	+
EBRT alone	+	+/-	-	-
EBRT/ADT	-	+/-	+	+
Brachy alone	+	+	-	-
EBRT/Brachy	-	+/-	+	+/-
Triple therapy	-	-	+	+

EBRT = 74-78 Gy to small fields (6-7 field CRT or IMRT)
Brachy = LDR Iodine125, 160 Gy to the GTV
EBRT/Brachy = 46Gy CRT plus 106 Gy brachy boost
Triple therapy ADT duration 3-12 months
Salvage BT = 120Gy

National expansion: principles

- Choose a single/uniform technique (Stock/Stone, intraoperative planning)
- Established, evidence based, peer reviewed
- Establish a structured mentoring programme
- Buy in from colleagues and NCCP
- Develop a QA and QI programme
- Audit, refine, change
- Publish

QA foundations… into the void

- UK colleagues established UK and Ireland QA committee

Guidelines Committee

Robert Laing, Consultant Clinical Oncologist (Chair)

Frank Sullivan, Professor and Chairman, Radiation Oncology

James Wylie, Consultant Clinical Oncologist

Peter Bownes, Consultant Physicist

Sarah Aldridge, Consultant Physicist

Henry Taylor, Consultant Clinical Oncologist

<u>Generated Guideline template</u>

  - International best practice
  - Mimimum requirements for team member, hospitals
  - Mentoring and credentialing standards
- Guidelines adopted by UK Faculty Radiology 2012
- Template for Irish Prostate Brachy Guideline (NCCP)

UK/Ireland Guidelines 2012

Clinical Oncology
The Royal College of Radiologists

Oncology

Quality assurance practice guidelines for transperineal LDR permanent seed brachytherapy of prostate cancer

Board of the Faculty of Clinical Oncology
The Royal College of Radiologists

Training requirements

Training should be undertaken that is appropriate to the role of the individual in the team. It is the responsibility of the lead radiation oncologist and MPE to ensure that all staff within their group has undergone the appropriate training.

Clinical oncologist

The clinical oncologist should undergo a period of supervised cases before performing the procedure solo. The recommended training of the clinical oncologist is as follows:

- Mentored planning cases: 5
- Observation cases: 5
- Mentored implant cases: 10
- Monitored solo cases: 10.

Post-implant dosimetry of the solo cases should be assessed by the mentoring team. Established brachytherapy centres should adopt these recommendations for new members of staff. Proctors involved in mentoring should have completed 100 cases in the last three years and have experience in the specific technique being mentored.

Plain English
Approved by NALA

nccp National Cancer Control Programme

HSE Feidhmeannacht na Seirbhíse Sláinte Health Service Executive

About Prostate Seed Brachytherapy

and what it means for you

National Cancer Control Programme
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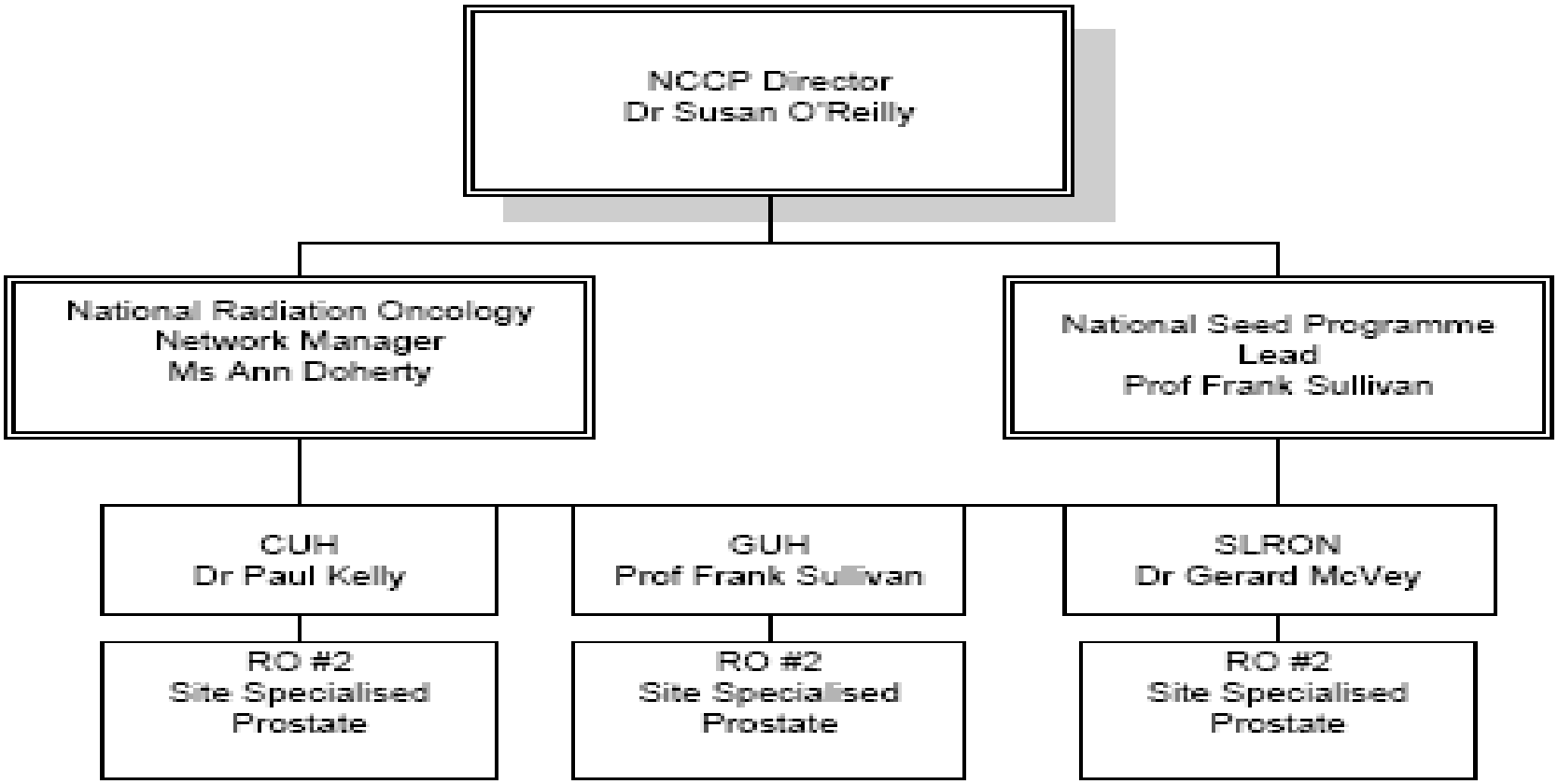
NCCP National Prostate Brachytherapy Program 2012-2015

Leadership Structure National Prostate Seed Programme



Launch

Thursday, January 31, 2013

Galway leads the way in high-tech treatment for prostate cancer

BY SIOBHÁN HOLLIMAN

Increased numbers put pressure on Galway rapid-access clinic

ADDITIONAL staff are needed to meet the growing demand for Galway's rapid-

...ion of a full ...er treatments ...with prostate ...carrying out ...into the dis- ...rapid-access ...ic has been ...sful since its ...9, and in 2010 ...ancer Clinic at ...as established ...therapies and ...ents. We are ...deliver the lat- ...n a region that ...t incidence of the disease nationally," said Professor Sullivan.

A high-tech, low-invasive treatment fostered in Galway about five years ago has now been rolled-out throughout the country.

Brachytherapy treats early stage, low-risk prostate cancer by strategically placing radioactive seeds inside the prostate gland where they remain to irradiate the malignant tissue in the prostate.

"The seeds stay in permanently but only give off radiation for about a year and mostly within the first four months," explained Professor Sullivan, who learned the technique in America and began offering the treatment in Galway in 2007.

Over the past five years, 440 patients in Galway availed of brachytherapy for prostate cancer and 100 of these were treated last year.

The NCCP was so impressed by the work being done in Galway by Professor Sullivan that it supported the

www.galwayindependent

PROSTATE SERVICE LAUNCHED: Prof Frank Sullivan, Consultant Radiation Oncologist and Lead Clinician, Department of Radiation Oncology, Galway University Hospitals (GUH), Peter Keane, who received Prostate Brachytherapy treatment at GUH in 2010, and Dr Susan O'Reilly, National Director of the National Cancer Control Programme, at the launch of the National Prostate Brachytherapy Service at GUH on Monday. ***Photo: Joe Travers***

Programme design:

- Single technique, Stock & Stone
- Single mentor
- Real time intra-operative dosimetry
- UK & Ireland Guidelines
- Trainee didactics and planning 10 cases
- Trainee observe 10 ‘mentor’ cases
- Trainee performs 10 cases
- QA reporting

National expansion outcomes:

- Hospital sites: 1 to 3
- Initiated April 2012 to date (<2 years)
- Patients implanted in programme n=201
- QA programme extablished
- MD's trained:
  - 4 Consultant/Attending level
  - 3 in training

Programme highlights (2012-2015)

- Consultants interested 2012
- Steering committee appointed (NCCP) Kiliam McGrane (Chair)
  - Juliet Kelly RIP
- Didactic training sessions (2012)
  - Site visit to SLH and CUH (equipment/physics)
- Consultants “graduated” (4)
  - SLH x 2
  - CUH x 1
  - GUH x 1
  - SpR x 2
  - 133 Patients implanted (2013)
- Onsite training 10/10/10 per consultant
- Post implant dosimetry review
- Quarterly QA national committee meeting (2015)

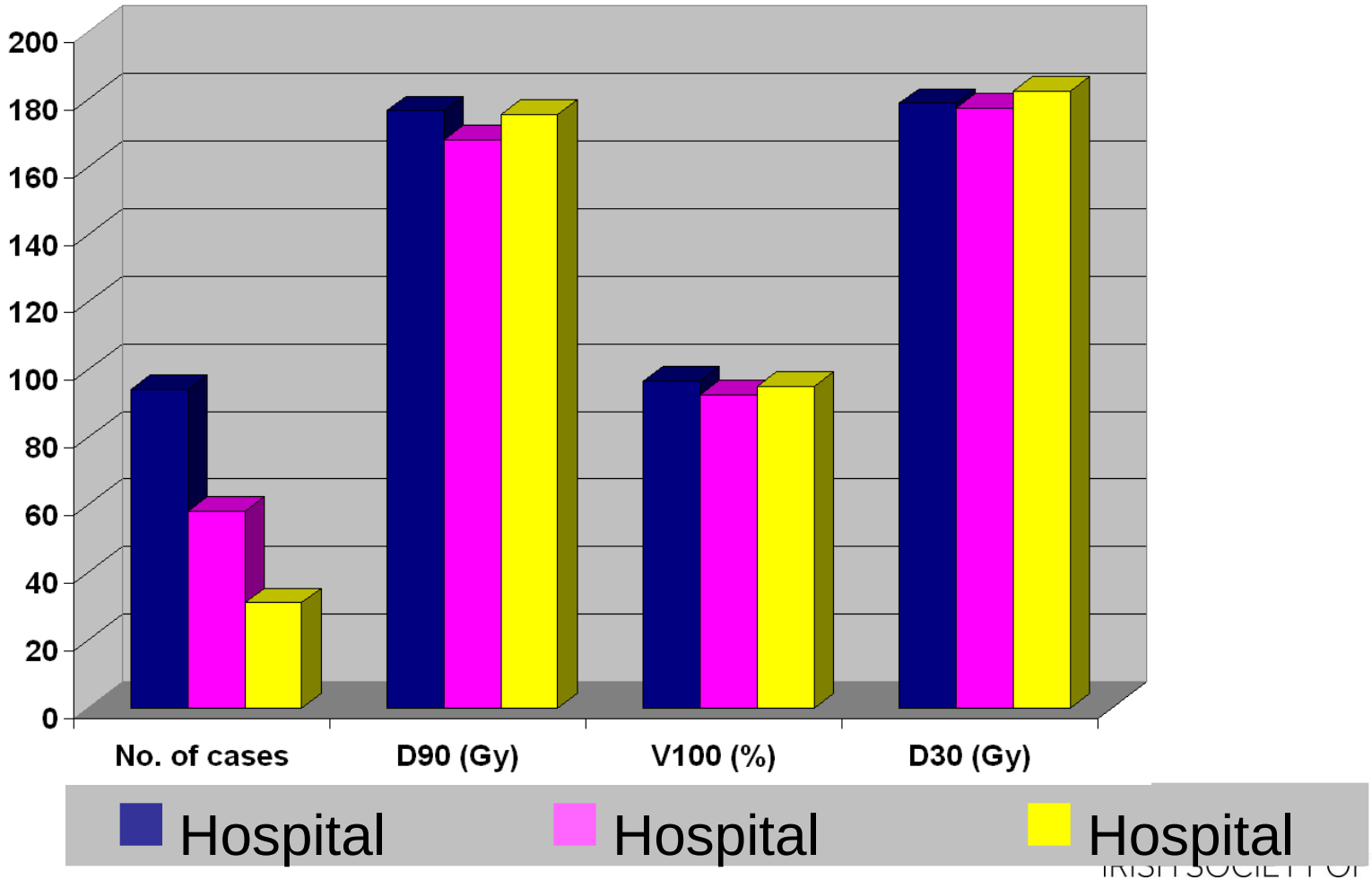
Technical aspects of teaching LDR-PBT

- Components
- Didactic: evidence, case selection, post treatment care
- Need for TRUS ultrasound training pre op (volume assessment)
- Need for hands on operative experience
  - Equipment, choice, utilization
  - Patient set up
  - Manual handling skills (Mick, needles, template, stepper)
  - TRUS skills intra operative
  - Dosimetry set up/image registration (Variseed)
  - Dosimetry and planning aspects
  - Audit
  - Difficult cases?
  - Masterclass?

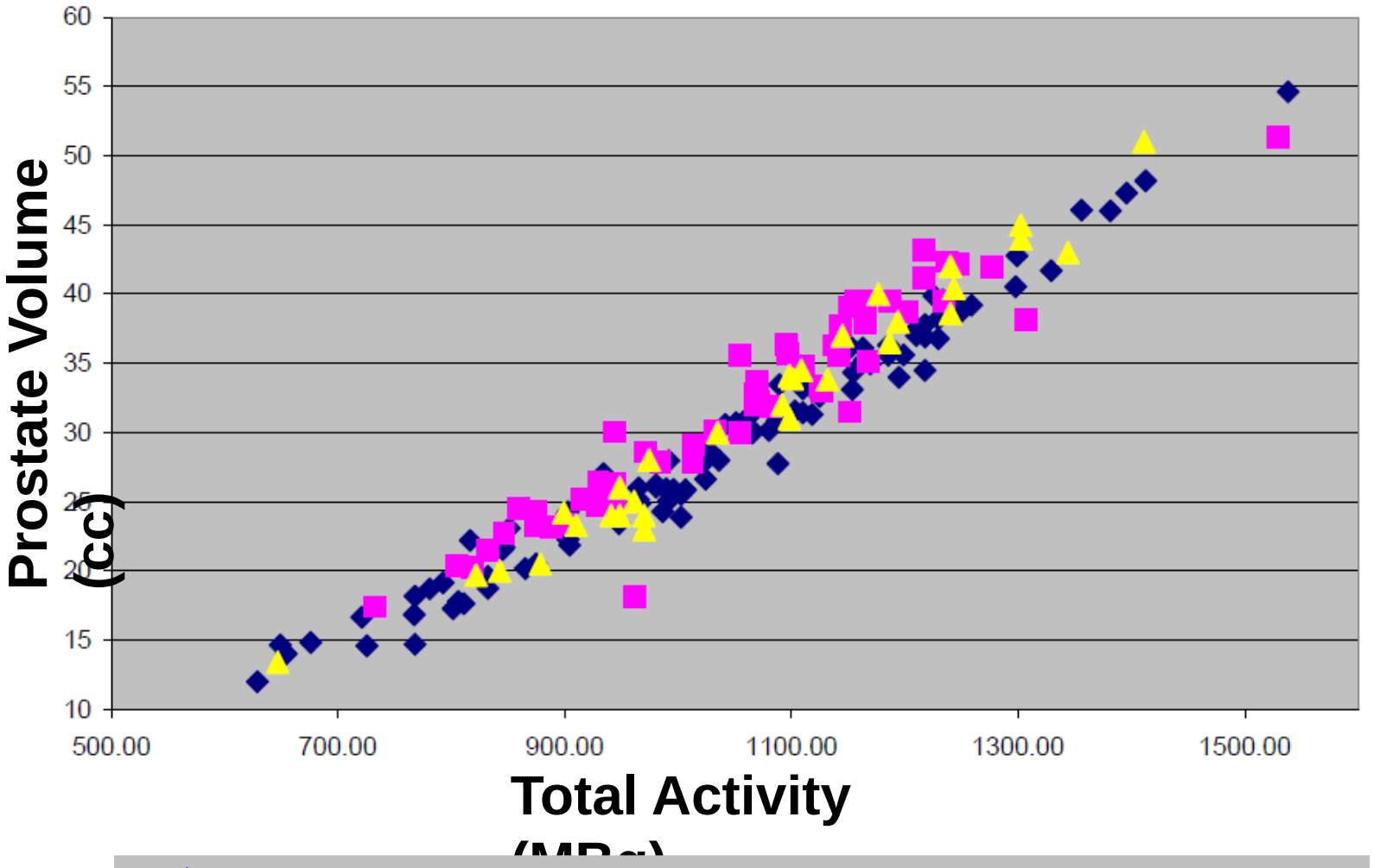
Quality comparison of 3 centres (2013 audit)

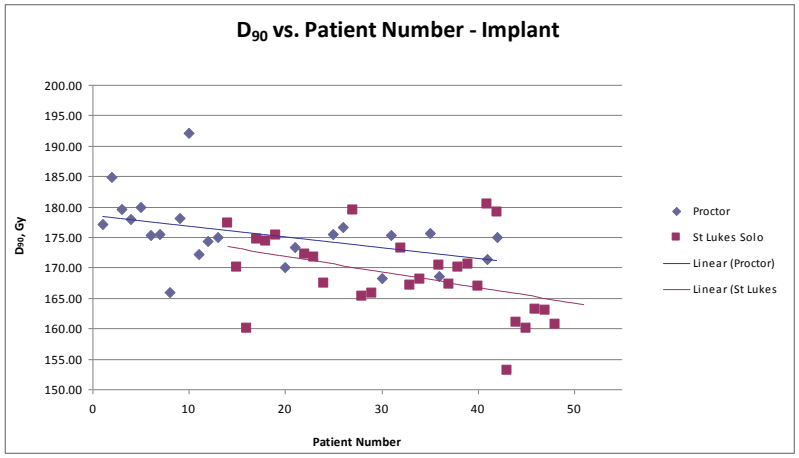
Year 2013	Hospital A	Hospital B	Hospital C
No. of Cases *Mono-Boost-Salvage*	94 *58 - 32 - 4*	58 *54 - 4 - 0*	31 *25 - 6 - 0*
Prostate - D90 Gy (mean ± SD)	176.5 ± 6.2	167.8 ± 6.9	175.5 ± 6.4
Prostate - V100 % (mean ± SD)	96.6 ± 1.7	92.4 ± 2.3	94.9 ± 2.1
Urethra - D30 Gy (mean ± SD)	178.7 ± 8.4	177.4 ± 3.8	182.2 ± 11.9

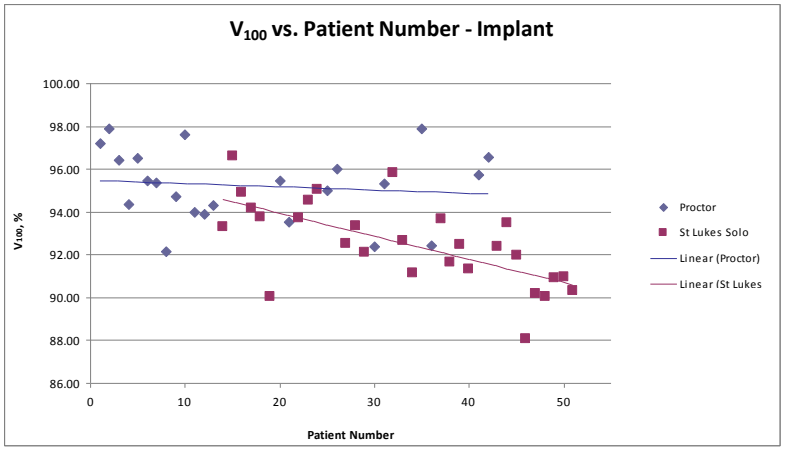
Comparison of 3 centres (2013 audit)



Prostate Volume vs. Total Activity





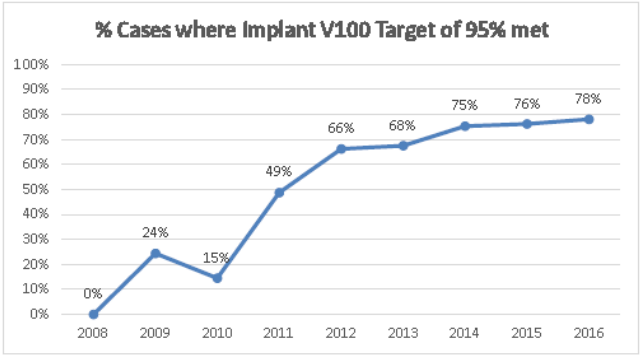


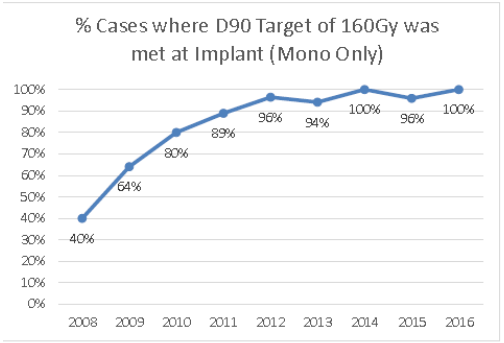
Proctored	**V_{100} = 95.03%**	**D90=175.79Gy**	**Du30=178.57Gy**
Proctored	**V_{100} = 96.155**	**D90=173.16Gy**	**Du30=178.415Gy**
Solo	**V_{100} = 92.61%**	**D90=169.15Gy**	**Du30=177.73Gy**
Solo	**V_{100} = 90.31%**	**D90=160.77Gy**	**Du30=179.85Gy**

GC (2016 audit)

notes	(All)
Month	(All)

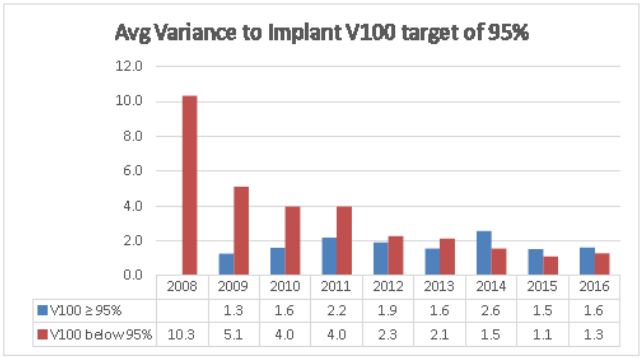
Count of Date	V100 at Implant	
Year	V100 ≥ 95%	V100 below 95%
2008	0.00%	100.00%
2009	24.44%	75.56%
2010	14.52%	85.48%
2011	48.78%	51.22%
2012	66.25%	33.75%
2013	67.53%	32.47%
2014	75.34%	24.66%
2015	76.25%	23.75%
2016	78.13%	21.88%
Grand Total	**57.77%**	**42.23%**

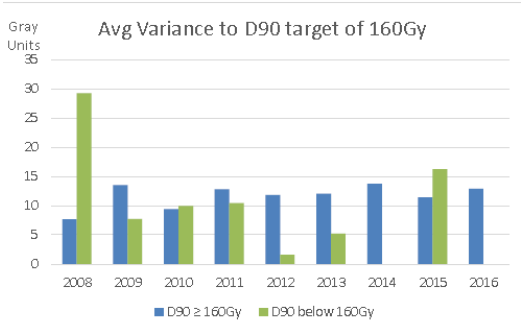




notes	(All)
Month	(All)

Average of V1	V100 at Implant	
Year	V100 ≥ 95%	V100 below 95%
2008		10.3
2009	1.3	5.1
2010	1.6	4.0
2011	2.2	4.0
2012	1.9	2.3
2013	1.6	2.1
2014	2.6	1.5
2015	1.5	1.1
2016	1.6	1.3
Grand Total	**1.8**	**3.4**

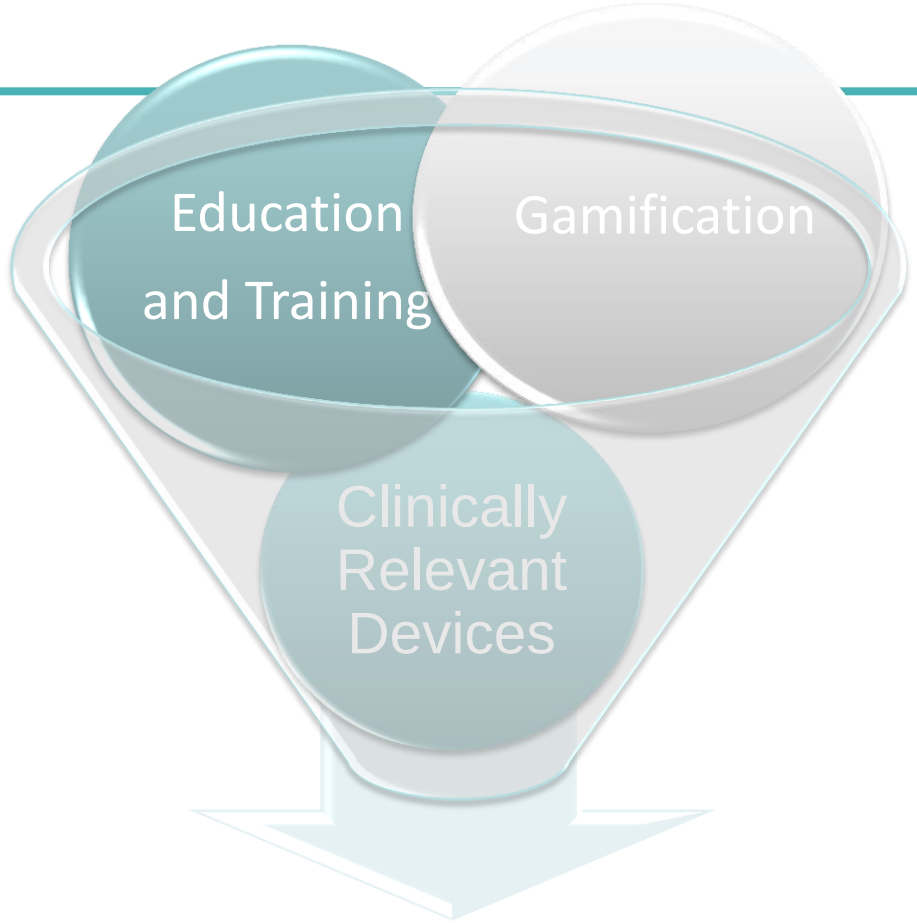




notes	(All)
Month	(All)

Count of Date	V100 at Implant		
Year	Not Recorded	V100 ≥ 95%	V100 below 95%
2008	2		10
2009	1	11	34
2010	2	9	53
2011		40	42
2012		53	27
2013		52	25
2014	2	55	18
2015		61	19
2016	4	50	14
Grand Total	**11**	**331**	**242**

The future…



High Quality Brachytherapy Procedure

Why use complex anthropomorphic models for training?

- **Medical Education**

- There are four overall benefits to using medical simulators as a component of medical training:

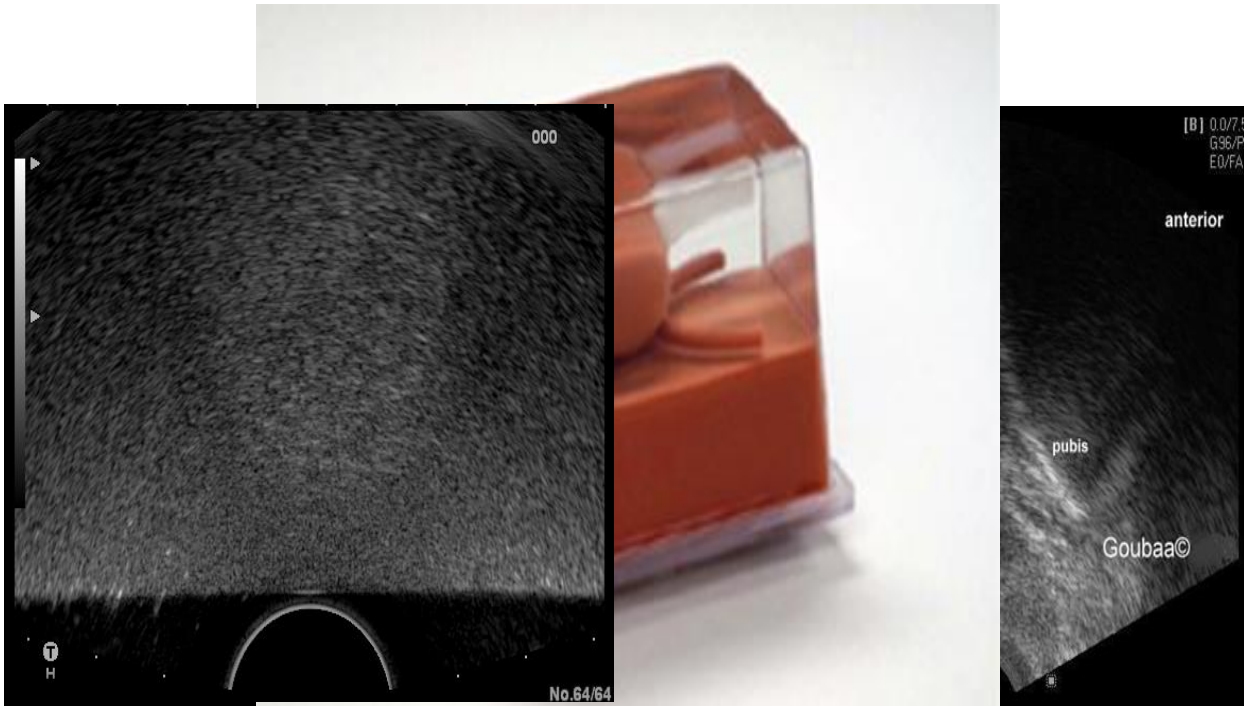
  i. Improved educational experience

  ii. Increased patient safety

  iii. Cost efficiency

  iv. Ongoing training opportunities

Current Training Device



CIRS training phantom

Ultrasound phantom image

Transurethral CIRS phantom volume image

Ultrasound prostate image

Complex anthropomorphic models for training?

- Through use of complex anthropomorphic models:

- Operator gets hands-on training
  - self-directed learning
  - unpressurised environment
  - improve their clinical competency in live-patient scanning
  - Operator's improves their ultrasound scanning skills
  - hand-eye coordination
  - Operator improves their ability to optimise the image quality

- Project: 3D print individual prostate model for comparison with achieved vs 'training' implant, using live plan US Variseed programme
  - Andrea Doyle, FS et al

Acknowlegements

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