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Original paper

Surveying trends in radiation oncology medical physics in the Asia Pacific Region ☆

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ABSTRACT

Objective: Our study aims to assess and track work load, working conditions and professional recognition of radiation oncology medical physicists (ROMPs) in the Asia Pacific Region over time.
Methods: A structured questionnaire was mailed in 2008, 2011 and 2014 to senior medical physicists representing 23 countries. The questionnaire covers 7 themes: education and training including certification; staffing; typical tasks; professional organisations; resources; research and teaching; job satisfaction.
Results: Across all surveys the response rate was >85% with the replies representing practice affecting more than half of the world's population. The expectation of ROMP qualifications (MSc and between 1 and 3 years of clinical experience) has not changed much over the years.
However, compared to 2008, the number of medical physicists in many countries has doubled. Formal professional certification is only available in a small number of countries. The number of experienced ROMPs is small in particular in low and middle income countries. The increase in staff numbers from 2008 to 2014 is matched by a similar increase in the number of treatment units which is accompanied by an increase in treatment complexity. Many ROMPs are required to work overtime and not many find time for research. Resource availability has only improved marginally and ROMPs still feel generally overworked, but professional recognition, while varying widely, appears to be improving slowly.
Conclusion: While number of physicists and complexity of treatment techniques and technologies have increased significantly, ROMP practice remains essentially unchanged over the last 6 years in the Asia Pacific Region.

1. Introduction

The Asia Pacific Region stretching from Pakistan to New Zealand and Korea is home to more than half of the world's population and has undergone dramatic development in the last decades. This includes aging population and improving access to healthcare, both of which will increase the need for and importance of radiation oncology as a part of cancer management and there has been significant interest into the development of the profession in Asian countries over the last years [1–4].

Medical physicists are one of the key professional groups supporting radiation oncology. However, their work is often less visible than that of clinicians or allied health staff which could affect their status as members of the health care team [5]. It is the objective of the present work to assess and track the work load, working conditions and professional recognition of radiation oncology medical physicists (ROMPs) in the Asia Pacific Region over time based on a series of surveys performed over the last 10 years [6–8] and investigate how this compares with other regions in the world where such surveys were performed [9,10].

As most of similar work, the study was to be conducted using similar questionnaires on several occasions over time to establish not only a snapshot in time but being able to identify trends. An additional advantage of longitudinal studies is that trends can be

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identified even on the background of differences in economic and cultural conditions. As one of the most important aspects of these surveys is the buy in from all countries we used a survey of key persons in Asia Pacific countries to inform our analysis. While it is acknowledged that this method can introduce some bias, the approach allows employing personal contact, e-mail and phone follow up to improve the response rate.

2. Methods

A structured questionnaire was sent by e-mail in 2008, 2011 and 2014 to 20–22 senior medical physicists in the Asia Pacific Region [6–8]. The persons were identified through professional networks, relevant publications and activities in regional organisations such as the Asia-Oceania Federation of Organization for Medical Physics (AFOMP - http://www.afomp.org/Main/main.php) and the South East Asia Federation of Organizations for Medical Physics (SEAFOMP - https://sites.google.com/a/sci.ui.ac.id/seafomp/).

Table 1
Summary of the three surveys conducted to assess radiation oncology medical physics practice in the Asia Pacific Region.

	2008	2011	2014
Number of questionnaires sent	20	22	23
Response rate (%)	85	100	100
Number of countries represented	17	22	23
Time window for answers	Mar–Jun 2008	Mar–Jul 2011	Jul 2014–Feb 2015

Most of the correspondents approached were the same in the three surveys between 2008 and 2014; however, some senior members of the profession passed the survey to more junior colleagues in the most recent survey to broaden the base of participants and provide opportunities for more junior staff to participate in international activities.

The questionnaire covered seven themes:

1. Education, Training and Professional Certification including a question on Continuing Professional Development (CPD),
2. Staffing,
3. Typical tasks undertaken by ROMPs,
4. Professional organisations,
5. Resources available including dosimetry equipment, literature and access to professional networks,
6. Research and teaching, including a new question on the percentage of ROMPs holding (honorary) academic appointments, and
7. Job satisfaction assessed through professional recognition, remuneration and workload.

In addition to the structured questions, participants were invited to provide as many comments in open form as they would like.

Over the six years of the study, few additional questions were introduced to refine the data collection without affecting the value of the tool for longitudinal data acquisition. For example a distinction between senior (defined as >10 years' experience) and less experienced (less than 10 years' experience, for simplicity called 'junior') staff was introduced in addition to an updated exploration

Table 2
Development of number of radiation oncology medical physicists (ROMPs) and MV treatment units in countries participating in the survey of 2014.

	Number of ROMPs 2014	% of ROMPs with more than 10 years experience	% growth over 2011	% growth over 2008	Population (million)	Cobalt units[a]	% growth over 2011	Linacs[a]	% growth over 2011	Other units and special techniques 2014[a]
Australia	340	44	24	52	23.2	0	0	167	28	IMRT, IGRT, HT 4, GK 1, CK 1, IMRT, IGRT, SRS
Bangladesh	29	9	45		157	11	0	14	56	
Brunei	3	30	50		0.4			1		HT 1
Cambodia	2				15.1	1		3		
Hong Kong China	62	50	44	48	7.2	0	0	31	−3	HT 5, CK 1, GK 1, IMRT, IGRT, SRS
India	1000	40	25	82	1250	230	−17	255	62	HT 3, GK 7, CK 3, IMRT, IGRT, SRS
Indonesia	58	25	38	53	252	15	−12	26	63	IMRT, IGRT, SRS, GK1
Japan	812		44		127.3	1	−91	937	15	HT 11, GK 54, CK 28, P 15, IMRT, IGRT
South Korea	128	30		94	50.2			133		HT19, CK11, GK18, IMRT, IGRT, SRS
Malaysia	92		15	59	29.7	0	−100	36	13	CK 1, HT4, GK1, IMRT, IGRT, SRS
Mongolia	5		25	67	2.8	2	0			
Myanmar	11	10	175		53.3	5	−17	7		CK1
Nepal	10			0	27	4	0	3	0	
New Zealand	67		22	52	4.5	0	0	30	20	IMRT, IGRT, SRS
Pakistan	60	35	28		182.1	26	44	24	14	GK 1, CK1, SRS
Papua New Guinea	0.1				7.3	1	0	0		
Philippines	51	32	24	70	98.4	6	−25	32	14	GK 1, HT2
PR China	1700		13	44	1357	300	−40	1400	17	CK10, HT15, GK100, IMRT, IGRT, SRS
Singapore	25.5	45	50	96	5.5	0	0	17	−6	HT2, GK 1, IMRT, IGRT, SRS
Sri Lanka	26	10	189	225	20.5	10	0	3	50	HT1
Republic of China (Taiwan)	190	18.4	34	90	23.3	1	−75	139	9	HT18, CK5, GK8, IMRT, IGRT, SRS, P1
Thailand	104		28	37	66	15	−35	68	51	CK 1, GK 1, HT 1
Vietnam	65	33	30	160	89.7	10	−29	34	100	CK 1, GK 6
Total/*Averages*	4841	*29.4* (*18*[b])	*31*	*77*	3849.5	638	−20	3360	30	
HDI < 50	1628	*31* (*24*[b])	*20*	*62*			−24		9	
HDI > 50	3213	*24* (*13*[b])	*34*	*80*			−16		40	

[a] Not all techniques are mentioned; HT = helical tomotherapy; CK = cyberknife; GK = gammaknife; P = proton radiotherapy; IMRT = Intensity modulated radiation therapy (including volumetric arc techniques) on conventional linacs; IGRT = Image guided radiation therapy on conventional linacs; SRS = stereotactic procedure.
[b] Assuming that the non-responders have no experienced physicists.