General Original Article

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Adherence to the RIGHT statement in Society of Interventional Radiology guidelines

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Abstract

Context: The Reporting Items for Practice Guidelines in Health Care (RIGHT) Statement was developed by a multidisciplinary team of experts to improve reporting quality and transparency in clinical practice guideline development.
Objective: To assess the quality of reporting in clinical practice guidelines put forth by the Society of Interventional Radiology (SIR) and their adherence to the RIGHT statement checklist.
Methods: In March 2018, using the 22 criteria listed in the RIGHT statement, two researchers independently documented adherence to each item for all eligible guidelines listed by the SIR by reading through each guideline and using the RIGHT statement elaboration and explanation document as a guide to determine if each item was appropriately addressed as listed in the checklist. To qualify for inclusion in this study, each guideline must have met the strict definition for a clinical practice guideline as set forth by the National Institute of Health and the Institute of Medicine, meaning they were informed by a systematic review of evidence and intended to direct patient care and physician decisions. Guidelines were excluded if they were identified as consensus statements, position statements, reporting standards, and training standards or guidelines. After exclusion criteria were applied, the two researchers scored each of the remaining clinical practice guidelines (CPGs) using a prespecified abstraction Google form that reflected the RIGHT statement checklist (22 criteria; 35 items inclusive of subset questions). Each item on the abstraction form consisted of a "yes/no" option; each item on the RIGHT checklist was recorded as "yes" if it was included in the guideline and "no" if it was not. Each checklist item was weighed equally. Partial adherence to checklist items was recorded as "no." Data were extracted into Microsoft Excel (Microsoft Corporation) for statistical analysis.
Results: The initial search results yielded 129 CPGs in the following areas: 13 of the guidelines were in the field of interventional oncology; 16 in neurovascular disorders; five in nonvascular interventions; four in pediatrics; 25 in peripheral, arterial, and aortic disease; one in cardiac; one in portal and mesenteric vascular disease; 37 in practice development and safety; three in spine and musculoskeletal disorders; 14 in venous disease; five in renal failure/hemodialysis; and five in women's health. Of the 46 guidelines deemed eligible for evaluation by the RIGHT checklist, 12 of the checklist items showed less than 25% adherence and 13 showed more than 75% adherence. Of 35 individual RIGHT statement checklist items, adherence was found for a mean (SD) of 22.9 items (16.3). The median number of items with adherence was 21 (interquartile range, 7.5–38).
Conclusion: The quality of reporting in interventional radiology guidelines is lacking in several key areas, including whether patient preferences were considered, whether costs and resources were considered, the strength of the recommendations, and the certainty of the body of evidence. Poor adherence to the RIGHT statement checklist in these guidelines reveals many areas for improvement in guideline reporting.

Keywords: clinical practice guidelines; evidence-based medicine; GRADE; interventional radiology; RIGHT statement.

Clinical practice guidelines (CPGs)—defined by the Institute of Medicine as "statements that include recommendations intended to optimize patient care that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care

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options"—are essential for providing evidence-based patient care.[1] To provide the highest quality recommendations for patients, guidelines must meet quality reporting standards.[2,3] Despite their importance, CPGs are poorly reported.[4] Clear and thorough CPGs can lead both to improved transparency in the guideline development process and to easier implementation of clinical practice recommendations.[5] Well-reported CPGs have the potential to reduce interventions that are harmful to patients while also facilitating the practice of cost-effective treatment for patients, providing outcomes of maximum benefit and minimum harm.[6]

Assessing the completeness of guideline reporting should be as vital to guideline development as assessing methodological quality. For example, a CPG may use robust methods to arrive at evidence-based recommendations, but if these methods are not reported, the trustworthiness of the recommendations can be called into question. To improve reporting quality and transparency in guideline development, a multidisciplinary team of experts, including editors, policymakers, epidemiologists, consumer representatives, clinicians, and methodologists from 12 different countries across the world collaborated to develop the Reporting Items for Practice Guidelines in Healthcare (RIGHT) Statement.[7] The accompanying 22-item RIGHT checklist offered as an itemized guide to complete reporting, with guideline developers, peer reviewers, and public readers as its intended users.[7]

Previous tools to assess the quality of CPGs were designed to assess both methodological and reporting quality. An example is the Appraisal of Guidelines for Evaluation and Research (AGREE) instrument and its updated form, AGREE II, which were created by an international team of guideline developers and researchers known as the AGREE Collaboration.[8] Despite assessing both the methodological and reporting qualities of CPGs, key components of reporting quality are still lacking.[8] The advantage of the RIGHT statement lies in its focus on completeness of reporting while offering a more thorough approach to assessing CPG reporting quality. For example, the RIGHT checklist includes items such as guideline development limitations and suggestions for future research, which are absent in the AGREE II instrument.[9] Furthermore, AGREE and AGREE II were created by a small group of guideline developers and researchers, rather than by a multidisciplinary team similar to those who developed the RIGHT checklist.

The RIGHT checklist is a valuable tool for reporting guidelines developers, peer reviewers and journal editors who review guideline reports, and healthcare practitioners in understanding and implementing a guideline in everyday practice.[7] Familiarity with the RIGHT checklist and applying it in clinical and research settings is beneficial to both osteopathic physicians and researchers. This study's objective was to evaluate the reporting quality of CPGs developed by the Society of Interventional Radiology (SIR) and to establish a baseline for improved reporting for new and updated guidelines. Using the RIGHT checklist as a standard index, we studied the strengths and weaknesses in CPGs adopted by the SIR.

Methods

Study design

Using the 22 criteria listed in the RIGHT checklist, two researchers (M.K., B.H.) independently searched the SIR website for CPGs and, for each guideline, documented adherence to each of the 22 items. The researchers independently abstracted and scored each of the CPGs using a separate prespecified abstraction Google form that reflected the RIGHT Statement checklist. Aggregated data were then recorded on a prespecified data abstraction form and extracted into Microsoft Excel for further statistical analysis.

Identification and selection of eligible CPGs

On March 5, 2018, two researchers (B.H., S.A-R.) independently searched the SIR website for CPGs. In the initial screening process, guidelines were included from all subcategories of interventional radiology listed by the SIR: cardiac; interventional oncology; neurovascular disorders; nonvascular interventions; pediatrics; peripheral, arterial, and aortic disease; portal and mesenteric vascular disease; practice development and safety; renal failure/hemodialysis; spine and musculoskeletal disorders; venous disease; and women's health. Initially, all CPGs in these respective topics were included.

Two researchers (B.H., S.A-R.) independently screened each guideline by title and full text in duplicate for inclusion. To qualify for inclusion, each guideline must have met the strict definition for a CPG as set forth by the NIH and Institute of Medicine. According to this definition, CPGs are statements informed by a systematic review of evidence and intended to direct patient care and physician decisions.[10] During the inclusion process, both researchers were blinded to the other's results. If discrepancies arose, they were to be resolved by group consensus with a third-party contributor;

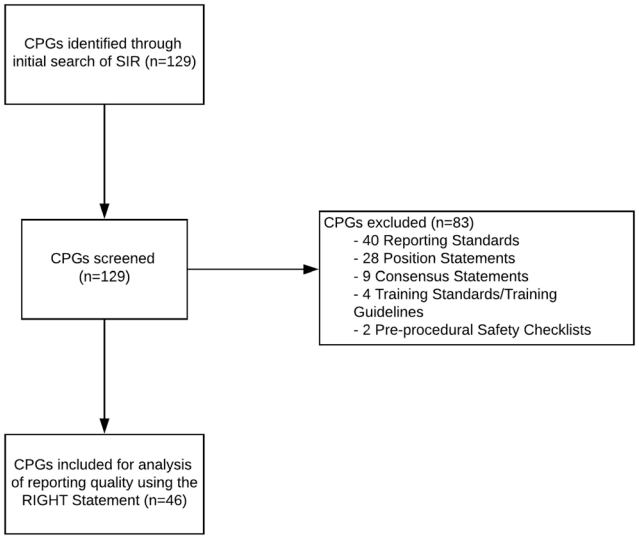

Figure 1: Preferred reporting items for systematic reviews and meta analyses (PRISMA) flow diagram documenting the literature search process conducted for this study. RIGHT, Reporting Items for Practice Guidelines in Health Care; SIR, Society of Interventional Radiology.

however, both researchers were in 100% agreement, and the third-party contributor was not needed.

Exclusion criteria included studies that were identified as consensus statements, position statements, reporting standards, and training standards or guidelines. A PRISMA flow diagram detailing the study selection process is presented in the Figure 1.

RIGHT checklist

The RIGHT checklist focuses on components deemed important for high reporting quality in CPGs. The initial development of this checklist was undertaken by a multidisciplinary international team of experts from 12 countries. The RIGHT checklist consists of 22 criteria that cover multiple domains, including basic information, background, evidence, recommendations, review and quality assurance, funding declaration, and management of conflicts of interest.[7] Prior to data abstraction, all authors of this article studied the RIGHT statement's explanation and elaboration document.[11] The elaboration and explanation document was written by the RIGHT group to guide readers in using the RIGHT checklist and provides detailed explanations of each item in the checklist with examples from literature that properly adhered to the item. The elaboration and explanation document was used as needed throughout the abstraction process, and the authors strictly adhered to this document and the examples it provided.

Data abstraction and verification

Two researchers (M.K., B.H.) independently abstracted and scored each of the CPGs using a prespecified abstraction Google form that reflected the RIGHT statement checklist. Both researchers were blinded to the decisions made by the other throughout the abstraction process. Each item on the abstraction form consisted of a "yes/no" option; each item on the RIGHT checklist was recorded as "yes" if it was included in the guideline and "no" if it was not. Each checklist item was weighed equally. Partial adherence to checklist items was recorded as "no." After scoring, each item for every CPG was verified by the second researcher. Any discrepancies were resolved via group consensus with the RIGHT Statement's Explanation and Elaboration document used as needed.

Data analysis

Data were exported into Microsoft Excel (Microsoft Corp.) for further statistical analysis. Once exported, the data were analyzed using descriptive statistics, including the mean, median, interquartile range, range, and standard deviation of adherence to the RIGHT checklist. Gwet AC1 was calculated to evaluate interrater reliability using Stata 16.1 (StataCorp).

Results

We identified 129 guidelines that were provided by the SIR. From this initial sample, 13 of the guidelines were in the field of interventional oncology; 16 in neurovascular disorders; five in nonvascular interventions; four in pediatrics; 25 in peripheral, arterial, and aortic disease; one in cardiac; one in portal and mesenteric vascular disease; 37 in practice development and safety; three in spine and musculoskeletal disorders; 14 in venous disease; five in renal failure/hemodialysis; and five in women's health.

After exclusion, our final sample size was 46 guidelines: four in neurovascular disorders; eight in peripheral, arterial, and aortic disease; four in pediatrics; three in interventional oncology; five in nonvascular interventions; 12 in practice development and safety; three in renal failure/hemodialysis; four in venous disease; one in spine and musculoskeletal disorders; one in portal and mesenteric

vascular disease; and one in women's health. The study characteristics for the CPGs included the year of publication, subcategory of interventional radiology, and level of adherence to the RIGHT checklist are shown in Table 1. Publication dates ranged from 2003 to 2017, with the highest number of articles published in 2010 (10; 21.7%).

Twenty-two criteria comprise the RIGHT checklist, with some criteria consisting of multiple components, resulting in 35 individual "yes/no" items for evaluating reporting quality. The number of checklist items that were adhered to for each of the guidelines ranged from a minimum of nine (25.7% adherence) to a maximum of 30 (85.7%).

Interrater reliability was within acceptable ranges (Gwet AC1 = 0.88; 95% CI = 0.86, 0.90). Across the 46 guidelines evaluated in our sample, the adherence rate reported for each checklist item ranged from zero (0% adherence) to 46 (100% adherence). Of 35 individual RIGHT checklist items and subitems, adherence was found for a mean (SD) of 22.9 (16.3) items. The median number of items with adherence was 21 (interquartile range, 7.5–38). Table 2 lists adherence to each of the RIGHT checklist items.

Thirteen items of the RIGHT checklist[8] had strong (>75%) adherence across the CPGs: (#1a) "identify the report as a guideline, that is, with 'guideline(s)' or 'recommendation(s)' in the title"; (#1b) "describe the year of publication of the guideline"; (#1c) "describe the focus of the guideline, such as screening, diagnosis, treatment, management, prevention, or others"; (#3) "define new or key terms, and provide a list of abbreviations and acronyms if applicable"; (#4) "identify at least one corresponding developer or author who can be contacted about the guideline"; (#6) "describe the aim(s) of the guideline and specific objectives, such as improvements in health indicators (e.g., mortality and disease prevalence), quality of life, or cost savings"; (#8a) "describe the intended primary users of the guideline (such as primary care providers, clinical specialists, public health practitioners, program managers, and policymakers) and other potential users of the guideline"; (#9b) "list all individuals involved in developing the guideline, including their title, role(s), and institutional affiliation(s)"; (#12) "describe the approach used to assess the certainty of the body of evidence"; (#15) "describe the processes and approaches used by the guideline development group to make decisions, particularly the formulation of recommendations (such as how consensus was defined and achieved and whether voting was used)"; (#16) "indicate whether the draft guideline underwent independent review and, if so, how this was executed and the comments considered and addressed"; (#17) "indicate whether the guideline was subjected to a quality assurance process and if yes, describe the process"; and (#20) "describe where the guideline, its appendices, and other related documents can be accessed."

Twelve items of the RIGHT checklist were met with weak (<25%) adherence across the CPGs: (#10a) "state the key questions that were the basis of the recommendations in the guideline in PICO (population, intervention, comparator, and outcome) or other format as appropriate"; (#11a) indicate whether the guideline is based on new systematic reviews done specifically for this guideline or whether existing systematic reviews were used"; (#11b) "if the guideline developers used existing systematic reviews, reference these and describe how those reviews were identified and assessed (provide the search strategies and the selection criteria, and describe how the risk of bias was evaluated) and whether they were updated"; (#13b) "present separate recommendations for important subgroups if the evidence suggests that there are important differences in factors influencing recommendations, particularly the balance of benefits and harms across subgroups"; (#13c) "indicate the strength of the recommendations and the certainty of the supporting evidence"; (#14a) "describe whether values and preferences of the target population(s) were considered in the formulation of each recommendation; if yes, describe the approaches and methods used to elicit or identify these values and preferences; if values and preferences were not considered, provide an explanation"; (#14b) "describe whether cost and resource implications were considered in the formulation of recommendations; if yes, describe the specific approaches and methods used (such as cost-effectiveness analysis) and summarize the results; if resource issues were not considered, provide an explanation"; (#18a) describe the specific sources of funding for all stages of guideline development"; (#18b) "describe the role of funder(s) in the different stages of guideline development and in the dissemination and implementation of the recommendations"; (#19b) "describe how conflicts of interest were evaluated and managed and how users of the guideline can access the declarations"; (#21) "describe the gaps in the evidence and/or provide suggestions for future research"; and (#22) "describe any limitations in the guideline development process (such as the development groups were not multidisciplinary or patients' values and preferences were not sought), and indicate how these limitations might have affected the validity of the recommendations."

Discussion

Although this study examined CPGs produced for interventional radiology, potential use of the RIGHT checklist

Table 1: Clinical practice guideline adherence to RIGHT checklist by topic.

Title of CPG and year of publication	Checklist items adhered to	Checklist items not adhered to	Overall adherence
Interventional oncology			
Quality improvement guidelines for transarterial chemoembolization and embolization of hepatic malignancy (2017)[18]	1a, 1b, 1c, 3, 4, 5, 6, 7a, 7b, 8a, 8b, 9a, 9b,10b, 12, 13b, 14c, 15, 16, 17, 20, 21	2, 10a, 11a, 11b, 13a, 13c, 14a, 14b, 18a, 18b, 19a, 19b, 22	62.86%
Quality improvement guidelines for transhepatic arterial chemoembolization, embolization, and chemotherapeutic infusion for hepatic malignancy (2012)[19]	1a, 1b, 1c, 3, 4, 5, 6, 7a, 7b, 8a, 9a, 9b, 10b, 12, 13b, 14c, 15, 16, 17, 20	2, 8b, 10a, 11a, 11b, 13a, 13c, 14a, 14b, 18a, 18b, 19a, 19b, 21, 22	57.14%
Radioembolization of hepatic malignancies: Background, quality improvement guidelines, and future directions (2016)[20]	1a, 1b, 1c, 3, 4, 5, 6, 8a, 9a, 9b, 10b, 12, 14a, 14c, 15, 16, 17, 20, 21	2, 7a, 7b, 8b, 10a, 11a, 11b, 13a, 13b, 13c, 14b, 18a, 18b, 19a, 19b, 22	54.29%
Neurovascular disorders			
2011 ASA/ACCF/AHA/AANN/AANS/ACR/ASNR/CNS/ SAIP/SCAI/SIR/SNIS/SVM/SVS guideline on the management of patients with extracranial carotid and vertebral artery disease (2011)[21]	1a, 1b, 1c, 2, 3, 5, 6, 7a, 7b, 8a, 8b, 9a, 9b, 10a, 11a, 11b, 12, 13a, 13b, 13c, 14a, 14b, 14c, 15, 16, 17, 19a, 19b, 20, 21	4, 10b, 18a, 18b, 22	85.71%
Multisociety consensus quality improvement guidelines for intra-arterial catheter-directed treatment of acute ischemic stroke, from the American Society of Neuroradiology, Canadian Interventional Radiology Association, Cardiovascular And Interventional Radiological Society of Europe, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Neurointerventional Surgery, European Society of Minimally Invasive Neurological Therapy, and Society of Vascular and Interventional Neurology (2013)[22]	1a, 1b, 1c, 3, 4, 5, 8a, 8b, 9b, 10b, 11a, 11b, 19a, 20,	2, 6, 7a, 7b, 9a, 10a, 12, 13a, 13b, 13c, 14a, 14b, 14c, 15, 16, 17, 18a, 18b, 19b, 21, 22	40%
Quality improvement guidelines for adult diagnostic cervicocerebral angiography: Update cooperative study between the Society of Interventional Radiology (SIR), American Society of Neuroradiology (ASNR), and Society of NeuroInterventional Surgery (SNIS) (2015)[23]	1a, 1b, 1c, 3, 4, 6, 7a, 8a, 9a, 9b, 10b, 12, 14c, 15, 16, 17, 20	2, 5, 7b, 8b, 10a, 11a, 11b, 13a, 13b, 13c, 14a, 14b, 18a, 18b, 19a, 19b, 21, 22	48.57%
Quality improvement guidelines for the performance of cervical carotid angioplasty and stent placement developed by a collaborative panel of the American Society of Interventional and Therapeutic Neuroradiology, the American Society of Neuroradiology, and the Society of Interventional Radiology (2003)[24]	1a, 1b, 1c, 3, 4, 5, 7a, 8a, 9a, 9b, 15, 17, 20, 21	2, 6, 7b, 8b, 10a, 10b, 11a, 11b, 12, 13a, 13b, 13c, 14a, 14b, 14c, 16, 18a, 18b, 19a, 19b, 22	40%
Nonvascular interventions			
Multidisciplinary practical guidelines for gastrointestinal access for enteral nutrition and decompression from the Society of Interventional Radiology and American Gastroenterological Association (AGA) Institute, with endorsement by Canadian Interventional Radiological Association (CIRA) and Cardiovascular and Interventional Radiological Society of Europe (CIRSE) (2011)[25]	1a, 1b, 1c, 3, 4, 6, 7a, 7b, 8a, 8b, 9b, 10b, 13b, 19a, 20	2, 5, 9a, 10a, 11a, 11b, 12, 13a, 13c, 14a, 14b, 14c 15, 16, 17, 18a, 18b, 19b, 21, 22	42.86%
Quality improvement guidelines for percutaneous drainage/aspiration of abscess and fluid collections (2010)[26]	1a, 1b, 1c, 3, 4, 6, 8a, 9a, 9b, 10b, 12, 14c, 15, 16, 17, 20	2, 5, 7a, 7b, 8b, 10a, 11a, 11b, 13a, 13b, 13c, 14a, 14b, 18a, 18b, 19a, 19b, 21, 22	45.71%
Quality improvement guidelines for percutaneous needle biopsy (2010)[27]	1a, 1b, 1c, 3, 4, 6, 8a, 9a, 9b, 10b, 12, 15, 16, 17, 20	2, 5, 7a, 7b, 8b, 10a, 11a, 11b, 13a, 13b, 13c, 14a, 14b, 14c, 18a, 18b, 19a, 19b, 21, 22	42.86%
Quality improvement guidelines for percutaneous nephrostomy (2016)[28]	1a, 1b, 1c, 3, 4, 8b, 9a, 9b, 10b, 12, 15, 16, 17, 19a, 20	2, 5, 6, 7a, 7b, 8a, 10a, 11a, 11b, 13a, 13b, 13c, 14a, 14b, 14c, 18a, 18b, 19b, 21, 22	42.86%

Table 1: (continued)

Title of CPG and year of publication	Checklist items adhered to	Checklist items not adhered to	Overall adherence
Quality improvement guidelines for percutaneous transhepatic cholangiography, biliary drainage, and percutaneous cholecystostomy (2010)[29]	1a, 1b, 1c, 4, 6, 8a, 9a, 9b, 10b, 12, 15, 16, 17, 20	2, 3, 5, 7a, 7b, 8b, 10a, 11a, 11b, 13a, 13b, 13c, 14a, 14b, 14c, 18a, 18b, 19a, 19b, 21, 22	40%
Pediatric			
Developing a clinical pediatric interventional practice: a joint clinical practice guideline from the Society of Interventional Radiology and the Society for Pediatric Radiology (2011)[30]	1a, 1b, 4, 6, 7a, 8a, 8b, 9a, 9b, 13a, 14c, 20	1c, 2, 3, 5, 7b, 10a, 10b, 11a, 11b, 12, 13b, 13c, 14a, 14b, 15, 16, 17, 18a, 18b, 19a, 19b, 21, 22	34.29%
Joint quality improvement guidelines for pediatric arterial access and arteriography: from the Societies of Interventional Radiology and Pediatric Radiology (2010)[31]	1a, 1b, 1c, 4, 5, 7a, 8b, 9b, 12, 15, 16, 17, 20	2, 3, 6, 7b, 8a, 9a, 10a, 10b, 11a, 11b, 13a, 13b, 13c, 14a, 14b, 14c, 18a, 18b, 19a, 19b, 21, 22	37.14%
Quality improvement guidelines for pediatric abscess and fluid drainage (2012)[32]	1a, 1b, 1c, 3, 4, 6, 7a, 8a, 9b, 12, 14c, 15, 16, 17, 20	2, 5, 7b, 8b, 9a, 10a, 10b, 11a, 11b, 13a, 13b, 13c, 14a, 14b, 18a, 18b, 19a, 19b, 21, 22	42.86%
Quality improvement guidelines for pediatric gastrostomy and gastrojejunostomy tube placement (2014)[33]	1a, 1b, 1c, 3, 4, 6, 7a, 7b, 8a, 9a, 9b, 10b, 12, 13a, 13b, 15, 16, 17, 20	2, 5, 8b, 10a, 11a, 11b, 13c, 14a, 14b, 14c, 18a, 18b, 19a, 19b, 21, 22	54.29%
Peripheral, arterial, and aortic disease			
ACC/AHA 2005 guidelines for the management of patients with peripheral arterial disease (lower extremity, renal, mesenteric, and abdominal aortic) a collaborative report from the American Associations for Vascular Surgery/Society for Vascular Surgery, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, Society of Interventional Radiology, and the ACC/AHA task force on practice guidelines (writing committee to develop guidelines for the management of patients with peripheral arterial disease) summary of recommendations (2006)[34]	1a, 1b, 1c, 2, 6, 7a, 7b, 8a, 9a, 9b, 12, 13a, 13b, 13c, 14a, 14b, 16, 17, 19a, 19b, 20	3, 4, 5, 8b, 10a, 10b, 11a, 11b, 14c, 15, 18a, 18b, 21, 22	60%
Guidelines for development and use of transluminally placed endovascular prosthetic grafts in the arterial system (2003)[35]	1a, 1b, 1c, 6, 7b, 8a, 8b, 9b, 13b, 14c	2, 3, 4, 5, 7a, 9a, 10a, 10b, 11a, 11b, 12, 13a, 13c, 14a, 14b, 15, 16, 17, 18a, 18b, 19a, 19b, 20, 21, 22	28.57%
Clinical practice guidelines for endovascular abdominal aortic aneurysm repair: written by the Standards of Practice Committee for the Society of Interventional Radiology and endorsed by the Cardiovascular and Interventional Radiological Society of Europe and the Canadian Interventional Radiology Association (2010)[36]	1a, 1b, 1c, 3, 4, 5, 6, 7a, 7b, 8a, 9a, 9b, 12, 14a, 14b, 14c, 15, 16, 17, 20	2, 8b, 10a, 10b, 11a, 11b, 13a, 13b, 13c, 18a, 18b, 19a, 21, 22	57.14%
Guidelines for peripheral percutaneous transluminal angioplasty of the abdominal aorta and lower extremity vessels. A statement for health professionals from a special writing group of the Councils on Cardiovascular Radiology, Arteriosclerosis, Cardio-Thoracic and Vascular Surgery, Clinical Cardiology, and Epidemiology and Prevention, the American Heart Association (2003)[37]	1a, 1b, 1c, 5, 7a, 7b, 8a, 8b, 10b	2, 3, 4, 6, 9a, 9b, 10a, 11a, 11b, 12, 13a, 13b, 13c, 14a, 14b, 14c, 15, 16, 17, 18a, 18b, 19a, 19b, 20, 21, 22	25.71%
Quality improvement guidelines for diagnostic arteriography (2014)[38]	1a, 1b, 1c, 3, 4, 5, 6, 8a, 8b, 9a, 9b, 10b, 12, 14b, 14c, 15, 16, 17, 19b, 20	2, 7a, 7b, 10a, 11a, 11b, 18a, 18b, 19a, 21, 22	57.14%
Quality improvement guidelines for percutaneous management of acute lower-extremity ischemia (2013)[39]	1a, 1b, 1c, 3, 4, 5, 7a, 7b, 8a, 9a, 9b, 10b, 12, 15, 16, 17, 19a, 20	2, 6, 8b, 10a, 11a, 11b, 13a, 13b, 13c, 14a, 14b, 14c, 18a, 18b, 19b, 21, 22	51.43%
Quality improvement guidelines for percutaneous transcatheter embolization (2016)[40]	1a, 1b, 1c, 4, 8a, 9a, 12, 15, 16, 17, 19a, 20	2, 3, 5, 6, 7a, 7b, 8b, 10a, 10b, 11a, 11b, 13a, 13b, 13c, 14a, 14b, 14c, 18a, 18b, 19b, 21, 22	37.14%

Table 1: (continued)

Title of CPG and year of publication	Checklist items adhered to	Checklist items not adhered to	Overall adherence
Quality improvement guidelines for vascular access and closure device use (2014)[41]	1a, 1b, 2, 3, 4, 5, 7b, 8a, 9a, 9b, 10b, 11a, 12, 13a, 14b, 15, 16, 17, 19a, 19b, 20, 21	1c, 6, 7a, 8b, 10a, 11b, 13b, 13c, 14a, 14c, 18a, 18b, 22	62.86%
Portal and mesenteric vascular disease			
Quality improvement guidelines for transjugular intrahepatic portosystemic shunts (2016)[42]	1a, 1b, 1c, 3, 4, 6, 8a, 9a, 9b, 10b, 12, 14c, 15, 16, 17, 20	2, 5, 7a, 7b, 8b, 10a, 11a, 11b, 13a, 13b, 13c, 14a, 14b, 18a, 18b, 19a, 19b, 21, 22	45.71%
Practice development and safety			
Guidelines for establishing a quality improvement program in interventional radiology (2010)[43]	1a, 1b, 3, 4, 5, 6, 8a, 9a, 9b, 10b, 12, 13a, 15, 16, 17, 19a, 20	1c, 2, 7a, 7b, 8b, 10a, 11a, 11b, 13b, 13c, 14a, 14b, 14c, 18a, 18b, 19b, 21, 22	48.57%
Guidelines for patient radiation dose management (2009)[44]	1a, 1b, 1c, 2, 3, 4, 5, 6, 12, 13a, 14c, 15, 16, 17, 18a, 19a, 20	7a, 7b, 8b, 10a, 11a, 11b, 13b, 13c, 14a, 14b, 18b, 19b, 21, 22	60%
Consensus guidelines for periprocedural management of coagulation status and hemostasis risk in percutaneous image-guided interventions (2012)[45]	1a, 1b, 1c, 2, 3, 4, 5, 6, 7a, 7b, 8a, 8b, 9a, 9b, 12, 13a, 13b, 15, 16, 17, 20, 21	10a, 10b, 11a, 11b, 13c, 14a, 14b, 14c, 18a, 18b, 19a, 19b, 22	62.86%
Guidelines for the prevention of intravascular catheter-related infections: recommendations relevant to interventional radiology for venous catheter placement and maintenance (2012)[46]	1a, 1b, 1c, 2, 3, 4, 5, 6, 7b, 8a, 8b, 9b, 13a, 13b, 13c, 20	7a, 9a, 10a, 10b, 11a, 11b, 12, 14a, 14b, 14c, 15, 16, 17, 18a, 18b, 19a, 19b, 21, 22	45.71%
Joint practice guideline for sterile technique during vascular and interventional radiology procedures: From the Society of Interventional Radiology, Association of PeriOperative Registered Nurses, and Association for Radiologic and ImagingNursing, for the Society of Interventional Radiology (Wael Saad, MD, Chair), Standards of Practice Committee, and endorsed by the Cardiovascular Interventional Radiological Society of Europe and the Canadian Interventional Radiology Association (2012)[47]	1a, 1b, 1c, 2, 3, 4, 6, 8a, 8b, 9a, 9b, 10b, 12, 13a, 14b, 14c, 15, 16, 17, 20, 21, 22	5, 7a, 7b, 10a, 11a, 11b, 13b, 13c, 14a, 18a, 18b, 19a, 19b	62.86%
Occupational radiation protection in interventional radiology: A joint guideline of the Cardiovascular and Interventional Radiology Society of Europe and the Society of Interventional Radiology (2010)[48]	1a, 1b, 2, 3, 4, 6, 8a, 9a, 9b, 13a, 15, 16, 17, 20	1c, 5, 7a, 7b, 8b, 10a, 10b, 11a, 11b, 12, 13b, 13c, 14a, 14b, 14c, 18a, 18b, 19a, 19b, 21, 22	40%
Occupational radiation protection of pregnant or potentially pregnant workers in IR: A joint guideline of the Society of Interventional Radiology and the Cardiovascular and Interventional Radiological Society of Europe (2015)[49]	1a, 1b, 1c, 2, 3, 4, 5, 6, 7a, 8a, 9a, 9b, 12, 13a, 14a, 15, 16, 17, 19a, 20	7b, 8b, 10a, 10b, 11a, 11b, 13b, 13c, 14b, 14c, 18a, 18b, 19b, 21, 22	57.14%
Practice guideline for adult antibiotic prophylaxis during vascular and interventional radiology procedures (2010)[50]	1a, 1b, 1c, 3, 4, 5, 7a, 8a, 9b, 10b, 12, 13a, 13c, 14b, 15, 16, 17, 19a, 20	2, 6, 7b, 8b, 9a, 10a, 11a, 11b, 13b, 14a, 14c, 18a, 18b, 19b, 21, 22	54.29%
Quality improvement guidelines for preventing wrong site, wrong procedure, and wrong person errors: application of the joint commission universal protocol for preventing wrong site, wrong procedure, wrong person surgery to the practice of interventional radiology (2008)[51]	1a, 1b, 1c, 3, 4, 6, 8a, 9a, 9b, 10b, 12, 14c, 15, 16, 17, 19a, 20	2, 5, 7a, 7b, 8b, 10a, 11a, 11b, 13a, 13b, 13c, 14a, 14b, 18a, 18b, 19b, 21, 22	48.57%
Quality improvement guidelines for recording patient radiation dose in the medical record for fluoroscopically guided procedures (2012)[52]	1a, 1b, 1c, 3, 4, 5, 6, 8a, 9a, 9b, 10b, 12, 13a, 15, 16, 17, 20	2, 7a, 7b, 8b, 10a, 11a, 11b, 13b, 13c, 14a, 14b, 14c, 18a, 18b, 19a, 19b, 21, 22	48.57%
Radiation management for interventions using fluoroscopic or computed tomographic guidance during pregnancy: a joint guideline of the Society of Interventional Radiology and the Cardiovascular and	1a, 1b, 1c, 2, 3, 4, 5, 6, 7a, 8a, 9a, 9b, 12, 13a, 14c, 15, 16, 17, 18a, 20	7b, 8b, 10a, 10b, 11a, 11b, 13b, 13c, 14a, 14b, 18b, 19a, 19b, 21, 22	48.57%

Table 1: (continued)

Title of CPG and year of publication	Checklist items adhered to	Checklist items not adhered to	Overall adherence
Interventional Radiological Society of Europe with endorsement by the Canadian Interventional Radiology Association (2012)[53]			
Recommendations for the implementation of joint commission guidelines for labeling medications (2009)[54]	1a, 1b, 1c, 2, 4, 5, 8a, 9a, 9b, 12, 13a, 15, 16, 17, 19a, 20	3, 6, 7a, 7b, 8b, 10a, 10b, 11a, 11b, 13b, 13c, 14a, 14b, 14c, 18a, 18b, 19b, 21, 22	45.71%
Renal failure/hemodialysis			
Guidelines for the reporting of renal artery revascularization in clinical trials (2003)[55]	1a, 1b, 1c, 3, 4, 5, 6, 8a, 9b, 10b, 13a, 19a, 20	2, 7a, 7b, 8b, 9a, 10a, 11a, 11b, 12, 13b, 13c, 14a, 14b, 14c, 15, 16, 17, 18a, 18b, 19b, 21, 22	37.14%
Quality improvement guidelines for angiography, angioplasty, and stent placement for the diagnosis and treatment of renal artery stenosis in adults (2010)[56]	1a, 1b, 1c, 2, 3, 4, 5, 6, 7a, 7b, 8a, 9a, 9b, 10b, 12, 13a, 13b, 15, 16, 17, 19a, 20, 21	8b, 10a, 11a, 11b, 13c, 14a, 14b, 14c, 18a, 18b, 19b, 22	65.71%
Quality improvement guidelines for percutaneous image-guided management of the thrombosed or dysfunctional dialysis circuit (2016)[57]	1a, 1b, 1c, 3, 4, 5, 6, 7a, 8a, 8b, 9a, 9b, 10b, 12, 13a, 15, 16, 17, 19a, 20	2, 7b, 10a, 11a, 11b, 13b, 13c, 14a, 14b, 14c, 18a, 18b, 19b, 21, 22	57.14%
Spine and musculoskeletal disorders			
Quality improvement guidelines for percutaneous vertebroplasty (2014)[58]	1a, 1b, 1c, 3, 4, 6, 8a, 9a, 9b, 10b, 11a, 12, 15, 16, 17, 19a, 20	2, 5, 7a, 7b, 8b, 10a, 11b, 13a, 13b, 13c, 14a, 14b, 14c, 18a, 18b, 19b, 21, 22	48.57%
Venous disease			
Quality improvement guidelines for central venous access (2010)[59]	1a, 1b, 1c, 3, 4, 5, 8a, 9b, 10b, 12, 13c, 15, 16, 17, 19a, 20	2, 6, 7a, 7b, 8b, 9a, 10a, 11a, 11b, 13a, 13b, 14a, 14b, 14c, 18a, 18b, 19b, 21, 22	45.71%
Quality improvement guidelines for diagnostic infusion venography (2003)[60]	1a, 1b, 1c, 3, 4, 6, 8a, 9a, 9b, 10b, 12, 15, 16, 17, 20	2, 5, 7a, 7b, 8b, 10a, 11a, 11b, 13a, 13b, 13c, 14a, 14b, 14c, 18a, 18b, 19a, 19b, 21, 22	42.86%
Quality improvement guidelines for the performance of inferior vena cava filter placement for the prevention of pulmonary embolism (2011)[61]	1a, 1b, 1c, 3, 4, 5, 6, 9b, 10b, 12, 13a, 15, 16, 20	2, 7a, 7b, 8a, 8b, 9a, 10a, 11a, 11b, 13b, 13c, 14a, 14b, 14c, 17, 18a, 18b, 19a, 19b, 21, 22	40%
Quality improvement guidelines for the treatment of lower-extremity deep vein thrombosis with use of endovascular thrombus removal (2014)[62]	1a, 1b, 1c, 3, 4, 6, 7b, 8a, 9a, 9b, 10b, 11a, 12, 13a, 14a, 14c, 15, 16, 17, 20	2, 5, 7a, 8b, 10a, 11b, 13b, 13c, 14b, 18a, 18b, 19a, 19b, 21, 22	57.14%
Women's health			
Quality improvement guidelines for uterine artery embolization for symptomatic leiomyomata (2014)[63]	1a, 1b, 1c, 3, 4, 5, 6, 7a, 7b, 8a, 9b, 10b, 12, 13a, 13b, 14a, 14b, 15, 16, 17, 20, 21	2, 8b, 9a, 10a, 11a, 11b, 13c, 14c, 18a, 18b, 19a, 19b, 22	62.86%

can be applied to CPGs across medical specialties. Osteopathic physicians, guideline authors, and researchers should be familiar with the RIGHT statement as a tool for evaluating CPGs and apply its content in the development of new CPGs. The RIGHT checklist provides a standardized structure for reporting CPGs that allows such guidelines to be more easily understood and implemented into practice, thereby facilitating cost-effective patient care. Our study evaluated the reporting quality of CPGs developed by the SIR and the RIGHT checklist, which applies to all medical specialties; therefore, the results of our study are applicable not only to osteopathic interventional radiologists, but also osteopathic physicians in all fields of medicine.

Overall, our results demonstrate that CPGs in interventional radiology need improved reporting practices. Specifically, 12 items demonstrated adherence of less than

Table 2: Number of RIGHT checklist items reported in 46 eligible interventional radiology clinical practice guidelines.

Checklist item	Adherence across interventional radiology guidelines, %	Strong adherence, (>75%)	Weak adherence, (<25%)
1a: Identify the report as a guideline, that is, with guideline(s) or recommendation(s) in the title.	46 (100%)	x	
1b: Describe the year of publication of the guideline.	46 (100%)	x	
1c: Describe the focus of the guideline, such as screening, diagnosis, treatment, management, prevention, or others.	42 (91.3%)	x	
2: Provide a summary of the recommendations contained in the guideline.	12 (26.0%)		
3: Define new or key terms, and provide a list of abbreviations and acronyms if applicable.	38 (82.6%)	x	
4: Identify at least 1 corresponding developer or author who can be contacted about the guideline.	42 (91.3%)	x	
5: Describe the basic epidemiology of the problem, such as the prevalence/incidence, morbidity, mortality, and burden (including financial) resulting from the problem.	27 (58.7%)		
6: Describe the aim(s) of the guideline and specific objectives, such as improvements in health indicators (e.g., mortality and disease prevalence), quality of life, or cost savings.	35 (76.0%)	x	
7a: Describe the primary population(s) that is affected by the recommendation(s) in the guideline.	21 (45.6%)		
7b: Describe any subgroups that are given special consideration in the guideline.	16 (34.7%)		
8a: Describe the intended primary users of the guideline (such as primary care providers, clinical specialists, public health practitioners, program managers, and policymakers) and other potential users of the guideline.	43 (93.4%)	x	
8b: Describe the setting(s) for which the guideline is intended, such as primary care, low- and middle-income countries, or inpatient facilities.	14 (30.4%)		
9a: Describe how all contributors to the guideline development were selected and their roles and responsibilities (e.g., steering group, guideline panel, external reviewers, systematic review team, and methodologists).	34 (73.9%)		
9b: List all individuals involved in developing the guideline, including their title, role(s), and institutional affiliation(s).	45 (97.8%)	x	
10a: State the key questions that were the basis for the recommendations in PICO (population, intervention, comparator, and outcome) or other format as appropriate.	1 (2.1%)		x
10b: Indicate how the outcomes were selected and sorted.	31 (67.3%)		
11a: Indicate whether the guideline is based on new systematic reviews done specifically for this guideline or whether existing systematic reviews were used.	5 (10.8%)		x
11b: If the guideline developers used existing systematic reviews, reference these and describe how those reviews were identified and assessed (provide the search strategies and the selection criteria, and describe how the risk of bias was evaluated) and whether they were updated.	2 (4.3%)		x
12: Describe the approach used to assess the certainty of the body of evidence.	37 (80.4%)	x	
13a: Provide clear, precise, and actionable recommendations.	22 (47.8%)		
13b: Present separate recommendations for important subgroups if the evidence suggests that there are important differences in factors influencing recommendations, particularly the balance of benefits and harms across subgroups.	11 (23.9%)		x
13c: Indicate the strength of recommendations and the certainty of the supporting evidence.	5 (10.8%)		x

Table 2: (continued)

Checklist item	Adherence across interventional radiology guidelines, %	Strong adherence, (>75%)	Weak adherence, (<25%)
14a: Describe whether values and preferences of the target population(s) were considered in the formulation of each recommendation. If yes, describe the approaches and methods used to elicit or identify these values and preferences. If values and preferences were not considered, provide an explanation.	7 (15.2%)		x
14b: Describe whether cost and resource implications were considered in the formulation of recommendations. If yes, describe the specific approaches and methods used (such as cost-effectiveness analysis) and summarize the results. If resource issues were not considered, provide an explanation.	8 (17.3%)		x
14c: Describe other factors taken into consideration when formulating the recommendations, such as equity, feasibility, and acceptability.	17 (39.9%)		
15: Describe the processes and approaches used by the guideline development group to make decisions, particularly the formulation of recommendations (such as how consensus was defined and achieved and whether voting was used).	38 (82.6%)	x	
16: Indicate whether the draft guideline underwent independent review and, if so, how this was executed and the comments considered and addressed.	38 (82.6%)	x	
17: Indicate whether the guideline was subjected to a quality assurance process. If yes, describe the process.	38 (82.6%)	x	
18a: Describe the specific sources of funding for all stages of guideline development.	2 (4.3%)		x
18b: Describe the role of funder(s) in the different stages of guideline development and in the dissemination and implementation of the recommendations.	0 (0%)		x
19a: Describe what types of conflicts (financial and nonfinancial) were relevant to guideline development.	19 (41.3%)		
19b: Describe how conflicts of interest were evaluated and managed and how users of the guideline can access the declarations.	4 (8.7%)		x
20: Describe where the guideline, its appendices, and other related documents can be accessed.	44 (95.6%)	x	
21: Describe the gaps in the evidence and/or provide suggestions for future research.	9 (19.5%)		x
22: Describe any limitations in the guideline development process (such as the development groups were not multidisciplinary or patients' values and preferences were not sought), and indicate how these limitations might have affected the validity of the recommendations.	1 (2.1%)		x

25% and 13 showed adherence of more than 75%. On average, there was only about half (22.9 of 46; 49.8%) adherence to RIGHT checklist items across CPGs in our sample. Based on our results, we recommend that stronger efforts be made to improve reporting quality and transparency in interventional radiology guideline development.

Several key elements that were met with less than 25% adherence included whether patient preferences were considered, whether costs and resources were considered, the strength of the recommendations, and the certainty of the body of evidence. CPGs should detail how the values and preferences of the patient population were taken into account in the formulation of recommendations, which may improve the guidelines' dissemination and incorporation into clinical practice.[10] Similarly, the costs and resources required to implement recommendations are important considerations; if patient preferences and costs are not considered, patients may fail to receive adequate care.[12] For example, if a medication or procedure is too expensive relative to its efficacy, then the CPG recommendation will rarely be implemented, and patients may never benefit from it. Also, patient values and costs may not matter if the strength and certainty of clinical evidence are lacking. Appropriate reporting of the strength of

recommendations, along with the certainty of the body of evidence, is crucial so that practitioners may implement recommendations more appropriately and thereby improve clinical judgment.[13] We recommend the use of a standardized method, such as the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach, to evaluate recommendation strength.[14] The use of the GRADE approach should be reported in the CPG, thereby strengthening its quality.

Our investigation revealed other key elements that were consistently underreported in interventional radiology guidelines. Of particular note, RIGHT checklist item #18b, which deals with describing the role of the funder(s) in all stages of guideline development, was not met by any of the guidelines in our sample. Additionally, only 23 of the 46 (50%) evaluated CPGs adequately explained the types of conflicts that were relevant to guideline development or how they were evaluated. Adequate reporting of financial interests and any financial influences in guideline development is paramount in improving transparency and revealing financial conflicts of interest.[15,16] Rigorous guideline development and editorial independence from funders have been shown to improve overall guideline quality; therefore, stronger efforts to address these concerns may lead to higher quality guidelines.[17]

Partial adherence to the RIGHT checklist items was recorded as "no" in the abstraction forms, which was a limitation. For example, both the description of how conflicts of interest were managed and evaluated *and* having access to declarations must be included for 100% adherence to item #19b. Although this may be viewed as a limitation, all components are essential to adequately describe conflicts of interest.

Conclusion

We found that poor reporting practices are prevalent in interventional radiology CPGs, including key areas such as patient preferences, costs and resources, strength of the recommendations, and the certainty of the body of evidence. To improve the quality and transparency of interventional radiology CPGs, complete reporting should be emphasized. We encourage a unified attempt at incorporating the RIGHT checklist into guideline development and peer review, especially in the field of interventional radiology.

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