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Key words: Critical cancer services, Palliative radiation therapy, Resource utilization

original contribution

Impact of Severe Acute Respiratory Syndrome on Patient Access to Palliative Radiation Therapy

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Abstract

This study evaluated the impact of the severe acute respiratory syndrome (SARS) epidemic on access and utilization of palliative radiation therapy (RT) at a single institution using a retrospective chart review. A total of 649 patients seen between January and May 2002 and between January and May 2003 were evaluated. Treatment characteristics and waiting times were recorded. March 20 to May 30, 2003, was defined as the peak period of incidence and was compared with the same period in 2002. During the SARS epidemic, there was a 21% decrease in the number of patient consultations and a 15% reduction in the number of patients treated with RT. There was no significant change in the tumor type or reason for referral. Short fractionation schedules were employed for 35% of treated patients compared with 34% in 2002. Patient waiting times between referral and treatment decreased during the period of interest, from 16 days to 8 days ($P = 0.021$). This study demonstrates a reduction in palliative RT services that is similar in magnitude to decreases observed in other essential cancer services during the SARS epidemic. Use of single-fraction RT and delayed follow-up visits may help to minimize hospital transfers and visits in the event of future infectious disease outbreaks.

Introduction

The first probable case of severe acute respiratory syndrome (SARS) in Toronto, Canada, was reported in March 2003. By July 2003 there had been a total of 246 probable cases, 130 suspected cases, and 44 deaths attributed to SARS in the greater Toronto area.¹ During this time period, strict precautions were undertaken to prevent the spread of SARS. These included personal protective devices, patient and staff screening before entering hospitals, and restrictions on the

transfer of patients between all health care facilities.^{2,3} Recent studies have demonstrated the negative impact of the SARS epidemic on access to health care services such as emergency room visits, cardiac surgery, lumpectomy/mastectomy, and chemotherapy procedures.⁴

To our knowledge, the impact of SARS on patient access to supportive cancer therapy, including palliative radiation therapy (RT), has not been investigated. This study evaluates the

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Submitted: Nov 9, 2004; Revised: Dec 7, 2004; Accepted: Dec 7, 2004
Supportive Cancer Therapy, Vol 2, No 2, 109-113, 2005

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Table 1

Patient and Disease Demographics

Characteristics	Time Period			
	1/1/2002- 3/19/2002 (n = 178)	3/20/2002- 5/31/2002 (n = 168)	1/1/2003- 3/19/2003 (n = 170)	3/20/2003- 5/31/2003 (n = 133)
Median Age	67 Years	69 Years	70 Years	68 Years
Primary Tumor Site				
Lung	31%	26%	29%	38%
Gastrointestinal	29%	27%	29%	17%
Breast	16%	23%	16%	19%
Metastases				
Bone	51%	55%	55%	54%
Brain	22%	18%	14%	22%
Spinal cord/ cauda equina	6%	7%	6%	5%

effect of the SARS epidemic on utilization of palliative RT at a major radiation cancer center in the greater Toronto area.

The primary objective of the study was to identify any significant change in the number of patients seen and/or treated by the Rapid Response Radiotherapy Program (RRRP) at our center. Secondary objectives were to evaluate the impact of the SARS epidemic on tumor characteristics, treatment preferences, and waiting times compared with historical norms.

Patients and Methods

A retrospective chart review was used to evaluate all patients who attended the RRRP at the Toronto Sunnybrook Regional Cancer Centre between January 1 and May 31, 2002, and the same time period in 2003. Patients referred to the RRRP include patients with painful bony metastases, brain or lung metastases, bleeding, or painful masses. Ethics approval was obtained and data were reviewed from paper and electronic records.

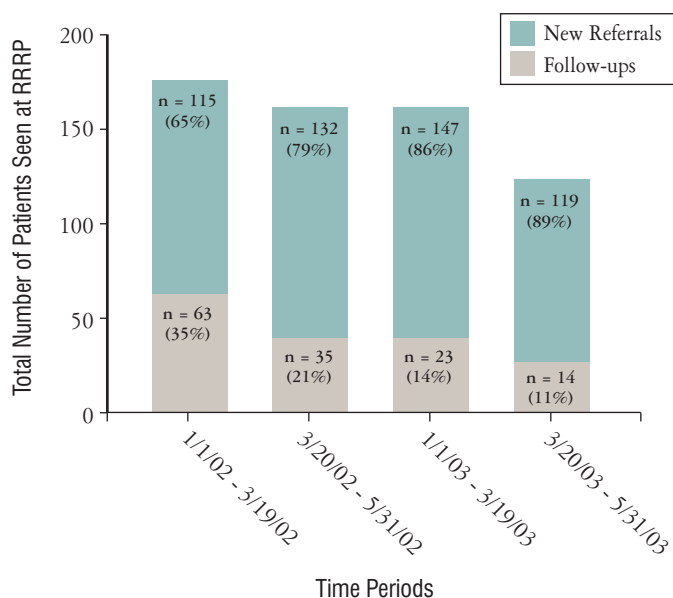
Patients were divided into 4 groups based on the date of their RRRP visit: January 1 to March 19, 2002; March 20 to May 31, 2002; January 1 to March 19, 2003; and March 20 to May 31, 2003. The period of interest was chosen as March 20 to May 31, 2003, to represent the period of increased infectious disease precautions to encompass the peak incidence of reported SARS cases. This period of peak incidence was then compared with the same period in the preceding year. January 1 to March 19, 2002, and the same period in 2003 were evaluated to control for interannual variation. The visit type was defined as new patient, follow-up, or "special," which refers to patients seen previously at the cancer center but new to the RRRP. Dates of referral, consultation, and first treatment were retrospectively evaluated for each patient if applicable. The site of primary tumor, reasons for RT consultation, and fractionation schedule were retrieved from the RRRP database and treatment records. Fractionation schedules were grouped into short (1-3 fractions), intermediate (4-9 fractions), and long courses (≥ 10 fractions) to evaluate whether prescription practices favored shorter treatment regimens during the SARS epidemic.

Statistical Analysis

Differences among clinic visit timing groups were compared with analysis of variance for continuous variables and χ^2 tests and Fisher exact tests for categorical variables. Permutation-style adjusted *P* values were reported while doing multiple comparisons with use of the MULTTEST procedure in SAS software, version 8.2. A 2-sided *P* value < 0.05 was deemed statistically significant.

Figure 1

New Patient Referrals and Follow-up Appointments to the RRRP



Results

This study does not attempt to quantify the effect of SARS on patient outcomes or missed follow-up appointments. It is possible that these patients experienced poor pain control or decreased quality of life as a result of delayed or deferred RT, but it is also conceivable that their pain may have been medically controlled until RT became more accessible. Twenty-eight patients were excluded from the study because of missing data. Information on primary tumor site and reason for referral was unavailable for 7% and 5% of patients, respectively.

From January to May 2002 and 2003, a total of 649 patients were scheduled to attend the RRRP clinic; 519 patients were treated with palliative RT. Patients' primary tumor site and reason for referral for each time period are reported in Table 1. Multiple comparisons among all 4 groups showed no significant difference in the median age of patients, number of patients seen, or number of patients receiving RT. There was a significant increase in the proportion of missed or cancelled visits during the period of SARS incidence compared with the same dates during the previous year (5% vs. 1%; $P = 0.049$). There was a decrease in the proportion of follow-up visits during the SARS epidemic (Figure 1), but this did not reach statistical significance ($P = 0.054$).

Treatment Characteristics

The number of fractions of RT was recorded for all treated patients. A short fractionation schedule (usually 800 cGy in 1 fraction) was used in 35% of treatment regimens, which was not significantly different from the previous year (35% vs. 34%; $P = 1.0$; Table 2).

Waiting Times

Intervals between referral, consultation, and treatment dates were calculated for all evaluable patients. There was a significant decrease in the waiting times of patients seen during the SARS epidemic compared with the previous year (Table 3). The median time from referral to consultation decreased from 10 to 5 days and the median time from consultation to treatment decreased from 3 days to 0 days. The mean waiting periods were similarly reduced during the SARS epidemic. The mean waiting time between referral and consultation was decreased (11.2 days vs. 5.9 days; $P = 0.046$) and the mean time from consultation to treat-

Table 2

Treatment Fractionation and Wait Times

	Time Period			
	1/1/2002- 3/19/2002	3/20/2002- 5/31/2002	1/1/2003- 3/19/2003	3/20/2003- 5/31/2003
Number of Patients Receiving RT	141	132	134	112
Referral to Consultation	8 Days \pm 5	11 Days \pm 7	12 Days \pm 34	6 Days \pm 9
Consultation to RT	3 Days \pm 6	5 Days \pm 6	3 Days \pm 8	3 Days \pm 5
Referral to RT	11 Days \pm 8	16 Days \pm 9	15 Days \pm 35	8 Days \pm 11
Number of RT Fractions				
1-3	56 (40%)	45 (34%)	56 (42%)	39 (35%)
4-9	79 (56%)	78 (59%)	66 (49%)	72 (64%)
≥ 10	6 (4%)	9 (7%)	12 (9%)	1 (1%)

Values displayed as means \pm SD where applicable.

ment was also significantly reduced during the SARS epidemic (5.0 days vs. 2.7 days; $P = 0.010$; Figure 2; Table 3).

Discussion

The Toronto Sunnybrook Regional Cancer Centre established the RRRP in 1996 to provide expedited access to RT for symptomatic patients with advanced incurable cancer to improve their quality of life. Patients referred to this program have an estimated life expectancy of < 12 months. The goal of the RRRP is to quickly address patients' symptoms within 3 working days of consultation. In most cases, treatment consultation, planning, and initiation of treatment occur on the same day.

Recent studies have evaluated the effect of SARS on patients infected with the illness,^{5,6} health care workers,⁷ and access to various health care services.⁴ The impact of SARS on critical cancer services such as breast biopsies, chemotherapy, and lumpectomy/mastectomy procedures has been assessed in the greater Toronto area. The number of patients accessing these services decreased in April and May 2003 compared with the same time period in 2002.⁴ The decreases ranged from 6% for lumpectomy/mastectomy (May 2003) to 27% in the number of breast biopsies (April 2003). The present study demonstrates a similar decrease in the number of patients evaluated by the palliative RT program (21%) and the number of patients receiving palliative RT (15%).

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Table 3

Comparisons of Equivalent Time Periods: 2002 Versus 2003

Variables	Overall <i>P</i> Values	Multiple Comparison <i>P</i> Values	
		1/1/2002-3/19/2002 vs. 1/1/2003-3/19/2003	3/20/2002-5/31/2002 vs. 3/20/2003-5/31/2003
Days from Referral to Consultation	0.0521	0.305	0.046*
Referrals for Cord Compression	0.9665	1.00	0.969
Referrals for Bone Metastases	0.8536	0.798	0.995
Follow-up Visits	< 0.0001*	< 0.0001*	0.054
No Show	0.0056	0.065	0.049
Primary Site: Lung	0.1991	0.972	0.113
Patients Who Received Radiation Therapy			
Days from Referral to Treatment	0.0523	0.582	0.0210*
Days from Consultation to Treatment	0.0078*	0.731	0.010*

*Statistically significant.

The χ^2 test and analysis of variance were used for categoric and continuous variables, respectively, for overall *P* values; SAS procedure PROC MULTTEST with permutation was used to perform multiple comparisons.

There are multiple causes for decreased patient access to palliative RT during the SARS outbreak. The decrease in the number of patients seen is largely attributable to fewer patients attending the clinic for follow-up, with a 60% decrease during the period of interest compared with the previous year. The cancer center was classified as a level 0 facility, which was defined as a health care facility with no known cases of probable or suspected SARS, which would prevent the transfer of any patients located at facilities classified as levels 1-3 (those with ≥ 1 suspected or probable case). Access to palliative RT may also have been affected by patient and physician perceptions of the cancer center, which is associated organizationally and geographically with Sunnybrook and Womens' College Health Sciences Centre (designated a level 2 facility). Similarly, patients' and physicians' perceptions of exposure to SARS or the risk of transmission of SARS to individuals seen or treated by the RRRP provides another possible factor that may have

contributed to the decrease in access and utilization of services provided by the RRRP.

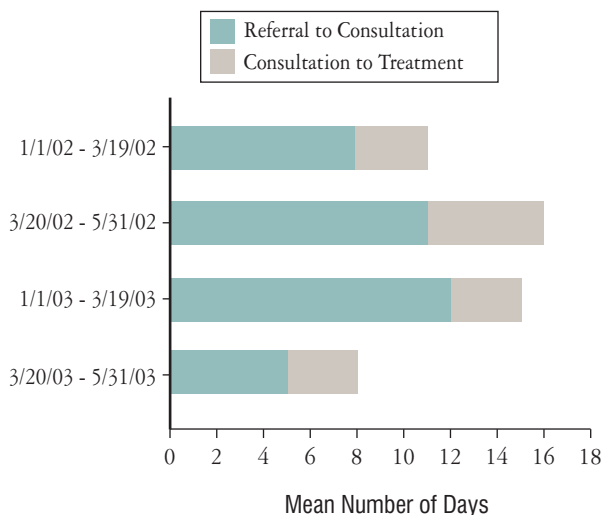
The most common site of primary cancer was lung (31%), followed by genitourinary tract (26%). Bone metastases, found in 54% of all patients seen by RRRP, were the most common site treated with palliative RT. Before initiating the study, it was hypothesized that fewer patients with primary lung carcinoma would be referred or treated during the SARS period as a result of strict screening and transfer restrictions. It was also believed that patients with bone metastases may have been treated with increased doses of analgesics to avoid RT, causing a decrease in the relative number of patients treated for bone pain and a subsequent increase in the percentage of patients treated for spinal cord compression.

Patients with malignant spinal cord compression require palliative RT on an urgent basis to avoid permanent neurologic damage.⁸ During the SARS epidemic, there was no increase in the proportion of patients with spinal cord compression who underwent evaluation and treatment.

The symptoms of SARS include fever, cough, dyspnea, and malaise,⁵ and may mimic those of patients with lung cancer. Despite this diagnostic similarity, patients with lung cancer were not seen with less frequency during the SARS

Figure 2

Patient Wait Times from Date of Referral to Consultation and Treatment



outbreak (38% of patients in 2003 and 26% in 2002). The study found no significant difference in the number of patients with primary lung cancer ($P = 0.1991$) or in the proportion of patients treated for bone metastases ($P = 0.8536$) or spinal cord compression ($P = 0.9665$) among the 4 groups (Tables 1 and 3).

The palliative benefit of RT for bone metastases has been shown in several studies. Decrease in pain is estimated at 50%-80%,^{9,10} and improvement in quality of life has also been measured in recent studies.¹¹ Although the decrease in the percentage of patients receiving RT was not significant from 2002 to 2003, the absolute decrease was 15%. This may represent patients who were not referred in order to avoid multiple transfers among hospitals and repeated screening procedures. Shorter fractionation schedules have been shown to deliver equivalent pain response⁹ and may provide an alternative to deferring or avoiding RT in the case of future infectious disease outbreaks.

Limitations

The design limitations of any retrospective chart review apply to this study. Incomplete data within the RRRP records resulted in the exclusion of 28 patients' records from the analysis.

Conclusion

There is a definite risk of future infectious disease outbreaks,¹² and the SARS epidemic has given cause for awareness and preparation in the case of such an event.¹³ The numbers of patients seen and treated with palliative RT decreased by 21% and 15%, respectively, similar to reductions in other essential cancer services. There was no significant change in fractionation schedules or the number of follow-up visits. Waiting times actually decreased, possibly attributable to the decreased number of patients seen. This may be a result of priorities being shifted such that less-urgent cases were delayed until after the acute phase of the SARS crisis had passed.

In the event of future outbreaks, access to supportive cancer therapy services should be maintained while observing public health measures and reducing transfers and hospital visits. Strategies to achieve this goal with respect to palliative

RT may include the use of short single fractionation and delaying follow-up visits until public health precautions have decreased.

Acknowledgement

The authors thank Bo Yang for her initial work on this topic.

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