

Advances in Radiation Oncology

A call for new 4R's based Radiation Oncology model in COVID-19 Pandemic

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Corresponding Author:	Shrinivas Rathod, MD University of Manitoba/CancerCare Manitoba Winnipeg, Manitoba CANADA
First Author:	Shrinivas Rathod, MD
Order of Authors:	Shrinivas Rathod, MD Arbind Dubey Amitava Chhowdhury Bashir Bashir Rashmi Koul
Abstract:	

A call for new 4R's based Radiation Oncology model in COVID-19 Pandemic

Shrinivas Rathod*, Arbind Dubey*, Amitava Chowdhury*, Bashir Bashir*, Rashmi Koul*.

* CancerCare Manitoba and University of Manitoba, Winnipeg, Manitoba, Canada

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4 We are in the midst of an unprecedented crisis worldwide. Since its first reports in China
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6 on 31st December 2019, it spread extensively across the globe. As of 4th April 2020, over
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8 1100,000 cases and over 60000 deaths are reported worldwide.¹ These numbers continue
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10 to rise exponentially and the healthcare system is strained to maximum.
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12 Immunocompromised and elderly individuals are susceptible to COVID19 with a higher
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14 risk of mortality.² Data shows an aggressive course of COVID19 and over 3 times higher
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16 risk of death in cancer patients.³ The Healthcare system is under enormous pressure to
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18 deal with this constantly changing and ever-evolving crisis. Several countries and
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20 provinces are reallocating resources and prioritizing available options in this emergency.
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22 Radiation Oncology is an integral part of Cancer care and expected to face significant
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24 challenges in the coming weeks as COVID19 continues to impact our lives.⁴⁻⁶

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31 Classical Radiation oncology is based on 4 classical Rs of repair, reassortment,
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33 repopulation and reoxygenation. In the COVID-19 pandemic and global emergency, we
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35 suggested 4 new R based radiation oncology model mitigate the impact of the current
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37 pandemic on our patients and cancer centers.⁷ The new 4R's include [1] Remote /
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39 ViRtual care (reduce in-person consult / follow up / on treatment visits) [2] Ration
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41 radiation (offer radiation wisely and avoid RT where minimal benefit) [3] Rational
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43 defeRring of radiation (as appropriate) [4] Reduce fractions / hypofRactionate radiation
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45 (where applicable)

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51 Significant emphasis is placed on minimizing in-person visits for patients and several
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53 Canadian provinces adopted Remote / viRtual care as a standard model in the current
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55 emergency.⁸ This will help minimize patient visits to the hospital and thus the risk of
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57 infection.
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4 Radiation Oncologists should wisely Ration radiation and avoid radiation in cases where
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6 there is a minimal or questionable benefit. Favourable Ductal carcinoma in situ⁹
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8 (mammographically detected, <2.5cm in size, low-intermediate grade, adequate resection
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10 margins), favourable lowgrade invasive breast carcinoma¹⁰ (age 70 years and older,
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12 primary <=3cm with negative resection margins, estrogen receptor +, node-negative and
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14 eligible to receive endocrine therapy), low-volume favourable intermediate-risk prostate
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16 carcinoma¹¹ may be appropriate for active surveillance. There are several such potential
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18 scenarios where avoiding radiation should be strongly considered.
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23 We should also diligently assess options of Rational defeRring of radiation as appropriate
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25 based on the clinical scenario. Ductal carcinoma in situ and invasive breast carcinoma
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27 could be safely delayed up to 12 weeks.¹²⁻¹⁴ Favourable intermediate-risk prostate cancer
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29 and unfavourable intermediate-risk prostate cancer could defer radiation for 3-4 months
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31 or longer. Androgen deprivation therapy could be used as a temporizing measure for
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33 radiation deferral in appropriate cases such as unfavourable intermediate-risk and high-
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35 risk prostate cancer.¹⁵⁻¹⁶
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40 In these unusual times, the use of reduced fractions/hypofractionation regimens is
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42 strongly recommended. Pre COVID19 era, for various reasons, the use of
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44 hypofractionated, was highly variable across the world despite supportive data. There is
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46 enough data to practice this regimen safely for common cancer sites as prostate, breast,
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48 rectum, lung and even palliative situations.^{7, 17,18,19,20,21,22} The use of hypofractionated and
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50 ultra hypofractionated radiation could save potential 10-20 visits, thus lower the risk of
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52 infection and even mitigate the risk of treatment breaks and allow the radiation facilities
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54 with reduced manpower. With the expected resource and manpower constraints, this
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4 model is gaining popularity.²³ A clinical scenario where boost radiation adds minimal
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6 benefits to the outcomes is also another potential opportunity to reduce the number of
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8 fractions.²⁴⁻²⁵ Judicious resource allocation is paramount and hypofractionation regimens
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10 serve a vital purpose.
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14 We used this model and proposed thoracic cancer specific provincial consensus.⁷ Prostate
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16 and breast cancer specific radiation guidelines were recently proposed.^{16, 23} The new 4 R
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18 based model framework could help the several other disease site group design and use
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20 site-specific policies. This would help global radiation oncology community use the
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22 constrained resources efficiently, function and fight better, and ultimately flatten the
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24 curve of COVID-19 pandemic. May we all emerge victoriously.
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