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# Review of Australian and New Zealand brachytherapy practices for cervical cancer



Claire Dempsey, Shane Dempsey

# Disclosure

- I have no actual or potential conflict of interest in relation to this presentation



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# Background

- RetroEMBRACE (12 centres, 852 patients) and EMBRACE (26 centres, 1416 patients) collected and analysed clinical and dosimetric data for cervical cancer patients
- There were no centres from Australia or New Zealand participating in these studies



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# It's even noted in publications...



## Clinical and Translational Radiation Oncology

Available online 11 January 2018

open access

In Press, Accepted Manuscript ?



Review Article

### The EMBRACE II study: The outcome and prospect of two decades of evolution within the GEC-ESTRO GYN working group and the EMBRACE studies

Richard Pötter <sup>a, 1</sup>, Kari Tanderup <sup>b, 1</sup>  , Christian Kirisits <sup>a</sup>, Astrid de Leeuw <sup>c</sup>, Kathrin Kirchheiner <sup>a</sup>, Remi Nout <sup>d</sup>, Li Tee Tan <sup>e</sup>, Christine Haie-Meder <sup>f</sup>, Umesh Mahantshetty <sup>g</sup>, Barbara Segedin <sup>h</sup>, Peter Hoskin <sup>i</sup>, Kjersti Bruheim <sup>j</sup>, Bhavana Rai <sup>k</sup>, Fleur Huang <sup>l, m</sup>, Erik van Limbergen <sup>n</sup>, Max Schmid <sup>a</sup>, Nicole Nesvacil <sup>a</sup>, Alina Sturdza <sup>a</sup> ... Ina Jürgenliemk-Schulz <sup>c</sup>



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# It's even noted in publications...

## Abstract

The publication of the GEC-ESTRO recommendations one decade ago was a significant step forward for reaching international consensus on adaptive target definition and dose reporting in image guided adaptive brachytherapy (IGABT) in locally advanced cervical cancer. Since then, IGABT has been spreading, particularly in Europe, North America and Asia, and the guidelines have proved their broad acceptance and applicability in clinical practice. However, a unified approach to volume contouring and reporting does not imply a unified administration of treatment, and currently both external beam radiotherapy (EBRT) and IGABT are delivered using a large variety of techniques and prescription/fractionation schedules.

.....

### 1. Development of image guided adaptive brachytherapy: The GEC-ESTRO GYN working group and network

.....

IGABT (with repetitive MRI regarded as the gold standard) is increasingly replacing 2D brachytherapy throughout the world, especially in Europe [5] and North America [6], but also in many places in Asia [7,8].

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Pötter, Tanderup, Kirisits, et al. "The EMBRACE II study: The outcome and prospect of two decades of evolution within the GEC-ESTRO GYN working group and the EMBRACE studies"

Clinical and Translational Radiation Oncology (in press)



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# But recognised in others...

*Journal of Medical Imaging and Radiation Oncology* 61 (2017) 674–681

RADIATION ONCOLOGY—ORIGINAL ARTICLE

## Patterns of practice survey for brachytherapy for cervix cancer in Australia and New Zealand

Karen Lim,<sup>1,2</sup>  Sylvia van Dyk,<sup>3</sup> Pearly Khaw,<sup>3</sup> Jacqueline Veera,<sup>2,3</sup> Linda Mileshkin,<sup>3</sup> Lucy Ohanessian,<sup>1</sup> Michelle Harrison<sup>1,4</sup> and Shalini K Vinod<sup>1,2,5</sup> 



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# Objective

## Review:

- treatment practices
- clinical patient information
- dosimetric data

from departments in Australia and  
New Zealand



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# Method

- In 2015, all centres performing GYN brachytherapy in Aus/NZ invited to participate
- Provided worksheet to be completed for a cross-section of de-identified cervical cancer patients treated in the department



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# Data requested

- Patient: age, diagnosis, FIGO stage
- External Beam: technique, dose, fractions
- Brachytherapy: timing of treatment, # fractions, fractions per day/week, dose per fraction, where dose prescribed to, imaging used, applicator used, HR-CTV (volume, dimensions, D90, D98, D100), Bladder/Rectum (D2cc, D0.1cc, ICRU), Sigmoid D2cc, Vaginal point dose, TRAK
- Follow-up: weeks since treatment, local recurrence, distant disease, complications



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# Analysis

- Data analysed for trends/statistics
- Outliers contacted to provide additional information in order to better classify results



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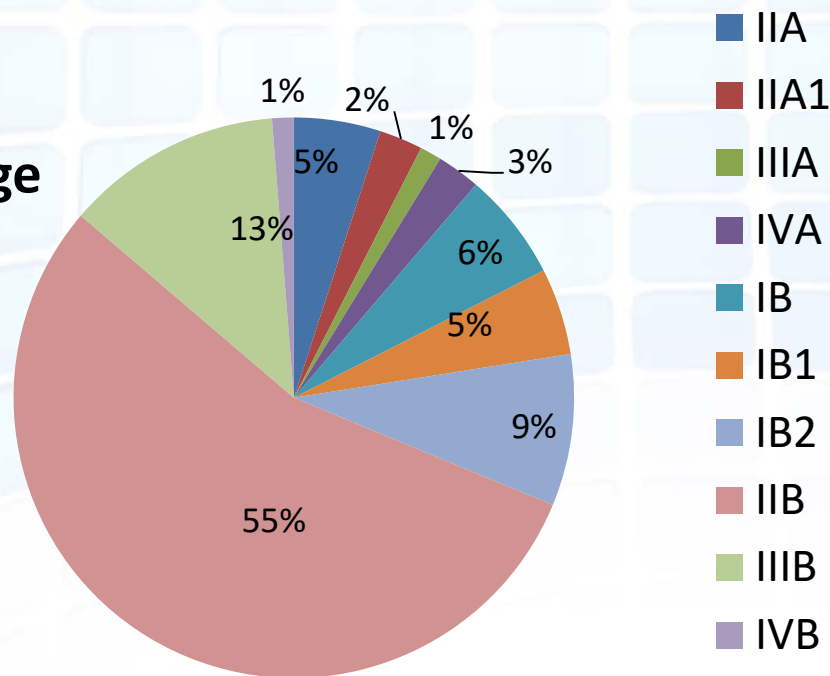
# Results

- 70% of departments provided data

## Patient demographics

- Average age 49.9 years (range: 25 to 88 years)
- > 50% squamous cell carcinoma of cervix of FIGO stage IIB

**FIGO Stage**



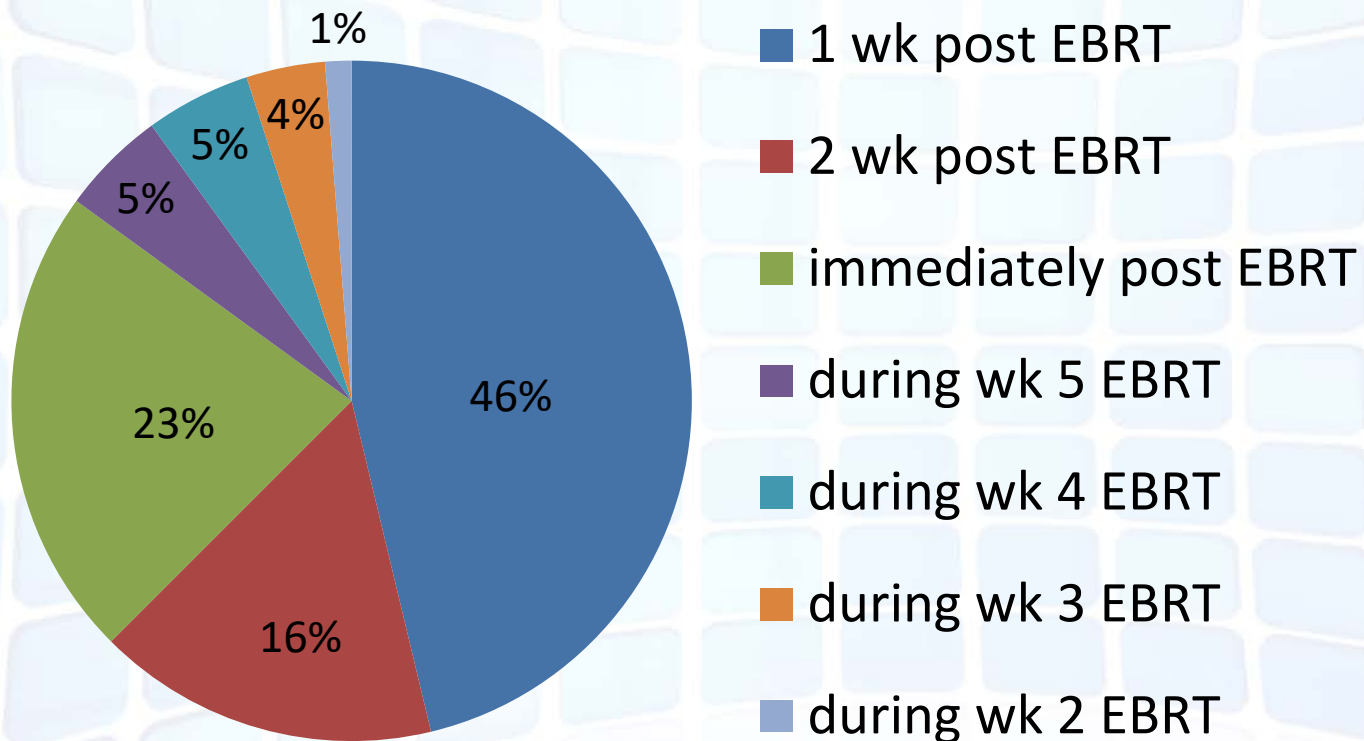
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# Results

## Timing of HDR



- > 85% of treatments given post-EBRT
- > 50% of patients had 45 Gy in 25 fx for EBRT



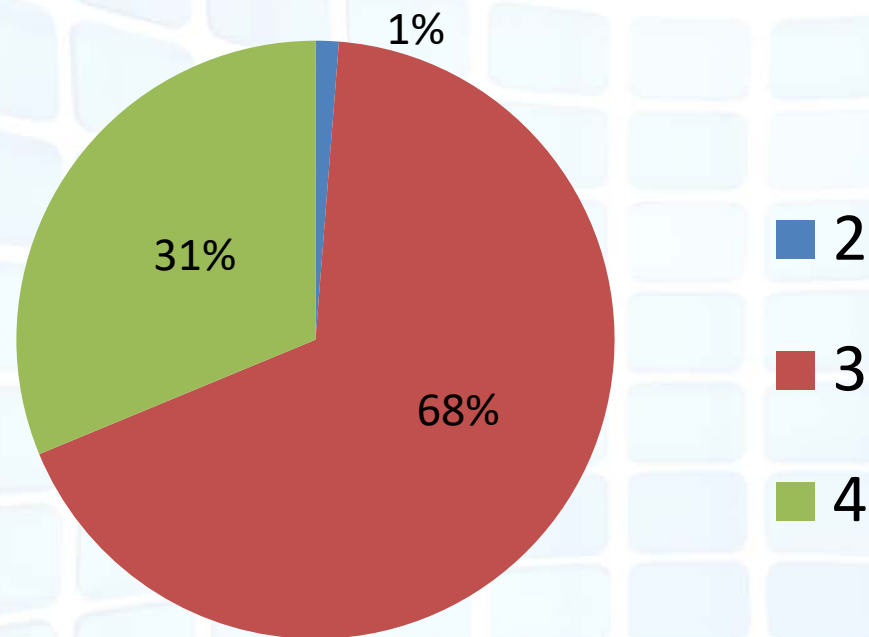
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# Results

## Fractions per patient



- > 95% treated once daily
- 68% treated in 3 fractions
  - Evenly split between 1 or 2 fractions/week

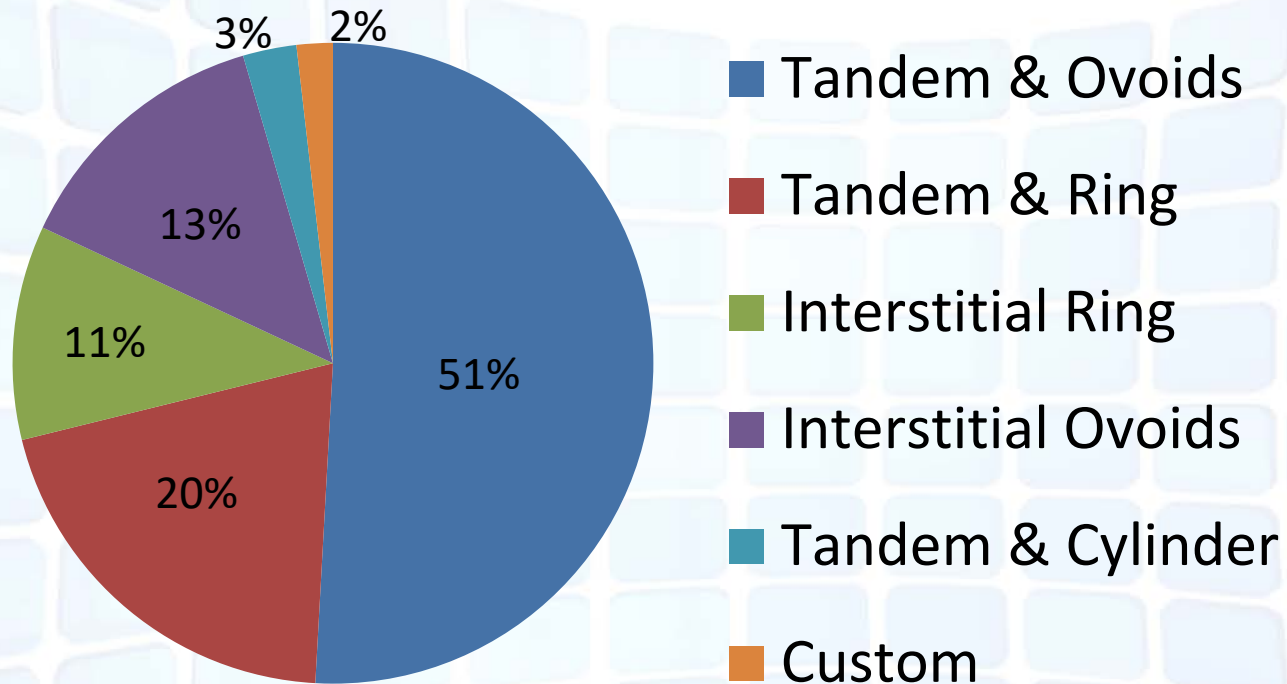


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# Results

## Applicator used



- Nearly  $\frac{1}{4}$  treated with combined interstitial/intracavitary



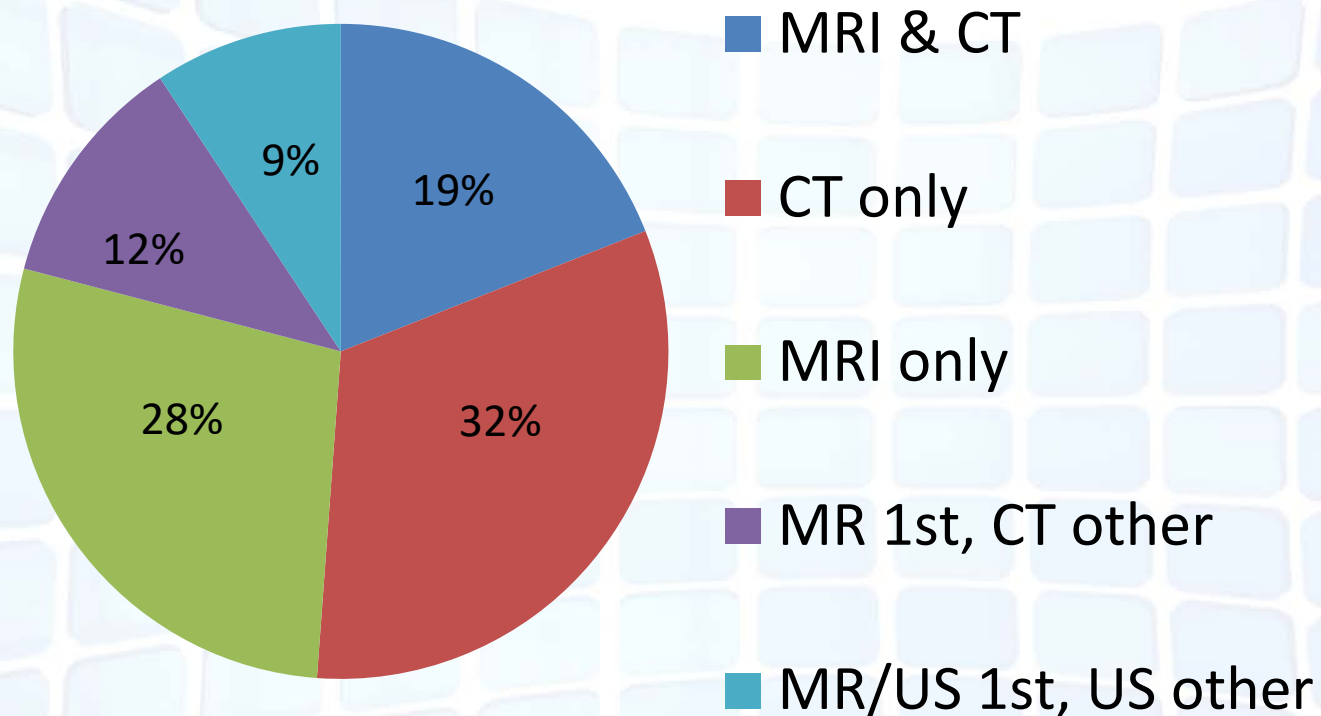
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# Results

## Imaging for planning



- 68% of departments use some form of MRI during treatment planning



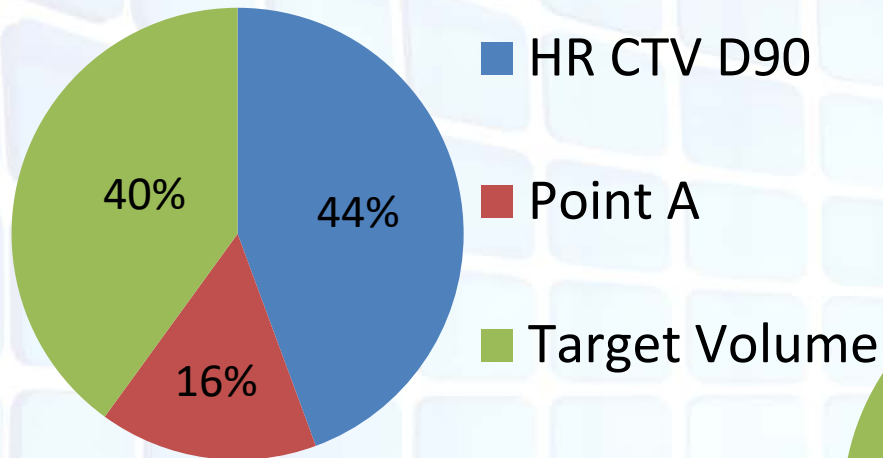
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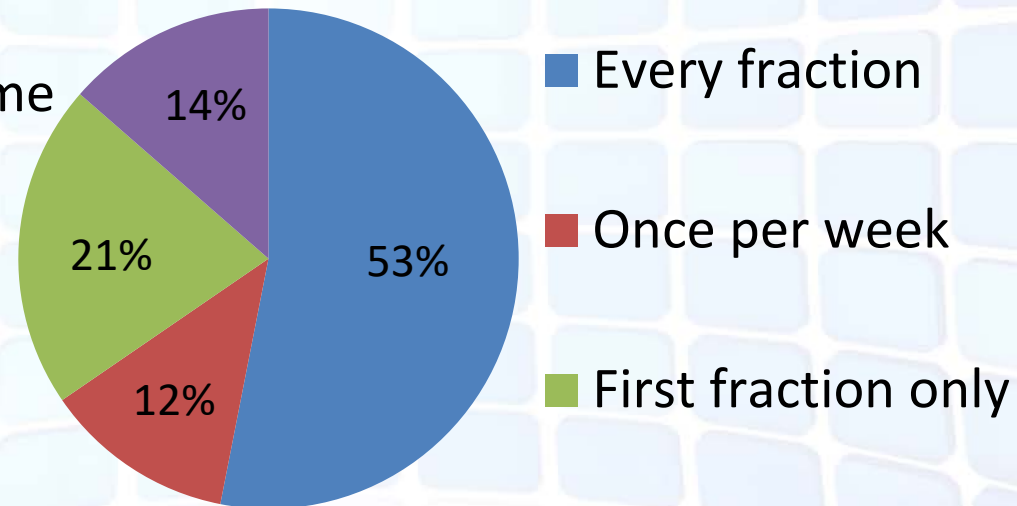
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# Results

## Prescribed to



## How often is plan optimised



- Almost 80 % of departments perform multiple planning sessions for each patient



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# Results

\* Doses given as total EQD<sub>2</sub>

|                     | Average across all depts | St. Dev |
|---------------------|--------------------------|---------|
| HR-CTV vol (cc)     | 29.8                     | 4.2     |
| Point A (Gy*)       | 77.1                     | 6.6     |
| HR-CTV D90 (Gy*)    | 90.4                     | 3.7     |
| HR-CTV D98 (Gy*)    | 79.7                     | 4.4     |
| HR-CTV D100 (Gy*)   | 70.9                     | 4.7     |
| Bladder D2cc (Gy*)  | 78.6                     | 9.7     |
| Bladder ICRU (Gy*)  | 70.0                     | 11.4    |
| Rectum D2cc (Gy*)   | 62.4                     | 5.9     |
| Rectum ICRU (Gy*)   | 65.0                     | 7.0     |
| Sigmoid D2cc (Gy*)  | 61.6                     | 5.3     |
| Vaginal point (Gy*) | 159.9                    | 85.5    |



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## EMBRACE II recommendations

HR-CTV D90 > 85 Gy

Bladder D2cc < 90 Gy

Rectum D2cc < 75 Gy

Sigmoid D2cc < 70 Gy

# Results

\* Doses given as total EQD<sub>2</sub>

|                     | Average across all depts | St. Dev | Comparison           | p-Value |
|---------------------|--------------------------|---------|----------------------|---------|
| HR-CTV vol (cc)     | 29.8                     | 4.2     |                      |         |
| Point A (Gy*)       | 77.1                     | 6.6     |                      |         |
| HR-CTV D90 (Gy*)    | 90.4                     | 3.7     | Pt A vs HR-CTV D90   | <0.003  |
| HR-CTV D98 (Gy*)    | 79.7                     | 4.4     | Pt A vs HR-CTV D98   | 0.31    |
| HR-CTV D100 (Gy*)   | 70.9                     | 4.7     | Pt A vs HR-CTV D100  | <0.02   |
| Bladder D2cc (Gy*)  | 78.6                     | 9.7     |                      |         |
| Bladder ICRU (Gy*)  | 70.0                     | 11.4    | Bladder D2cc vs ICRU | <0.05   |
| Rectum D2cc (Gy*)   | 62.4                     | 5.9     |                      |         |
| Rectum ICRU (Gy*)   | 65.0                     | 7.0     | Rectum D2cc vs ICRU  | 0.45    |
| Sigmoid D2cc (Gy*)  | 61.6                     | 5.3     |                      |         |
| Vaginal point (Gy*) | 159.9                    | 85.5    |                      |         |

# Results

## Outcomes

- > 95% had no local recurrence during follow up (range: 0 to 630 weeks)
- 80% also had no distant disease
- > 80% had no complications
  - Diarrhoea most common complication
  - Bowel obstruction and incontinence also listed



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# Conclusion

- Australian and New Zealand centres have “embraced” volumetric planning and advanced imaging
- HR-CTV volumes are slightly smaller than those in publications from other countries
- Almost all depts performing volumetric planning are meeting recommended dose levels for the HR-CTV and OAR
- Clinical outcomes in Australia and New Zealand are very good



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**Thank you**

