

PRISMA-RT

the first association in the health
care industry
that benchmarks incident data

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The development of a national patient safety network for the Dutch Radiotherapy, has been named PRISMA-RT. This is based on the benchmark of incident analyses (PRISMA) among 17 radiotherapy organizations. In this publication the whole process and the experiences of participants are shared.

Summary

PRISMA-RT was established in 2008, as a cooperation of 17 of the 21 Dutch Radiotherapy organizations. These radiotherapy organizations developed a national database. The development of the national initiative for benchmarking incident analyses within Dutch radiotherapy, originated with two cooperation projects between different radiotherapy departments. By means of the national database system, 17 Radiotherapy departments are able to collect (near) incidents reports digitally, analyze incidents and report these

analyses to the organization. The 17 departments all use the PRISMA method to analyze their (near) incidents. The primary objective of this initiative is to improve processes and increase patient safety within radiotherapy by comparing the root causes of incidents. Besides benchmarking on the organization level, it is also possible now to do this on a national level. PRISMA data (root causes) and context variables are transferred from individual databases to a central benchmark module. To exchange information and support benchmarking, a website was established.

Introduction

Patient safety is an increasing concern of health care organizations. Data from the Institute of Medicine in the US shows that every year between 44.000 and 98.000 people die as a consequence of medical errors in the US. [1, 2, 3, 4]. By order of the former minister of Health, Welfare and Sport in 2004 Mr. R. Willems, former president director of Shell The Netherlands, wrote a report on patient safety within Dutch hospitals. One of the recommendations of the report “Hier werk je veilig of je werkt hier niet” [5] (Here you work safe, or you don't work here at all) was that all hospitals were required to implement a clinical risk management system (CRMS) in 2008. The report indicates that important pillars for a CRMS are a good quality incident reporting system and a safe reporting culture.

In 2007 comparative research was undertaken in The Netherlands by means of analyzing 7,926 medical records. Results of the research showed that every year 1,735 patients died because of mistakes made in the medical sector and as well, approximately 30,000 patients suffered consequences of medical errors.

6,000 of these patients suffered permanent disabilities. 5.7% of this group of patients were related to unintentional damage and 2.3% related to avoidable damage.

Unintentional damage may occur as a consequence of not acting according to the professional standards of a care provider and/or the shortcomings of a health care system. [6]

It is hard to obtain reliable information on medical errors for several reasons.

Radiotherapy was no exception. Unlike surgery, in radiotherapy usually the effect of possible errors made during the treatment are not immediately visible. [7] The latent effects of adverse radiotherapeutic treatments, such as radiation proctitis, fistula formation, telangiectasia, often appear after a period of months or years. The relationship between latent effects of radiotherapy and prior treatment are not difficult to prove, but the effects are not always recognized by non-radiotherapists. A second reason is that a significant part of radiotherapy patients are getting palliative treatment. Because of the short life expectations, potential damage may also not be visible.

Radiotherapy is a complex and risky treatment which is given to about 35,000 patients with cancer every year in The Netherlands. Radiotherapy is continuously innovating processes and techniques, which results in improved treatments, but because of complexity, the chance of errors increases.

Errors in radiotherapy can have serious consequences; overdosing may result in injury of healthy tissue with the risk of complications. On the other hand, underdosing of the tumour can lead to a decreased chance of recovery. It is increasingly important that existing quality systems and built-in checkpoints are evaluated and adjusted to new techniques frequently. In order to decrease the risk of occurrence of errors, it is important to report and analyze both incidents and near incidents, because the root causes that lead to errors are often identical. [8]

So, analyzing near incidents can help to prevent serious incidents from happening, because this will produce information on weaknesses in the organizations' processes. This causal relationship has already been proven within the airline industry. [9]

This information offers the opportunity to set out specific improvement measures, before serious incidents develop. The PRISMA analysis method [10] is very suitable in this case.

This method was originally developed for the petrochemical industry [11] and has been adjusted to the health care industry by Prof. dr. T. van der Schaaf. [12]

Usually, patient safety activities are at the organizational level. Each organization has tried to increase their level of safety in their unique own way. If we want to raise patient

safety to a higher level within the specialty of radiotherapy, benchmarking data with fellow organizations is an essential next step. This way, an organization is not only able to learn from its own (near) incidents, but also from the experience of other organizations. At the moment, there is little known about similar initiatives within health care.

Within radiotherapy, a web-based safety information database from the ESTRO (European Society for Therapeutic Radiology and Oncology) is available at the European level, known as ROSIS (Radiation Oncology Safety Information System). But this database compares different incident categories and does not use an analysis method. The PRISMA-RT network is the first network in Europe that uses the root causes of (near) incidents data for collective learning.

Background

The foundation for the PRISMA-RT association was laid years ago. In 1984 the Catharina hospital started registering incidents. Over the past years, this has been more and more refined. In 1995 the PRISMA method was introduced and eventually it developed into a registration system for quality failures and (near) incidents. In 2002 the Erasmus MC hospital started with a digital incident registration and management system (IQS). Also in 2002 the PRISMA method was introduced in the MAASTRO Clinic and by 2003 data on root causes was being reported. In the Catharina hospital, the Erasmus MC hospital, as well as the MAASTRO Clinic the implementation of a good registration and analysis system created a significant increase of the willingness to report and a positive culture shift. This created more openness about reporting and discussing incidents at all participating sites.

Figure 1. Fault Tree

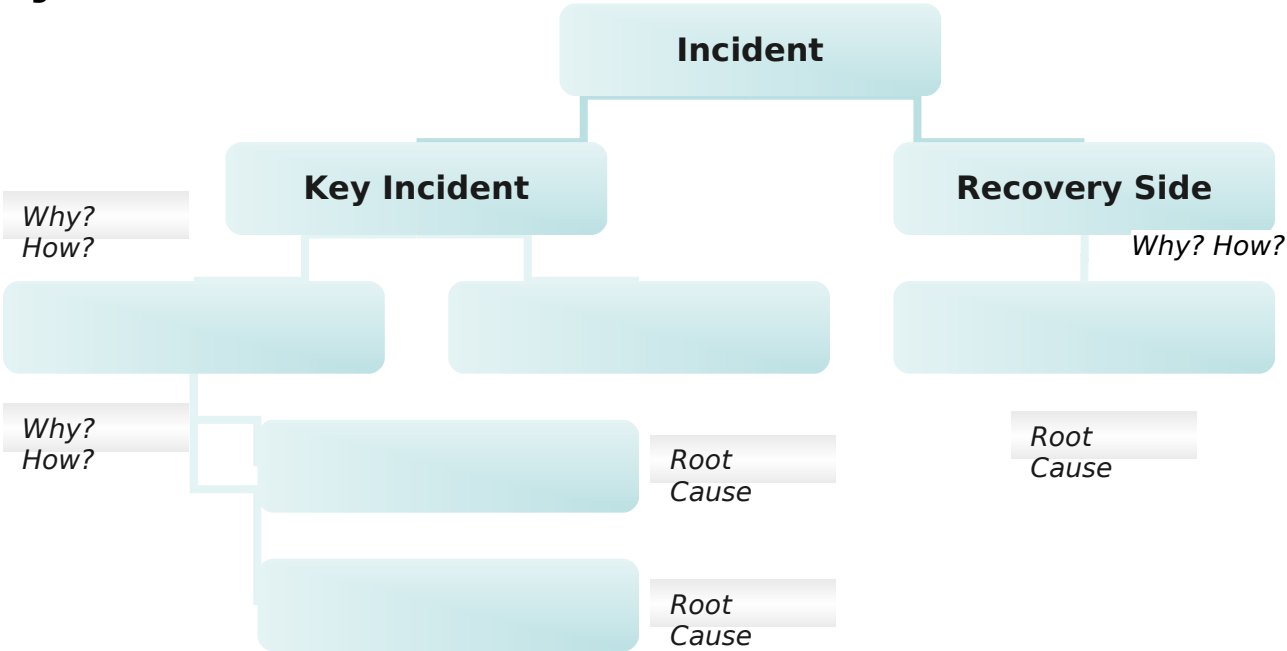




Figure 2. Overview of context variables the way they are visible in the database

Method

The PRISMA process includes 7 steps: collect, select and research, incident description, classification, reporting, interpretation and training. Every (near) incident report is being analyzed by means of a tree structure (fault tree), in order to identify root causes. (Figure 1)

For root cause classification the Eindhovenens-Classification Model (ECM) is being used. [13] For this purpose, 21 different codes are defined each divided into 4 categories: human, technical, organization or patient related. [14,15]

In addition, context variables in which the incident occurred are being determined.

Besides general context variables, specific human, technical and organizational context variables are determined. All this data is stored in a database.

On a periodic basis, analyses on the root causes are being undertaken to determine the risk trends within the organization. By means of the corresponding risk classification matrix further improvement opportunities can be determined, then improvement projects can be set up.

In 2008 PRISMA-RT, a cooperation of 17 Dutch radiotherapy organizations, was established. PRISMA-RT is the acronym for Prevention, Recovery and Information System for Monitoring and Analysis in RadioTherapy. All members of PRISMA-RT have established a multidisciplinary safety reporting committee. Reporting process problems is being completed electronically by the professionals that are involved in the process. Analysts skilled in the PRISMA method analyze the reports.

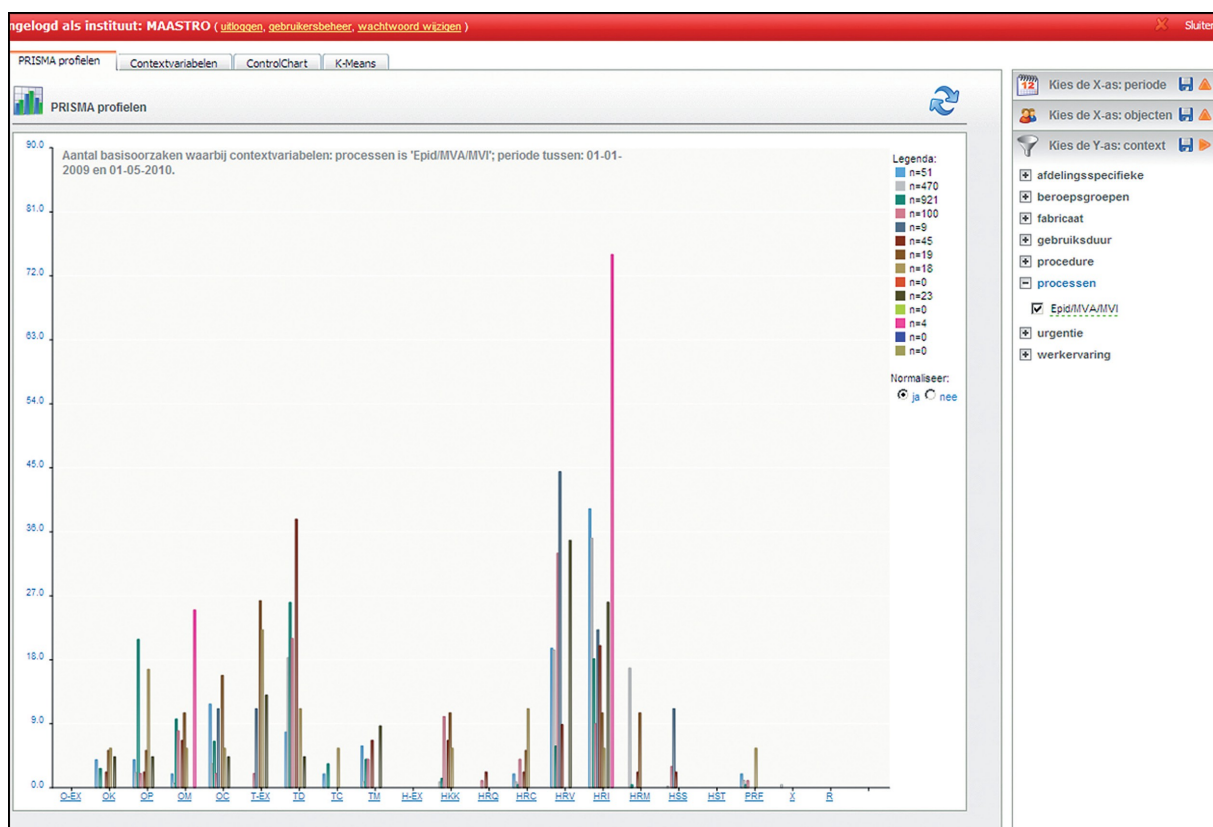


Figure 3, View of benchmark module, in the PRISMA-RT database for the selected process Epid/MVA

PRISMA-RT network

In order to develop a national database, selection criteria were drawn up in PRISMA-RT by a selection committee of the organizations involved. The criteria were divided into the following main categories: ICT & information security, analysis functionalities, user-friendliness and flexibility. Furthermore conditions were established for the organizations' participation in the association in order to guarantee the quality of the data. For example, the organization needed to be skilled in the PRISMA method and the organization needed to be willing to share their classification code and contexts as part of the national benchmark database (figure 2).

Development and results

In 2003 the MAASTRO Clinic gave a presentation to the OZRC organization (Consultation Independent Radiotherapy Centres) to encourage implementation of the PRISMA method. In 2004 a PRISMA training session was organized so that the reliability and the consistency of the cause classification and the reports were guaranteed. Employees were trained in the classification method and they had the opportunity to practice with their own reports, and with incidents from other sectors. In 2004 and 2005 the two benchmark projects were started and a number of master and bachelor investigations have been executed with the PRISMA database of the MAASTRO Clinic. One of the benchmark projects was based on the comparison of data from the PRISMA analysis of the EPID/MVA processes within OZRC organizations. A second project concerned the comparison of PRISMA analysis data within two processes: data transfer and patient identification, at three organizations.

The first steps to establish the association were taken in 2006. Research was initiated for the selection of the supplier of the collective database. In 2007 the two benchmark projects were finished and a follow-up research was started. The Patient Safety Company was selected for the supply of the database and further development for the national cooperation of radiotherapy. PRISMA-RT chose for the database based on the PRISMA method developed by The Patient Safety Company.

The development of a special module made it possible to benchmark through this database. In order to do this the existing software product was adapted and refined. The database had been placed physically on a central location at the DHD (Dutch Hospital Data), a cooperation of NVZ (Dutch Hospitals Association) and NFU (Dutch Federation of University Medical Centers) in Utrecht, The Netherlands. Eventually two contracts were drawn up with the association within the framework of this cooperation. In 2008 the database was implemented within every participating organization, training has been provided in relation to the database and the association has been officially established and registered with the Dutch Chamber of Commerce. Both a board and a team of experts have been put together to support the association. A website was developed in 2009 (www.prisma-rt.nl). In October of that same year the first research on the reliability of reviewers took place among the analysts of the involved organizations. This was combined with a central causality meeting. By the end of 2009 the first benchmark data from the collective database has been analyzed, so that the learning curve for the organizations began (figure 3).

Discussion

PRISMA has proven to be a useful instrument for systematic quantitative and qualitative information in relation to patient safety. Known incidents are being caused by several factors, which can be divided into human, technical, organizational and patient related causes by means of the PRISMA method. At the moment 17 of the 21 radiotherapy organizations participate in the PRISMA-RT network. We hope that in the short term the remaining organizations will also join the network. Meanwhile there also has been interest from outside the Dutch boundaries to participate in the project and possibly then it will grow into an international network. Reporting and analyzing near incidents provides organizations with insight in the potential risks and can lead to the reduction of real incidents. Besides analyzing risks, monitoring and evaluating improvement measures is also an important strength of the model. Originally PRISMA was developed for the petrochemical industry. Sharing information on incidents has

proven that this will reduce the amount of adverse events. Since 2008 also the Dutch Health Care Inspectorate is working with this analysis method. Our own results show that the PRISMA method is very effective for radiotherapy organizations. The willingness to report (near) incidents increased significantly after the introduction of PRISMA.

	Participating organizations	Representatives organizations
Amsterdam	AMC	Mrs. M. Bunck van der Laag
Arnhem	Arnhems Radiotherapeutisch Instituut	Mrs. E. van Schaik
Tilburg	Dr. Bernard Verbeeten Instituut	Mr. T. Naber
Eindhoven	Catharina Ziekenhuis	Mr. A. Joustra
Rotterdam	Erasmus MC	Mrs. M. Bijl van Pijpen
Den Haag	HAGA Ziekenhuis	Mr. E. Ligthart
Zwolle	ISALA Klinieken	Mr. J. Aitink
Maastricht	MAASTRO Clinic	Mr. H. Backes
Enschede	Medisch Spectrum Twente	Mr. H. Hofste
Amsterdam	NKI-Antoni van Leeuwenhoek Ziekenhuis	Mrs. R. Gilles
Delft	Reinier de Graaf Groep	Mr. M. de Langen
Leeuwarden	Radiotherapeutisch Instituut Friesland	Mr. R. Kaatee
Deventer	Radiotherapeutisch Instituut Stedendriehoek en Omstreken	Mrs. K. Mondriaan
Groningen	UMCG	Mr. P. v.d. Hulst
Utrecht	UMCU	Mr. W. Tulling
Amsterdam	VUmc	Mrs. M. Antonisse
Vlissingen	Zeeuws Radiotherapeutisch Instituut	Mr. J. Duvivier

The ratio between reported incidents and near incidents is a good indicator for the existing reporting culture. The most crucial factors that determine risk awareness and a good reporting culture are a no-blame environment and motivation of the management [16]. Because the root causes of near incidents and incidents are identical, the analysis of near incidents provides valuable information that can help reducing the risk of adverse events (Iceberg).[17] One condition that must be met to implement and compare a PRISMA database at several departments is that inter-assessor reliability research must be done to make sure that the method is being carried out in the same way by every organization. Besides that, the periodic training of analysts in the PRISMA method is also important. All reports need to be analyzed so that the data input is consistent at all participating organizations so that it becomes comparable.

The cooperation may possibly be expanded with the introduction of the prospective risk analysis method, Healthcare Failure Mode and Effect Analyses (HFMEA), within PRISMA-RT. HFMEA is a systematic proactive method that can help an organization to expose the weaknesses in processes and to prioritize their risks. This way, important improvement measures can be determined and set in place. In addition, financial consequences can be included and the costs of reporting, analyzing and recovery of near incidents can be investigated. Monitoring the reports and constructing a connection with the impact of extra time, material, waste and production loss can be included.

Conclusion

The PRISMA analysis method is a useful tool in radiotherapy that generates both qualitative and quantitative information systematically on the risks in patient safety. Furthermore radiotherapy is particularly suitable to compare processes because of the high degree of protocolization within a high-tech complex care environment. The PRISMA-RT association has shown that the collective database is useful. Within a relatively short period, we successfully trained the Dutch radiotherapy sector in the PRISMA method and introduced a collective database for the organizations involved. The most important goals we achieved were :

- the opportunity to learn from each other, improving the safety awareness
- improving the reporting culture and also the reduction of risks

Finally, we successfully established a national network that makes it possible to introduce new safety initiatives thus creating an advanced patient safety system for the entire sector. The intent of the cooperation is to bring patient safety to a higher level within radiotherapy in The Netherlands. In the near future we expect that there will be further validation of this approach.