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Bennett, Sophie

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Pelvic radiation disease and the role of the gut microbiome in gynaecology cancer patients

Sophie Bennett1

1Therapeutic Radiographer. Royal Cornwall Hospitals NHS Trust, TRURO, TR1 3LJ, UK.
Email: sophie.bennett@nhs.net
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Background

There are four key pillars to cancer control: prevention, diagnosis, treatment and living with and beyond cancer. Developments in prevention, diagnosis and treatment have enabled improvements in survival, with rates doubling in the last 40 years (Quaresma et al., 2015). Yet, patient quality of life beyond cancer has been substantially ignored. Gynaecology cancer patients are typically young and undergo vigorous treatment including surgery, chemotherapy, and radiotherapy. Although treatment is paramount in increasing survival, these treatment modalities increase the risk of severe toxicities. Pelvic radiation disease (PRD), a heterogenous pathology, encapsulates radiation-induced injuries including enteritis, proctitis, cystitis and vaginal fibrosis (Hofsjö et al., 2015, Morris and Haboubi, 2015, Yang et al., 2013). Studies frequently report 10-20% of patients receiving pelvic radiation develop moderate to severe gastrointestinal toxicities (Andreyev et al., 2005, Fuccio et al., 2012, Fernandes and Andreyev, 2021). Furthermore, current developments are unravelling the complex role of the gut microbiome in PRD (Wang et al., 2019).

Review of the evidence

A literature review was conducted systematically. The eligibility criteria included peer-reviewed journal articles over the last ten years, which were retrieved from CINAHL and Embase databases. Search terms used to identify the appropriate evidence are set out in Table 1.

The literature review highlighted the following key themes:

- Gastrointestinal side effects most prominently reported.
- Limited literature regarding PRD and sexuality.
- Insubstantial evidence of radiation injury at a molecular level for women.
- The gut microbiome's role in PRD is relatively unexplored.
- Limited exploration regarding patient-related factors which may predispose patients to an increased risk of toxicity.

### Table 1. Literature Review Search Terms

<table>
<thead>
<tr>
<th>Search No.</th>
<th>Search terms</th>
<th>CINAHL</th>
<th>Embase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Gastrointestinal OR Gut) AND (micro* OR microbiome) AND (Gynaec*) AND (Cancer)</td>
<td>10</td>
<td>1</td>
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<tr>
<td>2</td>
<td>(Cerv* OR Endomet* OR Ovarian OR Uterine) AND (Cancer) AND (Gastrointestinal OR Gut) AND (Micro* OR Microbiome)</td>
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<tr>
<td>3</td>
<td>(Cerv* OR Endomet* OR Ovarian OR Uterine) AND (Cancer) AND (Gastrointestinal OR Gut) AND (Micro* OR Microbiome) AND (Radiotherapy OR Radiation*)</td>
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<td>4</td>
</tr>
<tr>
<td>4</td>
<td>(Cerv* OR Endomet* OR Ovarian OR Uterine) AND (Pelvic Radiation Disease)</td>
<td>131</td>
<td>214</td>
</tr>
<tr>
<td>5</td>
<td>(Pelvic Radiation Disease) AND (Gastrointestinal OR Gut) AND (Micro* OR Microbiome)</td>
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<tr>
<td>6</td>
<td>Pelvic Radiation Disease</td>
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<td>52</td>
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<tr>
<td>7</td>
<td>(Cerv* OR Endomet* OR Ovarian OR Uterine) AND (Radiotherapy OR Radiation*) AND (Late Side Effects)</td>
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<td>24</td>
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<tr>
<td>8</td>
<td>(Cerv* OR Endomet* OR Ovarian OR Uterine) AND (Radiotherapy OR Radiation*) AND (Late Toxicity)</td>
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<td>286</td>
</tr>
<tr>
<td>9</td>
<td>(Cerv* OR Endomet* OR Ovarian OR Uterine) AND (Radiotherapy OR Radiation*) AND (Sexual OR Urinary OR Bowel)</td>
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</tbody>
</table>

- Total: 1,645
- Total duplicates: 647
- Total for title/abstract screening: 998
- Total excluded after title/abstract screening: 903
- Total for full-text screening: 95

Database search limits used
- By date to <10 years old
- By peer-reviewed journal type

### Project plan

The JBI Model of Evidence-Based Healthcare has been fundamental in planning this project (Porritt et al., 2020). The literature review identifies a knowledge gap in gynaecology cancer care, but also areas to explore within the project. A retrospective audit of radiotherapy patients at the Trust will be executed to assess gynaecology cancer patients from diagnosis to their radiotherapy follow-up. The aim is to gain a deeper understanding of toxicities that patients may experience throughout and after their radiotherapy at RCHT, including the risk of PRD. Once collated, presentations will be shared with stakeholders including clinical colleagues and a patient group. Audit findings and comparable current evidence will be explored to formulate a future clinical study protocol, which will form part of a NIHR Doctoral Fellowship application. A Patient and Public Involvement (PPI) group will be set-up as part of this project and utilised in the preliminary stages of the research study design, as research has shown that a PPI group can improve the quality of research and strengthen the research's effectiveness and meaningfulness (Ocloo and Matthews, 2016).

### References


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