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Job satisfaction and redesign – the perspective from the radiation therapist team

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Abstract

Radiation therapy technologists (RTTs) have been leaving the profession massively the last few years. It is necessary to understand team requirements in each department in order to improve work conditions. The aim is to understand the team perspective, to redefine the job and work conditions, but keep it aligned with the motives, passions and strengths thus empowering the team to do their best. The patients deserve the best care, but the staff cannot be forgotten. Even with the best technology that the RT departments could have, this will never be a substitution for the RTTs.

Keywords

Radiation therapist, Job satisfaction, Turnover, Job redesign

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Introduction

Radiation therapy technologists (RTTs) are healthcare professionals who primarily administer radiation therapy treatment to patients diagnosed with malignant disease. RTTs are part of a multidisciplinary team and, additional to treatment administration, are involved in the treatment preparation, treatment planning and patient care.

In recent years, there has been a shortage of clinical RTTs, which has posed a great challenge for departments worldwide. Urgent action is required to prevent the loss of RTTs from the profession, RTTs feel overwhelmed, exhausted and “burned-out”, so urgent action is required to prevent them from leaving the profession. It is also necessary to make the RTT profession more attractive to strengthen the team. It is not always possible to recruit necessary professionals to meet current and future demands. Therefore, there is a greater risk of error in the administration of radiotherapy, due to the insufficient numbers of RTT staff and a compromise of the well-being of those who remain on the team. In the radiotherapy department in Winterthur, Switzerland, it is necessary that there are always two RTTs present during all steps in the administration of radiotherapy treatment. When both RTTs are working on the treatment unit, there is no possibility for them to perform other functions, such as carrying out offline patient checks or other similar tasks. These functions are then neglected because their continuous presence is necessitated on the treatment unit or because the team regularly has fewer RTTs than necessary.

Statistics of this department show that fifty percent of RTTs who have quit in the last few years have not gone to work for competing organisations, but have switched to different professions. Cited reasons included exhaustion caused by a high workload and constantly being on the treatment unit for long periods of time. This allows us to deduce that the need to reinvent and enrich the profession is urgently required and that management must attempt to

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increase the attractiveness of the profession in order to retain RTTs. The acquisition of new technology is not solely sufficient in redefining the profession, no matter how innovative or effective it is, because it will never replace the empathy required by cancer patients.

The obligatory presence of two RTTs for each step during the radiotherapy treatment, which has been necessary until today, is perhaps no longer needed. If the department can safely ensure that technology or the support of a non-RTT professional can overtake certain tasks to reduce the RTT workload on the treatment unit, then this can enable adaption of the workflow protocols.

The goal of this case study is to evaluate the team sentiment concerning job satisfaction and the risk of leaving the team, or maybe the profession. Additionally, the study will attempt to gain perspective on the use of technology currently in the department. This is to help create new ways of working, further develop the profession to help with retention, improve the value of the organisation and thus increase commitment to the organisation. This, together with the support of a non-RTT professional, will offer more freedom to the RTTs as the traditional design of the profession will be organised, but will maintain its focus on patients and employees of the department.

Literature Review

“Occupational stress in the oncology setting is, in part, a result of continuous exposure to the grief and trauma of cancer patients, which affects health care professionals in both negative and positive ways” (Koo et al., 2013).

The number of radiotherapy centers is increasing due to the aging of the population (Taylor & Oetzel, 2020). In addition, treatment has become progressively more complex over the last years.

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New trends in the restructuring of health services and changes in the care of cancer patients (new treatment options, increased complexity of cases, better informed patients), which influence the working environment, are potential sources of stress for radiotherapy service workers (Sehlen et al., 2009). According to Sharma et al, the increased complexity of patient treatment means that health professionals find it more difficult to manage all the details of treatment (Sharma et al., 2008).

There are significant problems in recruiting and retaining RTTs, which puts RT services in a vulnerable state. An increase in demand for patient treatments can lead to long waiting times, which has consequences for the patients (Taylor & Oetzel, 2020). This also leads to an increase in the workload and stress levels of the staff, especially if they are already short-staffed (Jasperse et al., 2014).

Daily interaction with patients undergoing cancer treatment alongside the responsibility to accurately administer the treatment dose for each patient in each fraction can understandably become very stressful. The critical nature of the treatment can mean small errors could have catastrophic consequences for the patient (Probst & Griffiths, 2009). The heightened awareness of potential errors throughout the day means that the RTTs are constantly in stress.

“Modern radiotherapy practice is labour intensive, due to the technological complexity and the associated challenge of maintaining accuracy and safety awareness”(ESTRO, 2014, p. 6). Probst and Griffiths wrote in 2009, that “radiation therapy is an emotionally trying profession” (Probst & Griffiths, 2009). Nowadays, after more than thirteen years later, the situation is not any different. This is a staple part of the profession. These professionals already work in an emotionally challenging role, but the increasing complexity of technology and the increase in the administration of very high therapeutic doses, further increases the

risk of severe damage for the patients in the case of errors. This altogether makes for a highly stressful work environment for the RTTs.

The workforce of RTTs is in a vulnerable situation worldwide. Due to this, it is essential to understand the reasons for job satisfaction and intentions to leave the profession. This will help to change the course that is already being seen in many services, including a shortage of RTTs and a constant turnover (Taylor & Oetzel, 2020).

A good workforce is essential to ensure the smooth running of a radiotherapy service. Several factors have been described in the literature regarding the risk of RTTs leaving the profession: limited opportunities for professional development, working conditions and problems with management (Halkett et al., 2017). Career progression is also a factor highlighted by several authors (Coleman et al., 2009; Harnett et al., 2018) .

Cancer care workers in Ontario refer to high physical workload, permanent ringing of telephone, underpayment, breaking off a conversation with the patient, having conflicting demands on the time, having great volume of work, having inadequate staffing to do the job properly, and feeling under pressure to make deadlines are all determinants of job stress (Grunfeld et al., 2005). This all has direct consequences on job satisfaction.

A study by Halkett reported that RTTs who were dissatisfied would leave the profession if they could. It is impossible to ignore the fact that this aspect has negative consequences for the mental health of the RTT, as well as for the way these RTTs carry out their work on a daily basis and in their interaction with the patients (Halkett et al., 2018).

Taylor and Oetzel reported in 2020 that the RTTs who planned to leave the profession, referred to these three important factors as reasons when making the decision: “the need for

change or a new challenge, having flexible working arrangements and working conditions"(Taylor & Oetzel, 2020, p. 80).

Job demands, such as workload, time pressure, role conflicts, absence of job resources, machine constraints and inefficient work, contribute to job dissatisfaction. These factors can be significant protagonists in burnout. It is very important to analyse the team individually and consider department-specific reasons. Only then can we effectively create new ways of working in the department.

Organizational complexity, accelerated by transformations in the work environment, has led to burnout. This has claimed a place in the study of human behavior, especially in the last decade, which has had big consequences on job satisfaction. Burnout syndrome is currently a constant, alongside the pressure on professionals faced with new technologies, short deadlines, scarce resources and competition. The meta-analysis performed by Guerra and Patricio (2019) shows that the factors that most contribute to burnout in RTTs remain to be clarified, but revealed an arguably high prevalence of burnout in RTTs in spite of substantial differences between these studies (Guerra & Patrício, 2019).

Burnout is a well-known problem in cancer care worker teams. This has been studied by some authors during the last few years, which refer the high rate of burnout within RTT teams. In some studies, the Maslach Burnout Inventory questionnaire was used and illustrated high emotional exhaustion scores, high depersonalisation scores and low personal accomplishment scores (Akroyd et al., 2002; Demirci et al., 2010; Probst et al., 2012; Sale & Smoke, 2007). In a meta-analysis performed by Guerra and Patrício, it is shown that studies assessing burnout in RTTs are limited but show that RTTs are at medium to high risk of developing burnout. (Guerra & Patrício, 2019). In a Canadian and US Study about burnout

involving 1200 RTTs, burnout was found to be a consequence of the workload (Akroyd et al., 2002).

The work environment has a negative impact on the satisfaction of RTTs. Identifying and eliminating the critical points mentioned by the participants requires a number of changes, which should lead to a reduction in stress and consequently an increase in job satisfaction, thereby reducing turnover (Sehlen et al., 2009).

As Michael Taylor et al indicated in 2020, strategies that guarantee the sustainability of the RT workforce in the department “need to focus on developing a robust framework for career development”. Which includes “advanced practice opportunities that challenge RTs and ensuring workplaces create an environment that promote a sense of pride, camaraderie and flexibility in how they operate”(Taylor & Oetzel, 2020, p. 77).

Sehlen suggests some aspects to improve structural conditions within the department with positive consequences on job satisfaction: better definitions of responsibilities for the individual cancer care worker, delegation of office work to other professional groups, optimization of work process (quality management) and training of communication skills and conflict solving strategies (Sehlen et al., 2009).

Probst suggests in 2009 some strategies to reduce staff turnover, which include career planning, inclusive policies for development work, leadership skills, communication strategies and lastly, job redesign (Probst & Griffiths, 2009).

If there are continuous staff shortages, the level of stress gains another dimension. Some RTTs prefer to switch to dosimetry in order to avoid the feeling of making a potential error at any time as they often feel on the treatment unit, or otherwise RTTs will leave the profession in more extreme cases (Probst & Griffiths, 2009).

There are authors from other areas of work, for example marketing, that create a way to redesign the job, incorporating opinions, strengths and passions of the employees. This is called “job crafting”, which is a powerful tool to reenergising and reimagining work life (Wrzesniewski et al., 2010). There are many examples in this article that are valuable for this project. “Job crafting” is lead by the employee and not by the supervisor. The authors verified that when the employees from all kinds of backgrounds try “job crafting” they feel more engaged and satisfied with their work lives, “achieve higher levels of performance in their organisations” and “report greater personal resilience”. Organisations can gain a lot with this empowerment, and they are ultimately motivating employees to enhance their performance. Another important factor to consider job crafting are situations where pay raises are restrained or promotions are not possible. This could be a way to reduce turnover and increase the retention of the staff (Wrzesniewski et al., 2010).

All these aspects, job crafting, job redesign, and enrichment of the profession require a disruptive mindset to be able to reconfigure the work and make it more engaging and fulfilling. It is therefore essential to know the reasons that contribute to the satisfaction and retention of RTTs, in order to create sustainable strategies to change the current situation.

The recent pandemic forced people to think outside of the box to find alternative solutions and we need to look to innovative approaches (The Lancet Oncology, 2022).

The risk of losing the professions` reputation may lead to fewer people being interested in practicing, which will lead to resources becoming even scarcer in the future. This would result in insufficient staff to meet the service needs.

We cannot try to improve the described situations in the Radiotherapy departments using standard solutions. It is essential to know the level of satisfaction of the team and to involve

them in finding new solutions that make the profession more attractive, as well as the working conditions.

Bringing together the necessary conditions to increase job satisfaction and reduce turnover will consequently make for the process of attracting and retaining RTTs easier. This will also indirectly benefit the patients' experience in the service.

Objective

The goal of this work project, as manager of a RTT Team in the Radiotherapy department in Winterthur, is to evaluate the actual situation of our team, using a qualitative, anonymous survey, to figure out what percentage of co-workers are currently satisfied/dissatisfied with their job in the department and if they experience work exhaustion. The second goal will be to explore the applicability of remote work and redesign the treatment process in radiotherapy as seen by the radiation therapists.

Assess the risk of team members leaving the profession, qualitatively, how many RTTs are considering changing professions? What is the common denominator between the professionals who have left and those who are considering leaving the team?

- How to make the profession more attractive by offering new ways of working and redesigning the profession?
- Evaluate the feasibility of technology and the support of a no-RTT professional allowing the second RTTs to be less present during the treatment process. Could this allow the 3rd RTT to have the possibility of doing other functions, namely working from home?- This could lead to less routine work and reduce physical exhaustion.

The final goal is to have the perspective from the team to redefine our job and work conditions, but to keep it aligned with the motives, passions and strengths of our RTTs, thus empowering the team to do their best!

The Team in the last 5 years

During the last five years (since April 2018), twenty RTTs have left the department – the team has usually around sixteen RTTs. Before they leave, an interview was carried out with all of them individually. It's very important to evaluate the feelings of each RTT that left the team and find out for which reasons they did so.

The RTTs often referred to more than one single reason for leaving the department or the profession. Almost all of them referred to the high workload in our department, the time pressure and the possibility for an incident that can have very bad consequences for the patients.

At least fifteen referred to having had continuous symptoms of exhaustion and burnout caused by the high workload. At least fifteen referred to feeling very tired after the daily work on the machine, and therefore regularly felt they didn't have energy to enjoy their free time. They were willing to accept this if it only happened sometimes, but not when this became the daily routine. Some of them referred to the fact that they don't want to live for work, instead they wanted to work to live. Ten RTTs referred to their wish to switch to another profession, so as to not work on the treatment unit. These ten (fifty percent of all RTTs that left the department) are now working in other areas/professions.

All twenty RTTs referred to the difficulty of being continuously working in a team with staff shortages.

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The Team at present and the workplace – Description of the sample

As of September 2023, the team is composed of fourteen RTTs, and two open positions to fulfill. Eleven RTTs are female, and the remaining are men, coming from different countries and cultures. Our team is generally quite diverse in terms of culture and experience.

At present, several RTTs complain of work exhaustion from working as only two RTTs throughout the whole day for every patient. This makes it sometimes impossible to perform other types of work, which could make the profession less routine and thus more interesting. It is most likely that the lack of clinical RTTs is due to the unattractive work conditions that many departments offer to its professionals. Additionally, the constant turnover of RTTs means that the RTTs left on the team are forced to be constantly on the treatment unit and pick up the work of those who have left the profession. This allows fewer possibilities to learn and perform other functions. This reality affects job satisfaction.

To get a better idea of team satisfaction at present, a questionnaire will be performed with the team as a “pulse survey” to gauge the satisfaction/dissatisfaction of working as an RTT in the department, as well as, gauging whether the RTTs wished to leave the profession or continue in the profession as it stands now. This will help to define a set of priority levels.

The second aim of this study is to evaluate the possibility of treatments being administered by only one RTT (online), though not the same one all day long as it would not be feasible to have the same RTTs administering treatments from 08:00-17:00. The second RTT (offline work) would be always in the “controller room” to support the online RTT, any time when necessary. If this functions, whilst ensuring quality and safety for the patient, it could then be possible for the third RTT, who at the moment is always on the machine too, to rotate with the two other RTTs on a weekly basis. Then the third RTT could assume other functions, such as project work or patient checks. Additionally, home office would be a possibility in

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this model. Technology has also been more and more incorporated in daily RTT tasks. We must use it, not only in favour of the patient, but also to improve and create diversification in the way the RTTs work as well. The wish of a presence of a no-RTT professional will also be evaluated.

Job description in the department

When new staff join the department, the RTT is first trained on the treatment unit, also known as a linear accelerator (Linac). After some months and depending on how the RTT would like to develop in their career, they have the option to learn to work with other equipment. The description in detail about the job per equipment is presented in the exhibit 1.

Methodology – how to get the perspective of the team

A self-designed questionnaire was sent out via email link to all current practicing RTTs (fourteen) to assess job satisfaction and the team's perspective on job redesign. In addition, participants can make suggestions on how to improve the situation at work based on their point of view.

This case study will evaluate the job satisfaction of current employees and their opinion on performing tasks via Home Office, and a new process for RTTs on the treatment unit. This will all be evaluated qualitatively with a questionnaire answered by the RTT team members.

The survey was opened and data collected from 08 September 2023 until 22 September 2023. A reminder was sent on 18 September to improve the response rate. RTTs completed the survey via Google Forms and accessed via an open link. The Participants could choose to not answer any question and still progress through the survey. There was no question about age and years of experience to maintain the anonymity in the answers – in a small group of

fourteen RTTs, it would be easy to figure out who would answer what, depending on age and years of experience. The questions for the survey are detailed in exhibit 2.

Parallel to the questionnaire, the team was asked to select which tasks of the treatment process on the treatment unit could be taken over by technology or by another non-qualified person, e.g. a RTT student. This would be one way to redesign the treatment process, and consequently our job on the treatment unit. The table sent to the team with the tasks of the treatment process is detailed in exhibit 3.

The job description on the treatment unit is defined in exhibit 3 and all RTTs can select, anonymously what they think. This will illustrate the team's perspective about the possibility of redesigning the treatment process, which will create a more ideal, but realistic version of the job as a RTT on the treatment unit.

The results are analysed qualitatively using a thematic analysis approach. The author has identified the relevant and most common themes from the responses of all the participants.

The way we live has been changed because of the use of technology – the way we work can be changed too!

The perspective of the team on job satisfaction and job redesign

With this study, it was possible to get the perspective of 10 RTTs (fourteen received the questionnaire) about the job satisfaction and how it would be possible to increase it.

The results show that the job satisfaction level decreases, when we compare the job satisfaction after six months working in the department and now.

In terms of **the factors that influence job satisfaction**, it is possible to verify the most common aspects in the answers: Work pressure, the level of stress, too much work for too

few colleagues, healthy work culture, the daily tasks, good team work between the RTTs, doctors, nurses and physics. A no blame culture if there is a mistake, rotation to other areas to learn new things, support from management, ability to grow in the job, getting home on time and knowing working hours beforehand, without last minute changes were also referred. The access to continuous education and salary were also very important factors. Having enough time to treat patients, an integrated team, appreciation for the team and having enough work life balance, (getting home on time), are other aspects that were referred to.

The **aspects that were dissatisfying for the ten RTTs** that answered the survey include, the constant high level of stress (high number of patients for the team we have) and not having enough time for contact with the patients. They mentioned that when seeing so many patients every day and being under intense time pressure, it is difficult to give the patients any psychosocial assistance to develop trust. The team has to send the patients to the waiting area as fast as possible to get the next patient in. If the team is delayed due to a machine breakdown for example, it is difficult to make up this time. The RTTs on the unit are then behind all day, and this causes some of the staff to get very stressed. There is almost no possibility to do any computer work and the RTTs need to “walk” all day and cannot sit. Another aspect that is dissatisfying is the work on Saturdays and that the number of the patients per day is not limited, but the team is limited. Staff shortages are worse than ever and has caused more stress due to the extra work for the remaining RTTs. Low salary for the work that is done and the lack of increased salary or small increases of salary for learning something new or new responsibilities are other referred factors. This has a consequence of the low interest to learn new tasks. The constant change of personnel, without having enough time to teaching the other colleagues is another referred factor.

The factors that were most satisfying for the ten RTTs that answered the survey were definitively the contact with the patients and the team. The sentences written below reflect very well what is most satisfying for the RTTs.

“When the team works well together and also meeting new patients and feeling they appreciate the work that we do”;

“I love to communicate with the patients and being there for them”;

“The ability to learn new things and grow in my career”;

"I enjoy working with the team for the most part and with our patients”;

“The patients` sincere thanks”;

“Helping patients get rid of their tumours”;

“Helping new staff in their training”;

“The team is a big part of my job satisfaction”;

“I`m happy going to conferences and learning something new”; “being able to see firsthand how quick we work and catching up time is satisfying”;

"Seeing a smile on the Patient and receiving a compliment makes my day (but sadly there not saying it as often as before... (I imagine because we don`t have enough time for them anymore, and the patient feels it too), the overall work we do makes me happy”;

Other tasks, such as working as dosimetrist, the flexibility in the team and the kind of technology we have in the department were also referred.

Ten RTTs **referred their view of the RTTs regarding the current work conditions.** They referred to stress that comes in waves, with very high peaks followed by short breaks and the staff shortage.

“It's currently ok, but we are very aware that it is short term and will worsen again soon. The last few months were horrible, so many challenging patients with multiple volumes, coupled with major delays and also short staffing. We worked some very long days- unnecessarily hard”;

“a lot of colleagues who are afraid to call in sick, colleagues who return to work too soon after illness, colleagues who sometimes work with a cold for weeks”;

Many patients for a team shortage is also evident in some answers, as well as the working hours are long: “due to short staff, people are doing more late shifts than ever - Saturday shifts: more Saturday shifts means less work/life balance”;

“We are a small team and it is difficult to organize holidays, and the communication between the different professions in the department is also an issue”;

“Work load is too high for our staff. Leads to mistakes, stress, etc. Cannot plan anything in the evenings due to uncertainty of when I'll be able to get work done. We do not have enough people and everytime we lose someone, it takes too long to find a replacement and everyone suffers. The hospital always has this cycle of lots of people leaving at the same time and it gets worse every year” and “more and more is expected of you and in a shorter period of time”;

“If we separate it in different categories the conditions are met differently: - education/ congress/ seminar: really good – everything is paid for - even the social gathering which shows value in us also connecting with other people. - Patient care: as good as the situation gives us the opportunity to - working equipment: could be better – a lot is falling apart

without any backup - there is even stuff we have to tape together to make them hold on longer - personnel: really good team, really open communications, good doctors, all respectful, good head RTT who looks out for us -working hours/ Saturdays: ok, could be better with fewer Saturday's, the break times are great- lunch break has an optimal time - salary: room for improvement, people won't be staying long if the salary won't increase... there should be a yearly increase in salary even if it's a little bit”;

Regarding the workload on the treatment unit, seven RTTs indicate the maximum (very high) in the scale and 3 the second worst level.

As **aspects that they mentioned as being most challenging**, ten RTTs refer that the team is too few for the number of patients (high workload) we take care of daily, a lack of time, “Knowing every day that we are working with less staff than are needed- doing the job of other people and still no financial recognition”;

“The need to complete important tasks at the same time, which can reduce the quality of care and increase the likelihood of errors. Finding time to get everything done. Have to do a lot of overtime and it doesn't feel like there is a choice”;

“Delays caused by patients who do not have a full bladder or a full rectum”;

“No time to do other tasks, that doesn't mean directly treatment of the patients”;

“The fact that we have to run 2-3 hours, to be on time again”;

“I started this job in this department because I valued the time and communications with the patient and really being there for them throughout the treatment. Just to make them not feel too burdened everyday to come in. But now, everything is falling behind only to squeeze in one more Patient. There is no room for a second of thinking twice or if the patient isn't ready (bladder for example). It stresses me out that the moral of the whole thing why I started in

this department is not correlating to the daily, as it was in the past. Now it feels like it's all about the money, the competition with other hospital not to lose the patient to them - just because we would be starting the treatment a day or two later - and not about the person/ the patient anymore. Also the irregular working hours that got added, changing shift last minute, more Saturday shifts than what was promised in the beginning”;

About the topic **career development**, seven RTTs answered that the career developed how they would like, most of them are satisfied but refers that the more responsibility doesn't mean a significant financial remuneration. Two are not satisfied how the career developed in the department and one RTT mention do not really have a plan.

Regarding **how the RTTs see their career in the next five years**, five of them would like to do more functions in the department and have more responsibility, “I would still see me working in this department, because there are flaws everywhere, I just hope we can do our best to minimize it and grow together. To look back after 5 years and see what we have accomplished. I can also see myself doing part time this current job and part time something else. To get myself a little change of pace.” Three RTTs don't know now but would look for a job in another Hospital with better work conditions, if the situation in the department don't change in the next time. One RTT will look for better conditions in another Hospital “If it doesn't improve, I'll look for better working conditions at another hospital” and the other RTT would like to work in a company dedicated to the industries and not treating patients directly.

Ninety percent of the RTTs felt **emotionally and physically** exhausted and very exhausted after work.

Ninety percent of the RTTs see a **relationship between the workload and the exhaustion** at end of the workday and ninety percent of the RTTs see a relationship between their job satisfaction/dissatisfaction and the desire to either stay or quit the job.

Sixty percent of the RTTs **think about leaving this job for another job in the same profession** and they hope to find factors in another job in the same profession as: “more time for a patient, more guidance for the patient, more rest on the machine, more challenging, more flexibility, higher salary”;

“Better staffing level and career development”;

“RTT is an exhausting field to work in general, but if I had a choice I would take a position with a lighter work load”;

“Better work conditions (salary and workload), less stress, more stable working hours and a better career development”;

In terms of **thinking about leaving this profession as RTT to work in another field**, nine RTTs answered this question, and around sixty percent think about this between often and very often.

The reasons mentioned about **leaving the profession** are: more challenging, more flexibility and higher salary.

“The stress level on the machine is big and to stay healthy the most people will change the profession one day or look for other functions”; Less stress, attractive salary, looking for a challenge and work life balance were mentioned as well.

The **possibility of doing other functions as a RTT** interest seventy percent of the RTTs. The functions mentioned are: leadership role, having more responsibilities on the equipment, learning planning and contouring, and development of new projects.

Sixty percent of the team would see **new/added technology** as a positive change to redesign our standard treatment processes. Forty percent don't think so and mention

reasons such as the necessity of improving our work conditions first. For example, “Although I think new technology is a positive thing to redesign our standard treatment process, I feel like we have to work on improving the current situation first, for example: improving the staff levels (enough staff), improving working conditions of staff (pay, workload, less stress etc..), improving work/life balance, improving great culture within the department. I feel once all these improvements are done then we can work on improving our technology to attract more patients and staff”;

“We need more time and especially more people to treat, the technology won't give us more time”;

“Technology should not replace the personnel, otherwise the quality decreases”;

Ninety percent of the **RTTs are interested in working from home** (home office) and ninety percent of the RTTs assume that **this possibility would increase their job satisfaction.**

About their **opinion regarding working from home**, they would welcome this initiative, most of them refers the necessity of being in the department taking care of the patients when we have such a short staff as we have, but this possibility would be good for some tasks and for some RTTs with special responsibilities. “At home there would be fewer distractions, so I could accomplish more in the same time period”;

“It's a good possibility to have a day without the stress on the machine”;

The **kind of tasks** they think that would be possible do it from home are: Weekly chart checks, first checks on plans, end of therapy reports, research, project work, other computer work, treatment planning and contouring.

The **ways how the RTTs think our job could be redesigned to increase job satisfaction** included some variable answers.

“Maybe a four day week could be an option. - Less Saturday shifts - Working from home sounds very attractive (provided we have enough staff) -Skill/Career Development - Clear Career Path - Performance Recognition -Good Work/Life Balance”;

"Need more time during each week to sit and work on other things, not just treating patients. Work hours should be more fixed, not changing every day”;

“We have a tight schedule. I am going to lose as little energy as possible if we are behind. I can run faster, the advantage is small, and I am dead/empty at the end of my work day and maybe we need to look more at how can we create calm on the unit that everyone goes home with energy”;

“Using new technologies to make the work conditions better and having more time for the patients”;

“If a helping hand (without them being a RTT) is working on the linac it can help increase the workflow and relieve the RTT for a little break. But at the same time, the job comes with interaction with patients which is so beautiful but can also be stressful when there is a difficult patient. Whatever it is, if we take that completely away there also might be people who wouldn't want to do the job anymore. But it may also open a door for people who don't really like working too closely with patients. There are positives and negatives in every situation. The best thing to do is run a test trial. To see how if it works. If we are so far with the technology that working from home to be the second RTT for the match I believe that will also be a huge boost in satisfaction”;

Eight RTTs made additional comments about job satisfaction and job redesign: “For our clinic, a bigger Team would make a difference. It would also be nice to have a clearly defined program for progress within the Team and as an RTT. The Team needs to feel more appreciated with more than just words, but actions”;

They also made comments about wanting to see change in terms of work conditions (salaries, work time, more RTTs in the team, get automatically the day off on the birthday, fewer Saturday shifts, more time for other tasks, not having to treat patients for the whole day and are able to switch to other tasks).

The aspects that most satisfy/dissatisfy the team were very clear. The answers were dependent on the individual and almost all in the same direction. These were in accordance with other studies done from different countries around the world (Halkett et al., 2018; Hutton & Eddy, 2013; Jasperse et al., 2014; Probst & Griffiths, 2009; Sehlen et al., 2009; Taylor & Oetzel, 2020). About the home office possibility, it would be good for some RTTs, but there are RTTs that prefer to stay on the unit treating patients. “I didn’t chose to be a RTT so that I could work from home. I like working with people. Only a small fraction of our tasks can be done in an office setting and I wouldn’t see the point in going to that effort”;

Moving on to the second part of this project, how to redesign the treatment process on the unit, we can see the collective perspective of how the RTTs (eleven RTTs answered) would redesign the treatment process on the unit:

Table 1: Perspective from the team about redesigning the job on the treatment unit

Task	1. RTT (Online)	2. RTT (Offline)	Technology	Could be done by a student/non RTT Professional instead of 2. RTT
Open Patient Imagingblatt (Image record document)	X			X (10)

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Call patient into changing room (& first day talk)	X			X (11)
Open the patient on ARIA treatment console and prepare imaging	X			
Prepare treatment couch for individual patient positioning	X			X (10)
Bring patient into treatment room	X			X (11)
Patient identification (DOB, ID photo)	X	X (1)	X (2)	X (7)
(Bladder filling patients ultrasound, Day 1-3 or by problematic daily filling)	X	X (2)		X (7)
Align patient (using AlignRT)	X		X (3)	X (8)
Move gantry to start position as per imaging protocol	X	X (2)		X (8)
Prepare treatment console for image	X	X (1)		X (1)
Perform patient and plan identification	X	X (1)		X (5)
Complete Imaging document	X	X (1)		X (9)
Take image	X	X (2)		
Match image	X	X (9)		
Apply shifts	X	X (1)		X (1)
Take AlignRT reference capture	X			X (11)
Beam on	X			
(Correction of AlignRT– if patient has shifted out of tolerance, Send to Couch etc.)	X	X (6)	X (1)	X (2)
Treatment end – close patient profile	X			X (1)
Take patient down from Couch	X			X (11)
Return gantry to start position	X			X (10)

Accredited by:



Ranked by:



Clean equipment & prepare for next patient	X			X (11)
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With these results, it is possible to understand, the team is open to redesign the treatment process on the unit. There are some tasks where the presence of the offline RTT would be mandatory, like matching the image and the correction of AlignRT. Most of them however, could be done with the help of a student or a non-RTT Professional. The use of technology is an option for some tasks of the process, instead of the presence of an offline RTT, like aligning the patient and patient identification – for this one, we don't have at the moment, any system that can do it. There are some tasks though, where the presence of the online RTT is enough.

What comes next

The study aimed to gain an understanding of the perceptions of RTTs working in Winterthur, particularly factors contributing to intent to remain in the workplace and leave the RT profession. RTTs identified high workload, work pressure, salary, staff shortage “as significant factors that influence their decision to stay in both the workplace and profession; this is consistent with previous research on health care professionals” (Halkett et al., 2017). There are a lot of work for the number of RTTs in the team and they know how important is to give time to the patients. The high number of patients combined with having less time for the patients, was referred to as a dissatisfying factor.

There is evidence in these answers that the RTT workforce is exhausted, and that this is another point that reflects that the health care organizations must be more resilient than ever. The organizations can no longer simply react to unfolding events. The aspects that more dissatisfy the team, are still the similarly referred by the RTTs that left the department during the last five years and unfortunately, there still are RTTs in the that will look for a job in another hospital or worse, completely switch to another profession with less stress and more

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satisfying in terms of work conditions. The organizations need to focus on people and purpose in order to achieve a truly sustainable business model. With this, it will be possible to anticipate and mitigate risks. Good workforce retention is fundamental to guaranteeing a well-functioning, cost effective health service able to deliver positive health outcomes for its patients.

All this is challenging for organizations, because there is a delicate balance between achieving good results and managing risks using a human-centered approach, in order to attract and retain talent in a demanding area.

As Probst and Griffiths wrote in 2009, is important to “consider what elements of the job and work environment influence job satisfaction” (Probst & Griffiths, 2009). Now we have the results and the next step is to definitively define the priority areas for action - how to change the work conditions in order to change the intention to leave of the RTTs, in order to decrease any future losses from the profession.

It is not possible to define one way that could be adopted in all RT departments. This is a continuous work that has to be done, in terms of understanding what the needs of the RTTs in each department are, to achieve good job satisfaction. Flexible working conditions, salary and opportunities for career advancement have the highest impact on workforce satisfaction and retention of the RTTs.

One day, we could all become a cancer patient, but we cannot all become an RTT – We need to put our attention on them, without them, the patients cannot be treated.

The patients deserve the best care, but the staff cannot be forgotten. Even with the best technology that the RT departments could have, this will never be a substitution for the RTTs.

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Exhibit 1

Job description in the department

Linac (treatment unit)

The Linac is used by the RTTs to treat cancer patients with high radiation dose.

The skills required for working on the Linac are both technical and administrative. The RTT must be able to trouble-shoot the treatment schedule of patients each day while also administering radiotherapy accurately and efficiently. There are approximately 40-50 patients treated per day, per Linac and each patient on average has a time slot of 10 minutes. Therefore time pressure is evident working on the Linac, but emphasis is placed on doing the work correct firstly, then doing the work as quickly as possible to optimise each patient time slot. Technical errors and mistakes can be quite common if proper attention is not used, therefore constant attentiveness is warranted in order to correctly and quickly treat each patient. Additionally, we must deal with patients on a social level and address their issues and questions while trying to balance other tasks. So it becomes easily evident that the role on the Linac alone is multi-faceted and requires an acute sense awareness at all times. Each patient is unique in their treatments, so this acute awareness is required to ensure that each specific patient need is attended to and executed correctly.

Planning Computed Tomography (CT):

The work in planning CT involves taking an initial high quality image, i.e. CT scan, as instructed by the responsible doctor in order to better understand the extent of the cancer that will be eventually treated on the Linac. Dependent on treatment site, there may be various preparations required prior to CT which the RTTs must monitor before taking a CT scan. The RTT must be attentive to the parameters the responsible doctor has requested for the CT as

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repeating a CT is generally something that should be avoided. There is also quite a bit of administrative work involved in this role, as the CT needs to be passed on to treatment planning and all parameters of the CT must be well documented for the multi-disciplinary team to understand.

Treatment Planning:

The work involved in treatment planning includes importing CT scans, contouring target volumes for treatment and creating treatment plans for the Linac. This role is more computer-based and requires much less patient interaction. RTTs will work with a number of software programmes to ensure that the tumour is correctly and accurately delineated and that the correct dose is given to the tumour. This role involves a lot of interaction with the multi-disciplinary team such as with physics, doctors and dosimetrists.

Contouring:

As previously mentioned, this role requires RTTs to delineate the tumour under the instruction of the responsible doctor. Furthermore, they will delineate organs near the tumour on the CT image so that the treatment planning RTTs can sufficiently avoid giving too much dose to such sensitive organs.

Orthovoltage therapy:

This is another treatment machine which RTTs will use to treat superficial tumours such as those in skin cancer, however most of the patients will present to this machine with benign conditions such as arthritis or plantar fasciitis. It is a low-dose treatment as compared to that on the Linac.

Brachytherapy:

This type of treatment is preformed by RTTs and doctors for patients with gynaecological tumours. It is possible to treat other tumours with brachtherapy such as lung and prostate however in our department we mostly treat cervical, uterine and vaginal tumours using live source seeds, which are administered to the patient via small tubes that are inserted by a doctor prior to treatment. This treatment differs from the linac and orthovoltage treatments as this radiation is administered via a live source of *Iridium-192* which is constantly emitting radiation, unlike on the other machine where the radiation source is switched off after each treatment. Therefore, radiation safety is of utmost importance with brachytherapy to ensure staff and patient safety.

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Exhibit 2

Questions for the survey:

1. Identify your job satisfaction level after your first six months working in the department (range between 1-6) – very satisfied/ dissatisfied)
2. Identify your job satisfaction level now (range between 1-6) – very satisfied/ dissatisfied)
3. What factors influence your job satisfaction? Free answer
4. What is dissatisfying about your job as a RTT? Free answer
5. What is most satisfying about your work as a RTT? Free answer
6. What are your views regarding your current work conditions? Free answer
7. How is the workload on the Linac? ((range between 1- (low workload) – 6 (very high workload))
8. What aspects of your current role do you find most challenging? Free answer
9. Has your career developed as you had planned? If not, what has hampered your career development? Free answer
10. What do you see your career in the next five years? Free answer
11. How often do you feel physically exhausted after work? range between 1- (rarely exhausted) – 6 (very often exhausted)
12. How often do you feel emotionally exhausted after work? range between 1- (rarely exhausted) – 6 (very often exhausted)

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13. Do you see any relationship between the workload and your exhaustion at the end of the workday? Yes or no
14. Do you see any relationship between your job satisfaction/dissatisfaction and your desire to either stay or quit your job? Yes or no
15. How often do you think about leaving this job for another job in the same profession? Range between 1-6 (never – very often)
16. What do you hope to find in another job in the same profession? Free answer
17. How often do you think about leaving this profession to work in another field? Range between 1-6 (never-very often)
18. If you think about leaving the profession, what are the reasons?
19. Would the possibility of doing other functions as a RTT be interesting for you? (Yes or no)
20. What other functions would you like to try? Free answer
21. Would new/added technology be a positive change to redesign our standard treatment processes? Yes or no
22. If no, why not? Free answer
23. Would the possibility of working from home (home office) interest you? Yes or no
24. Would this possibility increase your job satisfaction? Yes or no
25. What is your opinion about working from home? Free answer
26. What kind of tasks, in your opinion, are possible to do from home? Free answer

27. In what ways do you think our job could be redesigned to increase job satisfaction? Free answer

28. Do you have anything else, you would like to write about the topics job satisfaction and job redesign?

Exhibit 3

Table 1: Tasks of the treatment process on the treatment unit

Task	1. RTT (Online)	2. RTT (Offline)	Technology	Could be done by a student/non RTT Professional instead of 2. RTT
Open Patient Imagingblatt (Image record document)	X			
Call patient into changing room (& first day talk)	X			
Open the patient on ARIA treatment console and prepare imaging	X			
Prepare treatment couch for individual patient positioning	X			
Bring patient into treatment room	X			
Patient identification (DOB, ID photo)	X			
(Bladder filling patients ultrasound, Day 1-3 or by problematic daily filling)	X			
Align patient (using AlignRT)	X			
Move gantry to start position as per imaging protocol	X			
Prepare treatment console for image	X			
Perform patient and plan identification	X			
Complete Imaging document	X			

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Ranked by:



Take image	X			
Match image	X			
Apply shifts	X			
Take AlignRT reference capture	X			
Beam on	X			
(Correction of AlignRT– if patient has shifted out of tolerance, Send to Couch etc.)	X			
Treatment end – close patient profile	X			
Take patient down from Couch	X			
Return gantry to start position	X			
Clean equipment & prepare for next patient	X			

Accredited by:



Ranked by:

