Improving Interdisciplinary Communication: Barriers and Facilitators for Implementation of Standardized Structured Reporting in Oncology

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ABSTRACT

Background: Standardized structured reporting (SSR) improves quality of diagnostic cancer reporting and interdisciplinary communication in multidisciplinary team (MDT) meetings, resulting in more adequate treatment decisions and better health outcomes. However, use of SSR varies widely among pathologists, but might be encouraged by MDT members (MDTMs). Our objectives were to identify barriers and facilitators (influencing factors) for SSR implementation in oncologic pathology from the perspective of MDTMs and their determinants. **Methods:** In a multimethod design, we identified influencing factors for SSR implementation related to MDT meetings, using 5 domains: (1) innovation factors, (2) individual professional factors, (3) social setting factors, (4) organizational factors, and (5) political and legal factors. Four focus groups with MDTMs in urologic, gynecologic, and gastroenterologic oncology were conducted. We used an eSurvey among MDTMs to quantify the qualitative findings and to analyze determinants affecting these influencing factors. **Results:** Twenty-three MDTMs practicing in 9 oncology-related disciplines participated in the focus groups and yielded 28 barriers and 28 facilitators in all domains. The eSurvey yielded 211 responses. Main barriers related to lack of readability of SSR: difficulties with capturing nuances (66%) and formulation of the conclusion (43%); lack of transparency in the development (50%) and feedback processes of SSR templates (38%); and lack of information exchange about SSR between pathologists and other MDTMs (45%). Main facilitators were encouragement of pathologists' SSR use by MDTMs (90%) and expanding the recommendation of SSR use in national guidelines (80%). Oncology-related medical discipline and MDT type were the most relevant determinants for SSR implementation barriers. **Conclusions:** Although SSR makes diagnostic reports more complete, this study shows important barriers in implementing SSR in oncologic pathology. The next step is to use these factors for developing and testing implementation tools to improve SSR implementation.

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Background

Optimal treatment plans developed by multidisciplinary teams (MDTs) are essential for high-quality cancer care.[1,2] The central position of MDTs in cancer care demands high-quality MDT meetings, including diagnosticians and treatment providers, which can be measured with a key set of quality criteria.[3]

A crucial criterion of MDT meetings is the availability of relevant and sufficient information about the diagnoses of patients discussed. In MDT meetings, diagnostic information is mainly provided by pathologists and radiologists.[4] Research has shown that inadequate pathology and radiology information can cause MDT decision failures.[5,6]

Traditionally, diagnostic findings were reported with narrative reporting (NR). Currently, multiple studies have indicated that standardized structured reporting (SSR) improves the quality of oncology reporting, particularly the timely, complete, and accurate exchange of diagnostics and treatment information between medical disciplines.[7–11] Within pathology, these improvements in reporting resulted in more adequate risk assessments among patients with colorectal cancer, with more patients defined as high-risk receiving adjuvant chemotherapy, leading to improved overall survival (65.0% vs 62.4%).[7]

Despite the clear benefits of SSR, implementation of pathologists' reporting of diagnostic information with SSR templates is suboptimal.[12] Literature shows both national and international variation in SSR use in pathology.[13–17] Pathologists might be encouraged by MDT members (MDTMs) to use the available SSR templates more often to improve pathology reporting quality.

Uptake of SSR is demanding because various medical disciplines and information technology (IT) systems

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are involved. According to Grol and Wensing,[18] a tailored implementation strategy could improve the uptake of an innovation such as SSR. Factors influencing innovation implementation should be explored and used to develop the implementation strategy and tailor it to the factors found.[18] Influencing factors of pathologists' SSR implementation have already been investigated.[12] The most important barriers were lack of nuance in SSR, lack of support from MDTMs, and lack of connected IT systems. The most important facilitator was the incorporation of speech ability within SSR templates.[12]

The next step is to explore which factors influence SSR implementation among MDTMs to develop a combined and targeted implementation strategy. Therefore, this study aimed to qualitatively identify barriers and facilitators that MDTMs encounter in SSR implementation, especially in oncologic pathology reporting in MDT meetings; quantify influencing factors to select the most common ones in a nationwide survey; and analyze the determinants affecting these influencing factors so we could better fit the implementation strategy.

Methods

Study Design

Our multimethod study combined focus groups with a national web-based survey among MDTMs participating in urologic, gynecologic, and gastroenterologic oncology MDT meetings.

Setting

The PALGA Foundation is developing national SSR templates (see supplemental eTable 1, available with this article at JNCCN.org) to improve pathology reporting since 2009.[20]

MDT meetings take place in different hospital types (nonuniversity, university, specialized). The MDT discusses pathology reports to decide about diagnostics, treatments, and follow-up of patients with cancer. These reports are uploaded to the hospital information system (HIS) as fixed-text documents.

Ethical approval was obtained by the regional review board for human research (CMO Arnhem-Nijmegen dossier number 2018-4124).

Participants and Recruitment

Focus Groups

We organized 4 focus groups with MDTMs to explore barriers and facilitators in SSR implementation: 1 for gynecologic oncology, 1 for urologic oncology, and 2 for lower gastroenterologic oncology.[24] We chose these oncology disciplines because almost half of the SSR templates relate to them.[20] Invited MDTMs were medical oncologists, pathologists, radiologists, radiation oncologists, gynecologists, gastroenterologic surgeons, gastroenterologists, urologists, nuclear medicine physicians, and nurse practitioners.

We contacted the Netherlands Comprehensive Cancer Organization for support in contacting MDT chairs. Next, we purposively recruited participants from 4 MDT meetings (10–22 members) from different hospital types. We recruited early adapters, middle majority, and laggards of SSR.[25]

Survey

Analogous to the focus group recruitment, MDTMs operating in gynecologic, urologic, or gastroenterology oncologic care were included in the survey. The survey was distributed through multiple channels between October 26, 2018, and January 16, 2019 (see supplemental eTable 2, available with this article at JNCCN.org). Approached MDTMs were asked to share the survey hyperlink with their MDT comembers and colleagues. For a precise estimation of the barriers and facilitators, we aimed to include 171 participants, based on an assumed SSR implementation of 50%, α=0.05, and predication of estimation of 0.0075.[26] Survey completion took 10 to 15 minutes.

Instrument Development and Data Collection

Focus Groups

We developed an interview guide to structure the focus groups. The interview guide was derived from an interview guide used in another study regarding barriers and facilitators in SSR and was assessed by the multidisciplinary project team.[12]

The interview guide consisted of 4 parts: (1) exploring knowledge regarding SSR, (2) exploring the amount of experience with SSR, (3) asking about the perceived barriers and facilitators with SSR during MDT-meetings, and (4) asking about how to improve SSR-implementation in oncological pathology. Perceived influencing factors were structured with the domains of the implementation science frameworks of Flottorp et al[27] and Grol and Wensing[18]: innovation factors, individual professional factors, social setting factors, organizational factors, and political and legal factors.

Informed consent was signed prior to the focus groups. All focus groups were chaired by a junior researcher assisted by a senior researcher, who audiotaped and took notes. The focus groups lasted 20 to 46 minutes and took place after MDT meetings.

Survey

We developed an eSurvey with LimeSurvey (version 2.06+). This eSurvey was based on theoretical frameworks of Flottorp et al[27] and Grol and Wensing,[18] results of the focus groups with MDTMs, and results of a focus group with PALGA liaisons. We organized this additional focus

group to explore communicational and technical implications of SSR implementation. Most important findings were the various methods of communicating updates, lack of connected IT systems, and the inactive role of medical associations in encouraging SSR implementation.

The survey started with 2 inclusion questions, 7 about individual characteristics, 4 about SSR-usage in the MDT-meeting, and 5 about MDT characteristics. Next, 42 theses were posited about influencing factors of MDTMs with SSR. These were classified according to the implementation science frameworks and were scored on a 4-point Likert scale (1 – strongly disagree to 4 – strongly agree). When relevant, "not applicable" was included. The survey ended with an open-ended question asking for suggestions for improvement of SSR implementation. The survey did not accept unanswered questions. As a pilot, 2 project members and 1 gastroenterology resident independently tested the survey for ease of use and content and it was approved by the multidisciplinary project team. It was validated by calculating Cronbach α per domain.

Data Analysis

Qualitative Analysis

All focus group discussions were transcribed verbatim for content analysis. Two researchers used ATLAS.ti, version 8.3.16 (ATLAS.ti Scientific Software Development) to independently extract barriers and facilitators in SSR implementation from the transcripts. The factors were allocated to the domains of the implementation science framework of Flottorp et al,[27] except for the patient domain because patients are not directly involved in SSR implementation. Based on this framework, each encoder established an independent coding tree. To establish one refined coding tree, the researchers discussed both. If there were discrepancies, they discussed coding with each other and, when needed, with the senior researcher until they achieved consensus.

Quantitative Analysis

We used SPSS Statistics, version 25 (IBM Corp) for statistical analyses. We coded missing data including the answer option "not applicable" as such and excluded them from analysis. We performed descriptive statistics to determine the proportions of agreement of MDTMs with the influencing factors of SSR implementation. We considered a barrier or facilitator to be an important factor when more than one-third (33%) of the survey respondents (fully) agreed. To compare differences in agreement on the survey items between pathologists and the other MDTMs, we dichotomized the answer options (fully agree and agree; fully disagree and disagree) to perform chi-square tests. We used Bonferroni correction for multiple testing. To analyze determinants for the influencing factors, positive formulated items were reversed. We performed factor analysis to construct underlying domains. Domains with Cronbach $\alpha \geq 0.7$ were considered valid. We calculated mean scores, wherein a high mean score implied a barrier and a low mean score implied a facilitator. Additionally, characteristics were excluded from analysis when the sample size per group was too small (<5% of total sample size). Respondent characteristics investigated were age (years), experience (years), sex, position, medical discipline, hospital type, familiarity with existence and layout of SSR templates, and MDT type involved. MDT characteristics were SSR use by pathologists of MDT meetings (Table 1); presence, absence, and additional value of pathologists during MDT meetings; central reporting of MDT decisions; and presence of an MDT chair. We used univariate regression analyses to test the relationship between determinants affecting influencing factors for SSR implementation that emerged from the qualitative part of the study and the domain scores. Determinants with $P<.20$ were selected for multivariate regression analyses. One at the time, nonsignificant determinants were removed from the multivariate model until all determinants were statistically significant ($P<.05$), based on 2-sided tests. We used content analysis to analyze suggestions for improvement of SSR implementation provided in the open-ended question.

Results

Responses and Characteristics

Focus Groups

A total of 23 MDTMs participated in 4 focus groups: 14 men and 9 women, with an average work experience of 14.3 years (range, 1–31 years). Seven MDTMs participated in the gynecologic focus group, 6 in the urologic focus group, and 5 in each of the 2 lower gastroenterology focus groups (10 total). Five MDTMs (22%) worked in a university hospital, 6 (26%) in a specialized hospital, and 12 (52%) in nonuniversity hospitals.

Survey

Table 1 presents characteristics of survey participants and their MDT meetings. A total of 296 responses were received, with 212 respondents (72%) completing at least 50% of the statements of the survey. One respondent was excluded because of age exceeding the maximum criterion of 68 years, resulting in 211 remaining respondents. The respondents' average age was 46 years (range, 28–66 years) and their average work experience was 12 years (range, 1–38 years). Of the 211 respondents, 36% were involved in gastroenterologic MDT meetings, 19% in urologic MDT meetings, 16% in gynecologic MDT meetings, and 29% in combined MDT meetings.

Table 1. Survey Respondents and Their MDT Meetings Characteristics

Characteristics	n[a] (%)
Survey respondents (N=211)	
Age, mean [SD], y	46 [0.65]
Years of experience, mean [SD], y	12 [0.60]
Sex	
Male	108 (51%)
Female	103 (49%)
Position	
Nurse/Nurse physician	12 (6%)
Resident	17 (8%)
Medical specialist	182 (86%)
Medical discipline	
Imaging clinicians[b]	24 (11%)
Pathologists	57 (27%)
Treating clinicians[c]	130 (62%)
Hospital type	
Nonteaching/Teaching hospital	131 (62%)
University/Specialized hospital	80 (38%)
Familiarity with SSR templates	
Yes	176 (83%)
No	35 (17%)
Familiarity with SSR templates layout	
Yes	151 (72%)
No	60 (28%)
Type of MDT meeting involved	
Urologic oncology	39 (19%)
Gynecologic oncology	34 (16%)
Gastroenterologic oncology	77 (36%)
Mixed	61 (29%)
Last-attended MDT meeting	
Use of SSR by pathologists of MDT meeting	
Yes	138 (80%)
No/Sometimes[d]	35 (20%)
Presence of pathologist at MDT meeting	
Yes	199 (94%)
No	12 (6%)
Less pathologists present due to a lack of personnel	
Yes	30 (14%)
No	181 (86%)
Presence of pathologist has additional value	
Yes	201 (95%)
No	10 (5%)
MDT meeting notes were presented centrally	
Yes	155 (74%)
No	56 (26%)
A permanent chair was present at the MDT meeting	
Yes	166 (79%)
No	45 (21%)

Abbreviations: MDT, multidisciplinary team; MDTM, multidisciplinary team member; SSR, standardized structured reporting.
[a]Significantly more MDTMs who ended the survey early were less familiar with SSR (43% vs 17%; P=.000) and were imaging clinicians (26% vs 11%; P=.004) compared with MDTMs not ending the survey early.
[b]Radiologists and nuclear medicine physicians.
[c]Medical oncologists, urologists, gynecologists, surgeons, gastroenterologists, radiation oncologists, and nurse practitioners.
[d]The answer option "do not know" (n=38) was excluded from analysis.

MDTMs' Perspective on SSR Implementation

Focus Groups

We identified 28 barriers and 28 facilitators from the focus groups in all domains. In the innovation domain, most influencing factors related to the readability and content of the SSR. In the social setting domain, most influencing factors related particularly to the workflow of pathologists with their MDT comembers. Table 2 shows influencing factors cited in ≥2 focus groups. These influencing factors are illustrated with quotes, which were translated from Dutch to English (supplemental eFigure 1).

Survey

Barriers and facilitators were found for all domains. The barrier of external hospitals not using SSR was excluded because of too many missing values (52%). Cronbach α ranged from 0.7 to 0.8 (Table 3). Specifically, significant (P<.05) differences in perceived barriers and facilitators within these domains between pathologists and other MDTMs are shown in supplemental eTable 3.

Innovation Factors

Various influencing factors related to the compatibility, credibility, and observability of SSR were found in the innovation domain (Figure 1). Main obstacles for MDTMs with SSR were difficulties with capturing nuances (66%; n=167), caused by a lack of use of the free text within SSR templates among pathologists, and with the formulation of the conclusion (43%; n=167). Another main barrier mentioned was lack of transparency regarding responsibilities for design of the SSR templates, inclusion of additional features, and implementation (50%; n=211). Moreover, MDTMs were unaware of an SSR template working group evaluating SSR templates (38%; n=211). Less than 25% of MDTMs stated that SSR lacked compliance with MDTMs' information needs, although 37% (n=163) lacked information about regional arrangements

Table 2. Most Frequently Mentioned Barriers and Facilitators of SSR During Focus Group Interviews (n=4)

Domain	Barriers	Focus Groups, n
Innovation factors	Lack of important clinical information in the SSR	3
	Poor readability of generated pathology report (both microscopy and conclusion)	3
	Double and/or conflicting information within the SSR	3
	Development of SSR unknown to MDTMs	2
Individual professional factors	Additional value of SSR unknown to MDTMs	3
	SSR makes pathologists sloppy	2
	Negative attitude of MDTMs regarding SSR	2
Social setting factors	Disturbed partnership between pathologists and their MDT comembers	3
	Lack of important information in SSR causes inefficient MDT meetings	2
	Multiple conclusions could be drawn from the same SSR	2
	Unknown value of SSR use in MDT meeting	2
	External laboratories do not use SSR	2
Domain	**Facilitators**	**Focus Groups, n**
Innovation factors	Improvement of involvement of MDTMs within the development process of SSR templates	2
	Improvement of readability of SSR	2
	Advantage of adequate research data within databases due to SSR use	2
	Advantage of more complete pathology reports due to SSR use	2
	Advantage of more uniform pathology reports due to SSR use	2
Individual professional factors	Positive attitude of MDTMs toward SSR	4
	Familiarity with SSR templates	3
Social setting factors	MDTMs should promote SSR use among pathologists	2
	Improve the alignment between pathology reporting and requests for proper MDT information	2

Abbreviations: MDT, multidisciplinary team; MDTM, multidisciplinary team member; SSR, standardized structured reporting.

or clinical trials (35%; n=164). Some mentioned facilitators of SSR compared with NR, including improvement of uniformity (98%; n=167), completeness (90%; n=166), and data usage for research and quality improvement purposes (90%; n=163). Increasing MDTMs' involvement in the development of SSR templates (57%; n=211) and including early pathology research findings in SSR templates (55%; n=211) were other facilitators.

Individual Professional Factors

Figure 1 provides results of the individual professional factors. Many MDTMs had a positive attitude regarding SSR and called for increased SSR use by pathologists (84%; n=211). Less than 25% of the MDTMs were unaware of the additional value of SSR, with a difference between pathologists and other MDTMs (5% vs 28%) (supplemental eTable 3).

Social Setting Factors

In Figure 2, several barriers are displayed regarding communication and referral processes between pathologists and other MDTMs. MDTMs reported lack of communication on updates and new SSR templates from pathologists as a barrier (45%; n=131). Moreover, MDTMs inability to make correct treatment decisions due to a lack of nuances in SSR (45%; n=150) reported. Thus, MDTMs were afraid to overlook nuances in SSR because it led to black-and-white conclusions (35%; n=150).

MDTMs also reported facilitators in communication, referral, and team processes. SSR use resulted in improved pathology reports (88%; n=134) and saved time (80%; n=124). Furthermore, respondents felt that both regional MDTMs (90%; n=179) and MDT chairs (81%; n=179) should encourage pathologists to start using SSR, and that local MDTMs could encourage other pathologists by explaining the additional value of SSR (74%; n=179).

Organizational Factors

MDTMs mentioned several incentives of SSR implementation (Figure 2). Among these, respondents suggested

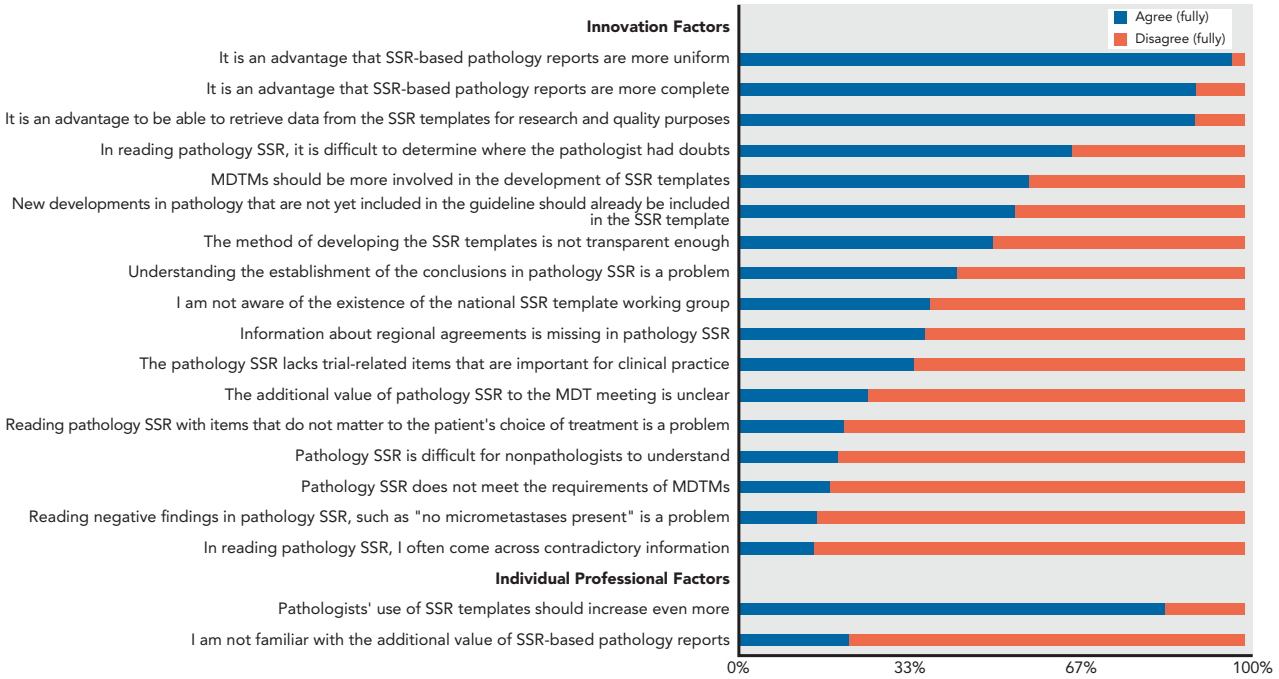

Figure 1. MDTM answers to theses about the social setting factors, organizational factors, and political and legal factors of SSR.
Abbreviations: MDT, multidisciplinary team meeting; MDTM, multidisciplinary team member; SSR, standardized structured reporting.

that PALGA could improve their feedback process of SSR templates' content, for example by analyzing information entered in the open text fields (78%; n=174); medical professional associations could improve their promotion of SSR use in pathology (71%; n=174); and inclusion of mandatory SSR use in both the audit criteria of the national pathology organization (68%; n=179) and quality of care institutes (68%; n=179) could serve as nonfinancial incentives to increase SSR use. These incentives were less often perceived as facilitators by pathologists (47%–49%) compared with the other MDTMs (77%) (supplemental eTable 3).

Political and Legal Factors

Figure 2 also shows results of political and legal factors. Most respondents agreed that all national oncology guidelines should recommend SSR use in pathology (80%; n=174), and 61% (n=174) agreed that SSR use should be mandatory in these guidelines, with a difference between pathologists (45%) compared with other MDTMs (68%).

Improvements for SSR

Most frequently yielded improvements to SSR implementation by MDTMs were including mandatory use of SSR in oncologic guidelines, improving the readability of SSR, improving cooperation of MDTMs in the development process, improving the ability of providing nuances in SSR templates, and regularly mentioning the benefits of SSR to encourage use.

Determinants of Barriers and Facilitators in SSR Implementation

Mean scores of the domains were >1.8 (range, 1–4) (Table 3). Univariate regression analyses resulted in multiple determinants for all domains except the social setting. After multivariate regression analyses (Table 3), medical discipline and MDT type remained significant determinants for all 4 domains. Concerning medical discipline, pathologists were less in favor of organizational incentives and regulations regarding SSR implementation compared with oncology-treating clinicians. Regarding MDT type, gastroenterologic oncology MDTMs had a more positive attitude toward SSR than gynecologic oncology MDTMs. When MDTMs knew SSR was used by pathologists, they were more in favor of especially political and legal facilitators promoting SSR use. Age was a determinant regarding political and legal factors: when age increased, pathologists had a more positive view regarding regulations for encouraging SSR use.

Discussion

This multimethod study provides an in-depth view on MDTMs' experiences with SSR explored in the domains of the frameworks of Flottorp et al[27] and Grol and Wensing,[18] and indicates several barriers and facilitators in SSR implementation. Most important barriers related to the innovation domain were difficulties with readability: extracting doubts of pathologists from SSR and formulation of the

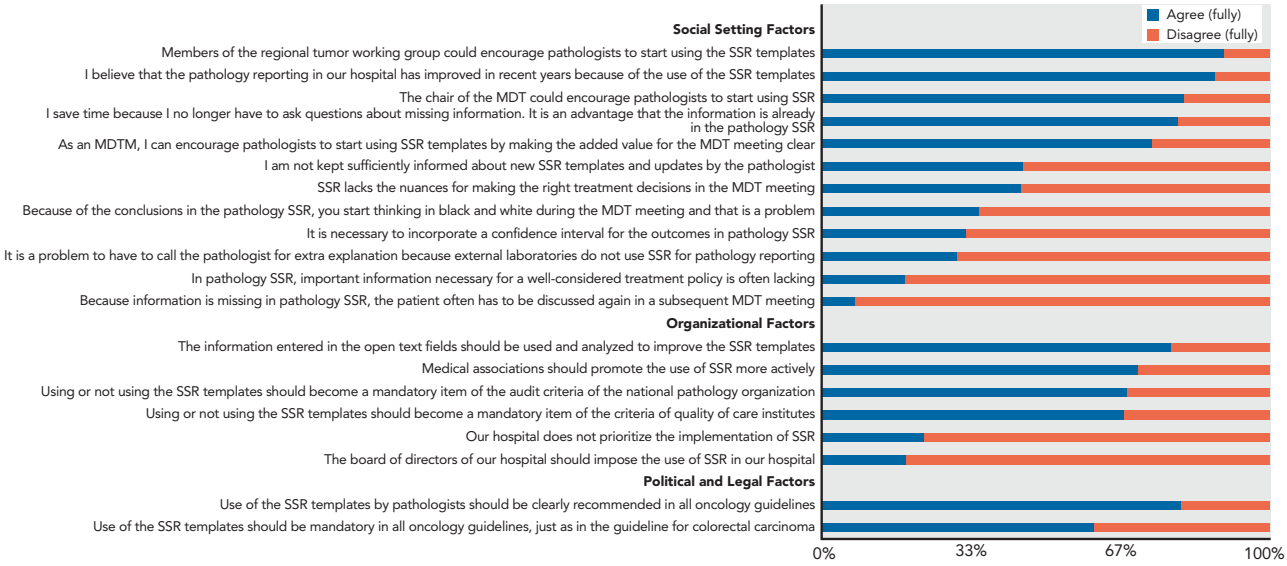

Figure 2. MDTM illustrative quotes about barriers and facilitators in SSR.
Abbreviations: MDT, multidisciplinary team meeting; MDTM, multidisciplinary team member; SSR, standardized structured reporting.

automated conclusion. A number of elements were lacking, including transparency in the development and feedback process and local information within SSR. In the social setting there was a lack of SSR-related information exchange between pathologists and MDTMs. Most important facilitators related to almost all domains, as in the innovation domain, the completeness of SSR. Other important facilitators were development of an effective feedback system in the organization domain, and were related to political and legal factors, such as establishing a policy among medical professional associations encouraging SSR use and increasing recommendations for SSR use within guidelines. Oncology-treating clinicians were more in favor of incentives and regulations regarding encouragement of SSR use than pathologists.

Readability of SSR was considered a substantial obstacle to SSR implementation in MDT settings. From the template perspective, according to Nakhleh,[28] the availability to add urgent information is an important factor in effective pathology communication and reporting when using SSR. However, a recent review stated that SSR should be sufficiently self-explanatory and additional information should be provided in the additional text field.[29] Renshaw et al[30] already suggested the need for additional study on the use of different formats and use of available free text within SSR templates. A promising development is the integration of speech recognition within SSR templates, which may encourage pathologists' use of these free text fields.[12] Future research could be focused on testing speech recognition software within SSR templates and determining the effect on SSR implementation.

From the report view, although graphic representation of data within SSR may also improve readability,[28] the layout of SSR currently depends on the type of HIS used during MDT meetings. Use of multiple HIS and laboratory information systems is a known obstacle in SSR implementation[12,30,31] and highlights the conclusion of Lankshear et al,[32] who emphasized the importance of technologic considerations in SSR's usability and design. When connecting data resources to improve multidisciplinary exchange of diagnostic findings, it will be essential to review the readability and layout of the output. Moreover, regarding the conclusion formulation, it is already possible to adjust the automatic generated conclusion or to draft one from scratch. However, this depends on the laboratory setting and effort of the pathologist to adapt or draft this improved version of the conclusion. Several suggestions are made by Renshaw et al[30] to improve readability of pathology reports established by the use of SSR templates. Future research could be aimed at finding a general, instead of a local, solution to improve the generated conclusion.

Lack of transparency and involvement in development and feedback processes, and improved alignment of information provision between pathologists and other MDTMs were important factors influencing MDTMs' perspectives regarding SSR. Lack of stakeholder involvement, such as by clinicians, was an important obstacle to SSR implementation in Canada.[33] In the United States, pathologists can customize the SSR templates developed by the College of American Pathologists to improve clinicians' satisfaction with SSR. Consequently, addendums for additionally requested information have increased significantly. Web-based technology is used to easily update templates and to keep them customized after

Table 3. Determinant Analyses

Domain	Items, n	Respondents, n	Cronbach α	Domain Score,[a] Mean (SD)	Determinant	*P* Value	β (95% CI)	
1 Innovation factors	17	156[b]	0.74	2.15 (0.30)	Medical discipline	.013	Imaging clinicians	0.22 (0.03 to 0.42)
							Pathologists	−0.06 (−0.16 to 0.04)
							Treating clinicians	Ref
					MDT type	.043	Gastroenterology	0.00 (−0.12 to 0.12)
							Gynecology	0.10 (−0.06 to 0.26)
							Urology	0.19 (0.03 to 0.34)
							Mixed	Ref
					SSR use	.001	No/ Sometimes	0.20 (0.08 to 0.33)
							Yes	Ref
2 Individual professional factors								
2.1 Knowledge and skills	1	211	—	—	—	—	—	
2.2 Attitude	2	211	0.69	1.76 (0.54)	Medical discipline	.019	Imaging clinicians	0.36 (0.10 to 0.63)
							Pathologists	0.01 (−0.17 to 0.18)
							Treating clinicians	Ref
					MDT type	.001	Gastroenterology	0.00 (−0.20 to 0.20)
							Gynecology	0.41 (0.16 to 0.65)
							Urology	0.23 (−0.01 to 0.46)
							Mixed	Ref

(*continued on next page*)

updates. However, pathology laboratories must be aware of interferences in case of national updates, which can cause technical challenges locally.[34] Therefore, adding customized questions to SSR templates is not possible in the Netherlands. To keep SSR template content up to date and thus continue to comply with the MDTMs' information need, it will be essential to collect feedback on SSR template content. To collect feedback from medical device users (eg, postmarket surveillance) will also be an important criterion of the new European regulation for medical devices.[35] Therefore, future research could focus on the development of a structured, transparent, and reliable feedback procedure, aiming to improve the alignment of SSR output with MDTMs' needs.

Related studies exploring the perspectives of treating clinicians receiving SSR reported mainly positive feedback.[14,15,32,36] Results about facilitators of SSR implementation in our study, such as improved completeness, are in line with the findings of Lankshear et al.[32] Additionally, Lankshear et al[32] found treating physicians were more satisfied with the overall SSR process compared with pathologists. This may explain why MDTMs in our study had a more positive attitude regarding incentives and mandatory regulations of SSR use compared with pathologists, because Dutch pathologists also encounter obstacles in implementing SSR.[12] This indicates the need for implementation tools to overcome the perceived barriers of SSR among pathologists.

Strengths of this study are that the perspectives of MDTMs from all oncology-related disciplines were involved in the analysis, and a broad and in-depth view of SSR implementation was gained in a structured manner via multimethod.

This study also has limitations. First, we could not calculate a survey response rate because of privacy regulations; we were not allowed to invite MDTMs individually. Furthermore, national data on the number of MDTMs, and more specifically, numbers of

Table 3. Determinant Analyses (cont.)

Domain	Items, n	Respondents, n	Cronbach α	Domain Score,[a] Mean (SD)	Determinant	*P* Value	β (95% CI)	
3 Social setting factors	11	96[c]	0.83	2.23 (0.38)	—	—	—	
4 Organizational factors	6	174[d]	0.70	2.37 (0.46)	Medical discipline	.002	Imaging clinicians	0.29 (−0.05 to 0.63)
							Pathologists	0.27 (0.12 to 0.42)
							Treating clinicians	Ref
					MDT type	.006	Gastroenterology	−0.12 (−0.30 to 0.06)
							Gynecology	0.25 (0.03 to 0.48)
							Urology	0.05 (−0.18 to 0.27)
							Mixed	Ref
					SSR use	.005	No/ Sometimes	0.25 (0.08 to 0.43)
							Yes	Ref
5 Political and legal factors	2	174[d]	0.75	2.28 (0.65)	Medical discipline	.002	Imaging clinicians	0.60 (0.25 to 0.95)
							Pathologists	0.29 (0.09 to 0.50)
							Treating clinicians	Ref
					MDT type	.016	Gastroenterology	−0.15 (−0.39 to 0.09)
							Gynecology	0.31 (0.00 to 0.62)
							Urology	0.07 (−0.23 to 0.37)
							Mixed	Ref
					SSR use	.000	No/ Sometimes	0.45 (0.21 to 0.69)
							Yes	Ref
					Age	.017	−0.01 (−0.02 to −0.00)	

Abbreviations: MDT, multidisciplinary team; MDTMs, multidisciplinary team members; SSR, standardized structured reporting.
[a]Mean domain scores range from 1 to 4.
[b]Significantly more MDTMs not familiar with SSR templates, from a nonteaching hospital, imaging clinicians and with MDT type urology did or could not respond to these questions.
[c]Group sizes too small (<5% of the total sample size) to include in linear regression analysis.
[d]Significantly more MDTMs not familiar with SSR templates and imaging clinicians did or could not respond to these questions.

MDTMs exposed to the survey, are lacking. Because SSR is more developed within pathology compared with other disciplines involved in MDT meetings, it is possible that individuals who did not respond were less familiar with SSR. However, by collecting data through a wide variety of channels and encouraging receivers of the survey to share the link with their MDT comembers and colleagues, we attempted to include as many MDTMs as possible and to minimize selection bias. As the study was focused on SSR in pathology, more pathologists were involved. Therefore, we added an additional analysis comparing pathologists with the other MDTMs, showing the differences in experienced barriers and facilitators of SSR. Furthermore, by incorporating the "not applicable" answer option, people not using SSR were also able to complete the survey and were able to skip questions for which additional knowledge about SSR was needed. Second, this study was conducted in the Netherlands. However, these findings can be translated to settings in which a national or regional organization is present to coordinate SSR implementation.

Conclusions

Although MDTMs benefit from SSR use by pathologists, barriers related to SSR implementation were perceived. The most important influencing factors for SSR implementation must be used to develop and execute strategies in close

collaboration with stakeholders to improve SSR implementation in pathology, both for pathologists as well as other MDTMs.

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Supplemental online content for:

Improving Interdisciplinary Communication: Barriers and Facilitators for Implementation of Standardized Structured Reporting in Oncology

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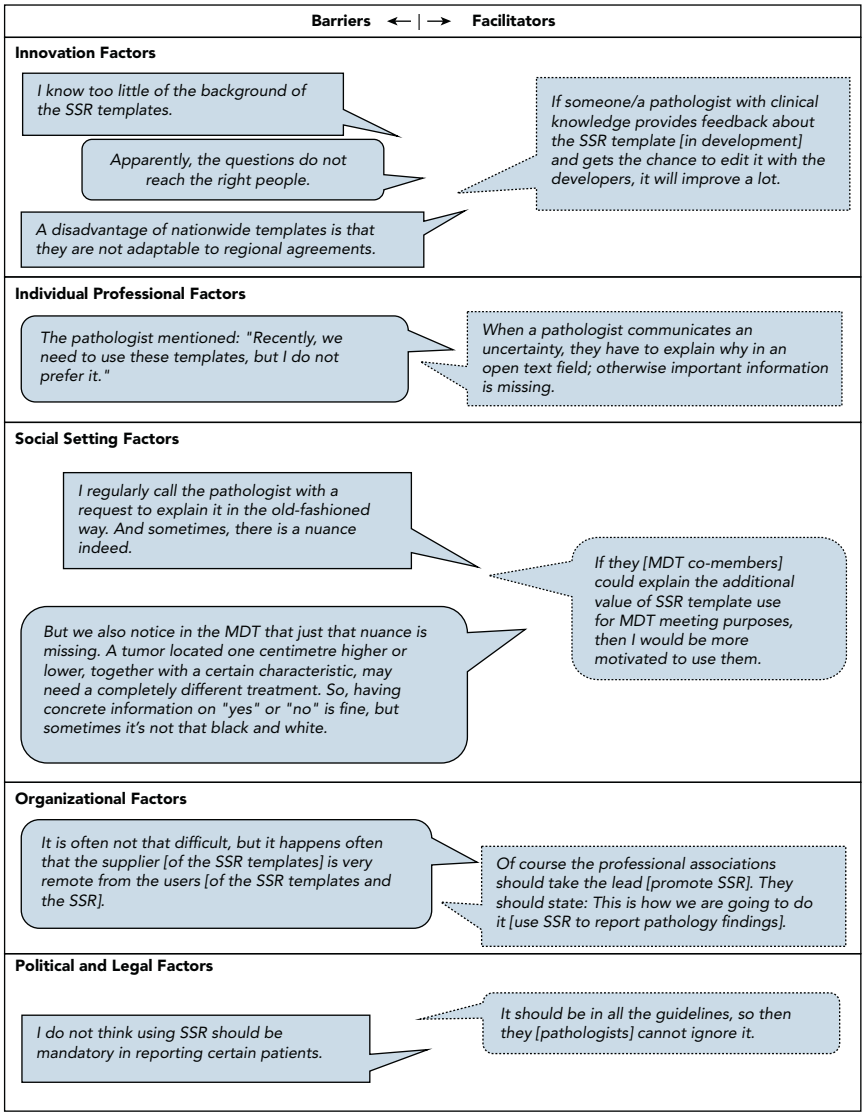

eFigure 1. MDTM answers to theses about the innovation factors and individual professional factors of SSR.
Abbreviations: MDT, multidisciplinary team meeting; MDTM, multidisciplinary team member; SSR, standardized structured reporting.

eTable 1. Information on the PALGA Foundation and SSR Templates

PALGA Foundation	SSR Templates
• Dutch network and registry of histopathology and cytopathology • Established in 1971 • Achieved nationwide coverage by 1991 • Currently 42 pathology laboratories are connected • Manages 2 databases containing all pathology reports in the Netherlands. Used for support of patient care, evaluation, monitoring of the population screenings programs, and scientific research purposes.[19] • Has a designated link with each laboratory: the PALGA liaison	• Enable SSR in pathology • Comprise the highest reporting level (level 6 in the Spectrum of Cancer Pathology Reporting)[13] • Consist of a minimal mandatory data set and additional nonmandatory items, both based on national and international guidelines.[21–23] • Automatically generate pathology reports ➤ Contain the clinical information, macroscopy and microscopy, and an automatically generated conclusion ➤ Additional information can be added manually ➤ Automatically generated conclusion can be turned off and a manual conclusion can be added

Abbreviations: HIS, hospital-information system; MDT, multidisciplinary team; SSR, standardized structured reporting.

eTable 2. Overview of the Distribution of the eSurvey

Discipline	Permission	Target Group	Type of Channel	Frequency
Strategy 1: Distribution by IKNL				
Gynecology	Regional tumor board chairs	Oncologic gynecologic tumor board members of IKNL	Email	2
Gastroenterology	Regional tumor board chairs	Oncologic gastrointestinal tumor board members of IKNL	Email	2
Urology	Not possible due to lack of regional tumor board chairs	—	—	—
Strategy 2: Distribution by medical associations				
Pathology	Dutch Society of Pathology	Pathologists and pathology residents	eNewsletter	3
Radiotherapy	Dutch Society of Radiotherapy	Radiotherapists	eNewsletter	3
Surgery	Dutch Society of Gastrointestinal Surgeons	Gastrointestinal surgeons	eNewsletter	1
Nuclear medicine	*Dutch Journal of Nuclear Medicine*	Nuclear medicine	eNewsletter	1
Radiology	Dutch Society of Radiology	Radiologists	Email	1
Urology	Dutch Society of Urology	Oncologic urologists	Email	2
Gynecology	Dutch Society of Gynecology	Oncologic gynecologists	Email	1
Pathology	Dutch Society of Pathology residents	Pathology residents	Email	2
Oncology-related disciplines	Dutch Society of Nurses and Nurse Practitioners	Nurses working in oncologic care	Email	1
Colorectal cancer-related disciplines	Dutch Colorectal Cancer Group	Colorectal cancer related disciplines	Email	1
All oncology-related disciplines	SONCOS	All oncology-related MDTMs	Website	1
Gastroenterology	Dutch Society of Gastroenterologists	Oncologic gastroenterologists	Website	1
Nuclear medicine	Dutch Society of Nuclear Medicine	Nuclear medicine	Website	1
Nuclear medicine	*Dutch Journal of Nuclear Medicine*	Nuclear medicine	Website	1
Strategy 3: Distribution by PALGA Foundation				
Pathology	PALGA Foundation	Pathologists	Website	1
			LinkedIn Page	1
Strategy 4: Distribution by study advisors				
All oncology-related disciplines	Not applicable	All oncology-related MDTMs	eNewsletter	1
Pathology	Chair of Dutch Society of Pathology	Pathologists and pathology residents	Email	1

Abbreviations: IKNL, Netherlands Comprehensive Cancer Organization; MDTM, Multidisciplinary team member.

eTable 3. Differences in Agreement With Barriers and Facilitators of SSR Perceived by Pathologists Versus Other MDTMs

Perceived Influencing Factors Per Domain	Pathologists[a] n (%)	Other MDTMs[b] n (%)	*P* Value
1. Innovation factors			
I am not aware of the existence of the national SSR template working group	4 (7)	76 (49)	.000[c]
Reading negative findings in pathology SSR, such as "no micrometastases present," is a problem	15 (28)	11 (10)	.003
Reading pathology SSR with items that do not matter to the patient's choice of treatment is a problem	18 (33)	17 (15)	.007
2. Individual professional factors			
I am not familiar with the additional value of SSR based pathology reports	3 (5)	43 (28)	.000[c]
3. Social setting factors			
I am not kept sufficiently informed about new SSR templates and updates by the pathologist	9 (2)	50 (55)	.001[c]
Because of the conclusions in the pathology SSR, you start thinking in black and white during the MDT meeting and that is a problem	25 (46)	28 (29)	.035
In pathology SSR, important information necessary for a well-considered treatment policy is often lacking	5 (9)	23 (24)	.027
4. Organizational factors			
Using or not using the SSR templates should become a mandatory item of the audit criteria of the national pathology organization	27 (49)	95 (77)	.000[c]
Using or not using the SSR templates should become a mandatory item of the criteria of quality of care institutes	26 (47)	95 (77)	.000[c]
Medical associations should promote the use of SSR more actively	32 (58)	91 (76)	.014
5. Political and legal factors			
Use of the SSR templates should be mandatory in all oncology guidelines, just as in the guideline for colorectal carcinoma	25 (45)	81 (68)	.004

Abbreviations: MDT, multidisciplinary team; MDTMs, multidisciplinary team members; SSR, standardized structured reporting.
[a]Not all questions were answered by all survey participants. Therefore, the results do not always relate to the total study population: pathologists (n=57) and other MDTMs (n=154).
[b]Medical oncologists, radiologists, radiation oncologists, gynecologists, gastroenterologic surgeons, gastroenterologists, urologists, nuclear medicine physicians, and nurse practitioners.
[c]Significant after Bonferroni correction for multiple testing (*P*=.001).