



Original Article

A Population-Based Study of Factors Affecting the Use of Radiotherapy for Endometrial Cancer

T.P. Hanna ^{*†}, H. Richardson ^{*‡}, Y. Peng ^{*§}, W. Kong ^{*}, J. Zhang-Salomons ^{*}, W.J. Mackillop ^{*†}

^{*}Division of Cancer Care and Epidemiology, Queen's University Cancer Research Institute, Kingston, Ontario, Canada

[†]Cancer Centre of Southeastern Ontario, Kingston, Ontario, Canada

[‡]National Cancer Institute of Canada, Clinical Trials Group, Kingston, Ontario, Canada

[§]Department of Mathematics and Statistics, Queen's University, Kingston, Ontario, Canada

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Abstract

Aims: To describe the use of adjuvant radiotherapy for endometrial cancer in Ontario, and identify factors associated with its use, and to determine whether variation in the use of radiation is associated with differences in survival.

Materials and methods: This was a retrospective, population-based, cohort study of all patients who had a hysterectomy for endometrial cancer in Ontario between 1992 and 2003. We used multiple logistic regression to identify health system-related factors associated with the use of radiotherapy, while controlling for disease- and patient-related factors. Survival and cancer cause-specific survival were compared among regions of the province with higher and lower rates of use of radiotherapy.

Results: The study population included a total of 9411 women with a median age of 63 years. Overall, 26.2% received adjuvant radiotherapy. Patients living further from regional cancer centres were slightly less likely to receive radiation ($P = 0.02$). Patients who had their surgery during longer prevailing waiting times for radiotherapy were less likely to receive radiation ($P = 0.04$). The use of radiotherapy varied widely from 18.0 to 34.3% among the catchment areas of provincial radiotherapy centres ($P < 0.0001$). In the overall population, there was no difference in survival among regions with higher and lower rates of use of radiotherapy. However, in the subgroup of cases with clear cell and serous carcinomas, both overall survival and cancer cause-specific survival were significantly lower in regions with lower rates of use of radiotherapy ($P < 0.05$). This difference remained significant after controlling for other factors ($P < 0.05$; hazard ratio 1.43; 95% confidence limits 1.06–1.93).

Conclusions: Health system-related factors unrelated to patients' needs affect the use of adjuvant radiotherapy in Ontario. Lower rates of use of adjuvant radiotherapy are associated with lower rates of survival in patients with serous and clear cell carcinomas.

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Key words: Endometrial neoplasms; health services accessibility; health services research; outcome assessment (healthcare); radiotherapy; survival rate

Introduction

It is estimated that between 34 to 58% of all patients with endometrial cancer will have an indication for external beam radiation at some point in the course of their disease [1]. There is no doubt that adjuvant radiotherapy reduces the risk of pelvic failure after surgery for early endometrial cancer and there is some evidence that it improves survival in high-risk stage I cases [2,3]. Randomised trials have, however, failed to show a survival advantage from

radiotherapy in intermediate-risk stage I patients and the role of postoperative radiotherapy in this large group remains controversial [4–7]. A guideline published by Ontario's Program in Evidence-Based Care recommends adjuvant radiotherapy for stage I patients with a high risk of recurrence (stage IC, grade 3), and recommends against radiotherapy in those at low risk of recurrence (stage IA, IB, grades 1 and 2) [8]. This guideline states that radiotherapy 'is a reasonable treatment option' for patients at intermediate risk of recurrence (stage IA, IB, grade 3 or stage IC, grades 1 and 2), and recommends that the decisions about radiotherapy in this situation should be based on consideration of the risks and benefits in the individual patient [8]. Given the continuing scientific controversies about the appropriate role of radiotherapy in early endometrial

Author for correspondence: W.J. Mackillop, Division of Cancer Care and Epidemiology, Queen's University Cancer Research Institute, 10 Stuart St. Level 2, Kingston, ON, Canada K7L 3N6. Tel: +613-533-6895; Fax: +613-533-6794.

E-mail address: William.Mackillop@krcc.on.ca (W.J. Mackillop).

cancer, it is not surprising that variations in the beliefs of individual doctors and variations in access to radiotherapy have been shown to influence the use of adjuvant radiotherapy in this situation [9].

Previous studies have shown variations in the use of radiotherapy in a number of clinical situations, and have identified potential barriers to access to radiotherapy in Ontario [10–12]. Older patients, residents of poorer communities, and those who reside further from a radiotherapy centre, have consistently been shown to be less likely than others to receive radiotherapy. Moreover, in some situations, there are large inter-regional variations in the use of radiotherapy, which are unexplained by variations in case mix [10,11]. It is not known whether such factors affect the use of postoperative radiotherapy for endometrial cancer, or whether variations in the use of radiation in this context affect outcomes at the population level. These questions can only be answered by population-based outcome studies [13].

The first objective of this study was to describe the use of postoperative radiation for endometrial cancer in Ontario between 1992 and 2003, and to identify potential barriers to the use of radiotherapy in this context. The generally accepted indications for the use of radiotherapy at that time were as described in Ontario's current practice guideline [8], but we hypothesised that the use of postoperative radiotherapy might also vary with factors affecting access to radiotherapy, such as distance of patient's residence to the nearest radiotherapy centre, or the prevailing waiting list for radiotherapy. We also hypothesised that there might be differences in the use of postoperative radiotherapy between patients who have their surgery in hospitals with specialist expertise in gynaecological oncology and those managed in less specialised general hospitals. The second objective of this study was to explore the relationship between rates of use of radiotherapy and survival in the general population, particularly in the context of high-risk histologies. Unfortunately, we were unable to measure rates of pelvic recurrence in this study because the relevant information was not available at the population level.

Materials and Methods

Ontario's Health System for the Management of Gynaecological Malignancies

Ontario's one-tier, publicly funded health care system provides cancer surgery, radiotherapy and hospital care, without direct charge, for all Ontario residents. There is no parallel private sector that offers these services. Both gynaecological oncologists and general gynaecologists are involved in the care of patients with endometrial cancer in Ontario. Gynaecological oncologists are usually confined to large hospitals in urban areas. Radiotherapy is available only at provincial cancer centres located in Ontario's larger cities. At the time of this study, there were nine radiotherapy centres in Ontario. There were no formal guidelines for the use of radiotherapy in endometrial cancer in Ontario

during the study period. We believe, however, that the general approach to the use of radiotherapy in stage I endometrial cancer in that era is accurately reflected in the guideline published not long afterwards by Ontario's Program in Evidence-Based Care. This was summarised above and is readily available online [8]. There are still no formal provincial guidelines for stage II and III cases, or for those with clear cell or serous histologies, but in most cases these characteristics would probably have been considered as indications for radiotherapy in that era. Some radiotherapy centres also have their own in-house treatment guidelines, but ultimately all decisions about the use of radiotherapy were, and still are, made by individual radiation oncologists and patients.

Study Population

This study was a retrospective, population-based study of all patients diagnosed with endometrial cancer in Ontario between 1992 and 2003, who underwent a simple or radical hysterectomy. Only patients with adenocarcinoma, clear cell carcinoma or serous carcinoma by ICD-0 criteria were included (adenocarcinoma 8140/3, 8210/3, 8380/3, 8570/3, clear cell carcinoma 8005/3, 8310/3, and serous carcinoma 8460/3, 8461/3). Patients with any previous malignancy were excluded. Patients known to have distant metastases at diagnosis and those whose first radiation after their primary surgery was described as palliative were excluded. Cases of endometrial cancer diagnosed by autopsy or death certificate were excluded. Patients dying within 90 days of surgery were excluded because they had not lived long enough to ascertain whether they would have received postoperative radiation, had they lived longer.

Sources of Data

Ontario Cancer Registry

The Ontario Cancer Registry (OCR) is a passive, population-based registry that collects administrative data about all cancer diagnosed in the province and identifies individual cases through a process of probabilistic linkage. The OCR is known to be at least 95% complete for all sites combined [14,15]. The OCR record includes: date of birth; postal code; Ministry of Health (MOH) residence code; date of cancer diagnosis; histological diagnosis in ICD-0 morphology code; and primary site in ICD-9, ICD-9-CM or ICD-10 topography code. The OCR database is regularly linked to the provincial and national death registries to provide information about date and cause of death. Figure 1 describes the sources of additional administrative data that were linked to the OCR to describe the management of endometrial carcinoma, as described previously [10,11].

Canadian Institute of Health Information

The Canadian Institute of Health Information (CIHI) Discharge Abstract database includes information about all hospital admissions in Ontario, including: admission and discharge dates; diagnosis most responsible for admission

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