

Exploring Health Professionals' Perceptions of Chemotherapy and Radiation Therapy-Related Oral Mucositis

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Abstract

Purpose

Determine health professionals' (HPs') perceptions of oral mucositis (OM), including clinical presentation of chemotherapy (CT)-induced vs radiation therapy (RT)-induced OM, its assessment and management.

Methods

HPs involved in the care of head and neck cancer (HNC) patients receiving RT to the oral cavity/oropharynx and haematopoietic stem cell transplantation (HSCT) patients receiving mucositis-inducing CT regimens were invited to participate in a customised 20-question survey. Themes included OM presentation, assessment and management.

Results

Survey response rate was 81.4%. Most were nurses (33%) and specialist doctors/dentists (25%). Majority (45%) identified as part of the haematology service, followed by radiation oncology (32%). Most haematology and radiation oncology HPs (89% and 70%, respectively) agreed/strongly agreed that OM impacted patients' ability to complete treatment. There was a significant association ($p < 0.01$) between HPs' specialty and their perceptions of OM manifestations. Most radiation oncology (85%) and all oral medicine HPs agreed/strongly agreed that clinical manifestations of CT-induced OM and RT-induced OM were different, whereas haematology HPs varied in their perceptions (11% disagreed, 41% were neutral and 48% agreed/strongly agreed). There was uncertainty regarding differences in management of CT vs RT-induced OM: 30% of haematology HPs and 45% of radiation oncology HPs agreed/strongly agreed but most (52% and 45%, respectively in each group) responded "neutral."

Conclusion

OM was recognised to adversely impact HSCT and HNC RT patients' ability to complete treatment. There were differences in HPs' perceived understanding of OM manifestations and management. Interventions to address these may reduce unwanted variations in patient care and outcomes.

Introduction

Mucositis, also known as mucosal barrier injury, is the mucosal damage secondary to cancer therapy such as chemotherapy (CT)/antineoplastic drugs and/or radiation therapy (RT). It may affect multiple mucosal sites, including the oral cavity, pharynx, larynx, oesophagus and other areas of the gastrointestinal (GI) tract [1, 2]. Due to the high number of cells undergoing cell division, mucosal cells are often inadvertent but natural targets of these modalities of cytotoxic cancer treatment [3].

CT-associated oral mucositis (OM) is generally a systemic manifestation affecting the mucosa bearing GI tract, whereas RT-associated OM affects the local area [4] that has been irradiated. This collateral damage is particularly seen amongst head and neck cancer (HNC) patients undergoing RT and patients undergoing conditioning regimens of haematopoietic stem cell transplantation (HSCT) [3]. Despite the increasing recognition of the differences between CT and RT-induced OM, there are no known published studies, to date, which explore the opinions and knowledge of health professionals (HPs) managing patients being treated with OM-inducing CT and RT.

The objective of this study was to determine HPs' perceptions of CT and RT-induced OM, including its clinical manifestations, assessment and management.

Material And Methods

The data were collected at the respective cancer services within the Western Sydney Local Health District (WSLHD), including: the Haematology and Bone Marrow Transplantation (BMT) Unit, Westmead Hospital; the Crown Princess Mary Cancer Centre, Westmead Hospital; Blacktown Cancer and Haematology Centre, Blacktown Hospital; the Sydney West HNC Multidisciplinary Clinic. Ethics for this study was approved by the WSLHD Human Research Ethics Committee (reference number: 2019/ETH11669). This study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later comparable ethical standards.

Selection criteria

From November 2019 to July 2020, all HPs involved in the management of haematology patients undergoing mucositis-inducing CT regimens and HNC patients receiving RT involving the oral cavity were invited to participate. This included the following:

- Haematology consultants, specialist trainees and junior medical officers involved in management of patients receiving OM-inducing CT
- Radiation oncology consultants, specialist trainees and junior medical officers involved in management of patients receiving RT to the oral cavity (most patients receiving RT for HNC)
- Oral medicine consultants, specialist trainees and oral health therapists involved in management of patients receiving HNC RT and/or HSCT
- Nursing staff involved in management of patients receiving HNC RT and/or HSCT, including clinical care coordinators and nurse unit managers.
- Allied Health staff involved in management of the patients receiving HNC RT and/or HSCT, including speech pathologists and dieticians

Health professionals survey

A 20 question customised online survey (Supplementary Figure 1) was developed with reference to existing surveys on antimicrobial stewardship (5) and so modified collaboration with research supervisors/senior specialists from radiation oncology and oral medicine with experience in assessment and management of CT and RT-associated OM. The Research Electronic Data Capture (REDCap) hosted by The University of Sydney was used for survey administration and data collection.

Invitations to participate in the study were disseminated via potential participants' work e-mail with additional information about the study, and invitations were delivered at departmental meetings and in-services. Three follow up e-mail reminder invitations were sent every 10 days via the Redcap system to non-responders. iPads were also available to complete the survey, in person, after departmental meetings and in-services. All potential participants were provided with participant information as part of their study invitation and questionnaire, and their consent was implied through their completion of the study questionnaire. The participants' responses to the questions were anonymous.

Statistical analysis

Descriptive statistical analyses were employed for analysis of participants' characteristics. The Pearson Chi-Square test was used to examine the association between the survey responses and HP specialties using statistical software (SPSS v25, IBM Australia).

Results

The response rate was 81.4%, where 57 out of 70 invited HPs participated in the survey. HP demographics are shown in Table 2. Most participating HPs were nurses (33%), followed by specialist doctors or dentists (25%). The majority of HPs worked with the haematology service (45%), followed by radiation oncology (32%). Respondents had a range of clinical experience, with around one-third of HPs having more than 15 years' experience (33%) and another approximately one-third having 1 to 5 years' experience (30%).

Table 1

Demographics of health professionals

Type of health professional		
	Number	(%)
Specialist	14	(25%)
Registrar/Specialist Trainee	12	(21%)
Junior Medical Officer	5	(9%)
Nurse	19	(33%)
Speech Pathologist	3	(5%)
Dietician	3	(5%)
Other	1	(2%)
Specialty*		
	Number	(%)
Haematology	28	(45%)
Radiation Oncology	20	(32%)
Oral Medicine	5	(8%)
Other/Did not specify	4	(15%)
Experience (years)		
	Number	(%)
<1 year	3	(5%)
1 to 5 years	17	(30%)
6 to 10 years	13	(23%)
11 to 15 years	5	(9%)
> 15 years	19	(33%)
* multiple specialties may have been specified per respondent		

Oral mucositis clinical assessment tools and quality of life measures

The World Health Organisation Oral Mucositis Grading appeared to be the most familiar assessment tool and in clinical practice, respondents were using this measure as well as the Common Terminology Criteria for Adverse Events equally (30% each). Only 9% of respondents had previous experience in using patient-reported outcome measures for OM (Table 2).

Health professionals' perceptions of oral mucositis

There was a significant association between HPs' specialty and their perception of OM affecting patients under their care at WSLHD hospitals ($p < 0.05$; see Figure 1). All haematology and radiation oncology HPs agreed or strongly agreed that OM affects patients under their care. All oral medicine HPs also agreed or strongly agreed, except one Oral Medicine HP who responded 'neutral'. No HP disagreed or strongly disagreed for this question.

Table 2

Health professionals' responses to experience with clinical assessment tools and patient reported outcome measures

Oral mucositis clinical assessment tool(s) most familiar with**		
	Number	(%)
World Health Organisation	28	(49%)
Common Terminology Criteria for Adverse Events	22	(39%)
Oral Mucositis Assessment Scale	15	(26%)
Oral Assessment Guide	5	(9%)
Radiation Therapy Oncology Group/ European Organisation for Research and Treatment of Cancer	17	(30%)
Other	1	(2%)
None	7	(12%)
Oral mucositis clinical assessment tool(s) currently used**		
	Number	(%)
World Health Organisation	17	(30%)
Common Terminology Criteria for Adverse Events	17	(30%)
- Version 3.0	0	
- Version 4.0	7	
- Version 5.0	2	
- Unsure	8	
Oral Mucositis Assessment Scale	7	(12%)
Oral Assessment Guide	1	(2%)
Radiation Therapy Oncology Group/ European Organisation for Research and Treatment of Cancer	3	(5%)
Other	2	(4%)
None	8	(14%)
Previous experience with using patient reported outcome measures for oral mucositis		
	Number	(%)
Yes***	5	(9%)
- Oral Mucositis Daily Questionnaire	1	
- Oral Mucositis Weekly Questionnaire	1	
- Functional Assessment of Cancer Therapy	0	

Oral mucositis clinical assessment tool(s) most familiar with**		
- Patient Reported Oral Mucositis Symptoms	3	
- Unsure	2	
No	52	(91%)

** multiple clinical assessment tools may have been selected per respondent

*** multiple patient reported outcome measures may have been selected per respondent

Most haematology and radiation oncology HPs agreed or strongly agreed (89% and 70%, respectively) that OM impacts on their patients' ability to complete medical treatment as required. In total 25% of radiation oncology HPs reported they felt 'neutral' to this statement. All oral medicine HPs agreed or strongly agreed to this question.

An overwhelming majority of HPs in each specialty reported that managing OM can be challenging. All haematology and radiation oncology HPs agreed or strongly agreed to this statement, except one HP in each specialty responded 'neutral'. All oral medicine HPs agreed or strongly agreed to this question. However, in regard to managing OM being time consuming and resource intensive, the responses in the haematology and radiation oncology groups were divided. The majority of HPs agreed or strongly agreed to this statement (63% and 65%, respectively), followed by 'neutral' responses (33% in haematology, 25% in radiation oncology). As per the previous question, all oral medicine HPs agreed or strongly agreed to this question.

There was a divided response across all specialties in response to the question that 'HPs involved in the care of HNC patients undergoing RT and/or BMT patients have a clear understanding of OM. Most HPs agreed or strongly agreed (60% each), followed by neutral (35% and 20% respectively). Most haematology HPs responded with a neutral (48%) answer, followed by agree or strongly agree (44%). However, there was recognition by HPs on the need to have a clear understanding of the clinical presentation and pathogenesis of OM. A majority of, if not all, HPs in each specialty agreed or strongly agreed to this statement (89% in haematology, 95% in radiation oncology, 100% in oral medicine).

There was a significant association ($p < 0.01$) between HPs' specialty and their perceptions of the manifestations of OM. Most radiation oncology (85%) and all oral medicine HPs agreed/strongly agreed that clinical manifestations of CT-induced OM and RT-induced OM were different, whereas haematology HPs varied in their perceptions (11% disagreed, 41% were neutral and 48% agreed or strongly agreed; see Figure 2). There was uncertainty regarding differences in management of CT vs RT-induced OM (see Figure 3): 30% of haematology HPs and 45% radiation oncology HPs agreed or strongly agreed but most (52% and 45% respectively in each group) responded "neutral".

Most HPs responded that they have not worked in healthcare facilities with an OM management clinical guideline (70% in haematology, 95% in radiation oncology, 80% in oral medicine). An overwhelming

majority in all specialties agreed a clinical guideline for OM management at WSLHD hospitals should be introduced (96% in haematology, 85% in radiation oncology, 100% in oral medicine). A similar response pattern was noted regarding the importance to identify a universal measure of OM within WSLHD (96% in haematology, 90% in radiation oncology, 100% in oral medicine) and between institutions (89% in haematology, 90% in radiation oncology, 100% in oral medicine).

Discussion

The aim of this study was to determine HPs' perceptions of OM, including clinical presentation of CT-induced and RT-induced OM, its assessment and management. There are no known studies which explore HPs' awareness of the differences between CT and RT-induced OM, including clinical presentation and management, as well as the various assessment tools measuring patient reported outcomes and clinical outcomes of OM.

HP respondents recognised the importance of understanding OM pathogenesis, however had divided responses on their perception of having this understanding. There was a strong association between HPs' specialty and their varying perception of OM manifestations, namely the differences in CT and RT-associated clinical presentations. There was overall uncertainty on the need for different management approaches between CT and RT-induced OM. The variation in management may be reflective of differences in the biologic pathways and kinetics of OM treatment, which themselves are due to differences in the clinical manifestations and the time course between CT and RT-induced OM [3, 6]. In addition, RT-associated OM manifestations are strictly in the RT field, whereas CT-associated OM is reflective of the systemic effects of CT throughout the GI tract [4]. Therefore, the same degree of OM that may be expected and therefore acceptable in RT-associated OM, where local symptoms can be managed effectively through close monitoring, proactive comfort, analgesic and supportive care with continuation of treatment. In CT-associated OM, such presentations may necessitate treatment modifications and escalation of care such as parenteral feeding. These findings highlight the importance of HP education and understanding of OM, including its clinical presentations and the differences in management that may be required for CT and RT-induced OM. Such efforts may reduce unwanted variations in patient care and treatment outcomes, especially where non-discipline specific HPs (junior medical officers, nursing and allied health staff) may rotate across CT/HSCT and RT services or provide inter-disciplinary care.

There was clear heterogeneity in the type of OM clinical assessment being used. An overwhelming majority of HPs in all specialties recognised the importance of using a consistent and reproducible measure of OM, within the local health district as well as across institutions. HPs acknowledging the need for a universal OM measure is in line with recognition in the literature on the importance of using a clinically applicable, reproducible and validated measure to facilitate sound clinical care and research [7, 8]. The limited ability to compare across studies due to the various OM assessment tools described in the literature is also acknowledged [4]. In addition to the difficulties in translating the findings of these research studies into clinical practice, there is also potential for miscommunication across the various disciplines of HPs. Miscommunication may impact on the ability to provide optimal clinical care within

and across multiple specialties. To address this, a possible intervention may include education for HPs on different OM clinical assessment measures, and the importance of specifying which clinical assessment tool is being used when communicating with colleagues.

An overwhelming majority of HPs in each specialty also reported that managing OM can be challenging. Given that a similar response was provided across all specialties on the need for a clinical guideline on OM management, developing such a guideline based on existing international recommendations [1, 9, 10] in collaboration with different specialties may be well received within WSLHD hospitals.

Future directions include potential education sessions for HPs regarding OM, including its clinical presentations, different assessment tools as well as differences in management between CT and RT-induced OM. This may improve communication between colleagues and reduce potential variation in patient care and treatment outcomes, especially with provision of inter-disciplinary care. In addition, developing a clinical guideline on OM management in collaboration with different specialties involved in management of CT and RT-induced OM may be effectively implemented within WSLHD hospitals.

Limitations

There are no known previous studies which have explored HPs' perceptions of OM. As such, comparison of this study's findings with those from other groups of HPs is not possible. However, these findings provide the opportunity for comparison and benchmarking in terms of future similar studies, at other institutions or local health districts. This study captured HPs' perceptions at a single point in time but may provide baseline data to compare against in the event of future implementation of OM education and management guidelines. It would be valuable to examine change in HPs' perception and understanding of OM clinical manifestations and management.

Self-selection bias is another potential limitation, as not all eligible HPs may have participated in the survey. This may have led to a biased sample, as there is a possibility HPs may have intentionally chosen not to participate or those who did because of their greater awareness of the problem of OM. This may have influenced and potentially skewed the reported responses in each specialty. Another limitation includes having a small sample number within the oral medicine speciality group (5 participants). Although this is unavoidable due to the small number of HPs within the specialty, this may have exaggerated the reported responses.

Conclusion

HPs recognised the importance of having a clear understanding of OM pathogenesis but had divided responses on their perception of having this understanding, as well as having varied responses on the different clinical manifestations CT and RT-associated OM and its management. In addition, there was clear heterogeneity in the type of OM clinical assessment tool being used, and HPs recognised the importance of using a consistent measure of OM (within their local health district and across institutions). Future efforts include the need to collaborate with all HPs involved in the care of OM and

provide education sessions which highlight the different OM assessment tools, differences in clinical presentations and management of CT and RT-induced OM; as well as development of a clinical guideline on OM management for implementation across WSLHD hospitals.

Declarations

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Conflicts of interest/competing interests: All authors have no conflicts of interests or competing interests to declare.

Availability of data and material: The collected data is stored in a secure area at Westmead Hospital (NSW) with data availability subject to access by research investigators and further ethics approval.

Code availability: Not applicable

Authors' contributions: The authors contributed to the study as follows: study concepts (MK, JC, PS, MS), study design (MK, MS, PS), data acquisition (MK, CB, AP, MB), data analysis and interpretation (MK, PS, TW), manuscript preparation (MK), manuscript editing and review (MK, MS, TW, MV, PS, CB, AP, JC, MB).

Ethics approval: Ethics for this study was approved by the WSLHD Human Research Ethics Committee (reference number: 2019/ETH11669). This study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later comparable ethical standards.

Consent to participate: All potential participants were provided with participant information as part of their study invitation and questionnaire, and their consent was implied through their completion of the study questionnaire.

Consent for publication: All potential participants were provided with participant information as part of their study invitation and questionnaire, and their consent for publication was implied through their completion of the study questionnaire.

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Figures

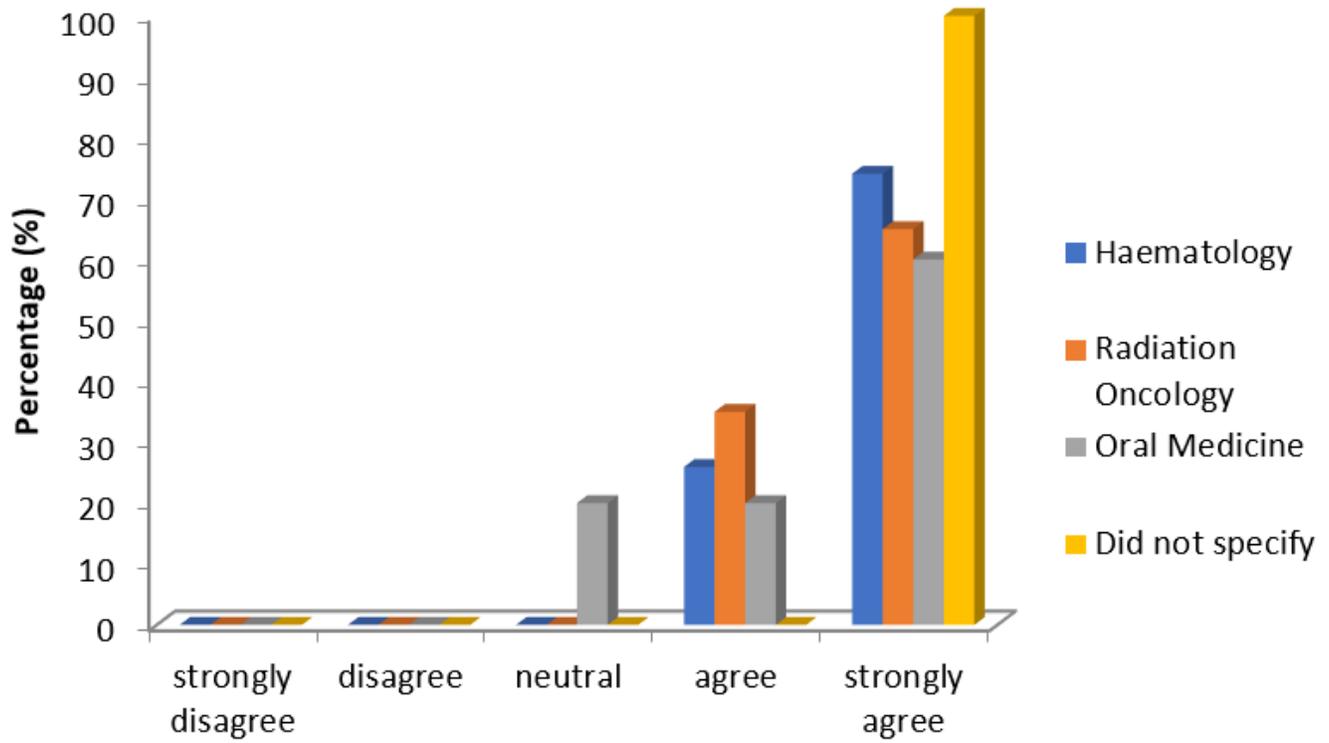


Figure 1

Health professionals' responses to question 9: 'OM affects patients under my care at Western Sydney Local Health District hospitals'

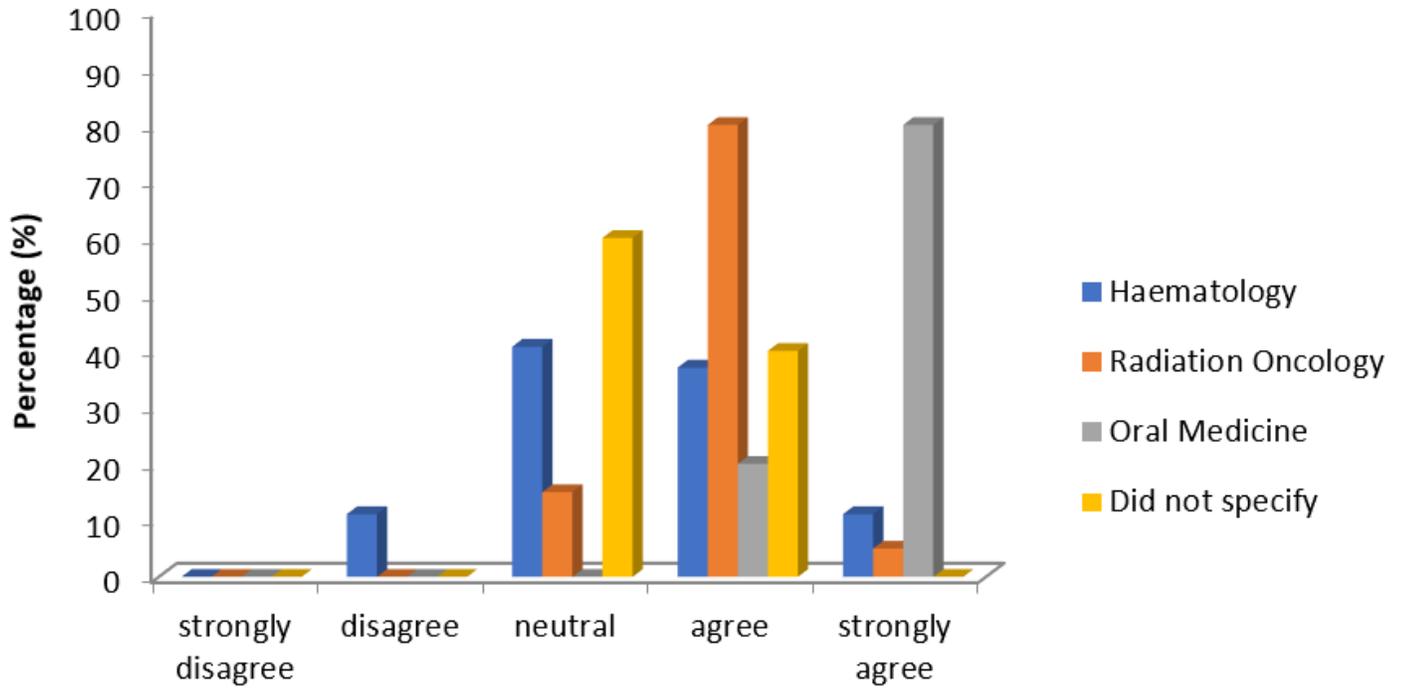


Figure 2

Health professionals' responses to question 15: 'there is a difference in the clinical manifestation between chemotherapy and radiation therapy-induced OM'

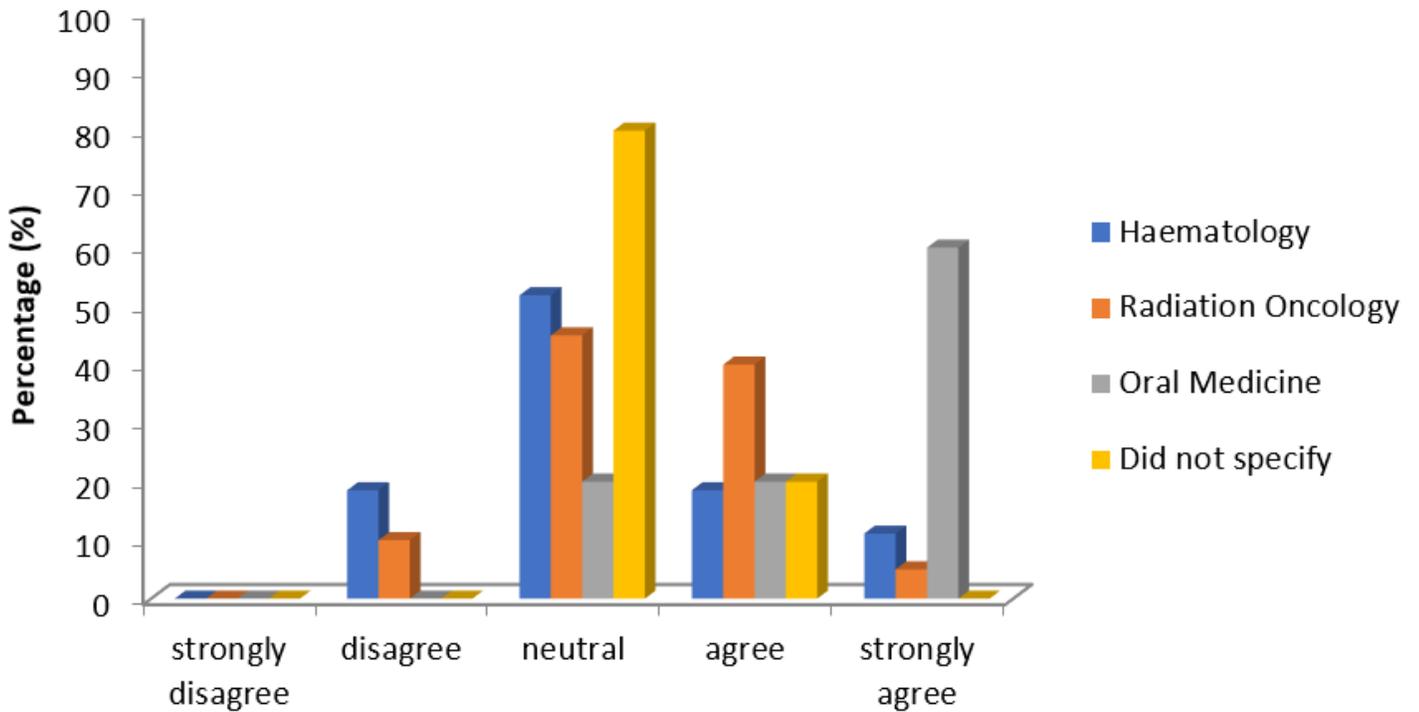


Figure 3

Health professionals' responses to question 16: 'there is a difference in the management between chemotherapy and radiation therapy-induced OM'

Supplementary Files

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- [SupplementaryFigure1.pdf](#)