

Impact of Professional Society Guideline Publications in Medicine Subspecialties From 2012 to 2022: Implications for Clinical Care and Health Policy

Nikita Jhawar, MD; William Klaus Mai, MD; Artur Schneider, DO; William Michael Schmidt, MD; Guozhen Xie, BS; Abhishek Sharma, MBBS; Christopher Bennett Parker; and Fred Kusumoto, MD

Abstract

Clinical guidelines have become an integral part of clinical care. We assessed professional society-based clinical guidelines from 2012 to 2022 to elucidate the trends in numbers of documents, recommendations, and classes of recommendations. Our results found that 40% of the guidelines do not follow all recommendations made by the Institute of Medicine for trustworthy documents. There has been a significant increase in documents in cardiology, gastroenterology, and hematology/oncology. In addition, of more than 20,000 recommendations, there was significant variability in recommendations made by different professional societies within a specialty. In documents from 11 of the 14 professional societies, more than 50% of the recommendations are supported with the lowest levels of evidence. In cardiology, in addition to the guideline documents, 140 nonguideline documents provide 1812 recommendations using the guideline verbiage, and 74% of the recommendations are supported by the lowest level of evidence. These data have important implications for health care because guidelines and guideline-like documents can be used for health policy issues such as assessment of quality of care, medical liability, education, and payment.

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From the Department of Internal Medicine, Mayo Clinic, Jacksonville, FL (N.J., W.K.M., A.S., W.M.S., C.B.P.); Mayo Clinic Alix School of Medicine, Phoenix, AZ (G.X.); Maulana Azad Medical College, New Delhi, India (A.S.); and Department of Cardiovascular Diseases, Mayo Clinic, Jacksonville, FL (F.K.)

The Agency for Health Care and Policy Research was established in 1989, and one of its first requests was to ask the Institute of Medicine (IOM) to create recommendations on the development of clinical practice guidelines. They first issued a report in 1990 and a subsequent report in 2011.^{1,2} These documents emphasized the importance of transparency for document development and writing group composition, managing relationships with industry, articulating recommendations and evidence base, and other best practices. Although almost all clinical practice guidelines use a class system to indicate the strength of a recommendation, the IOM emphasizes the importance of formulating recommendation statements that are actionable, use active voice, and provide sug-

gested verbiage on the basis of recommendation strength.² Clinical practice guidelines have become an important determinant for defining best care practices and have had a profound effect in medicine for assessing quality, liability, payment, and other aspects.³⁻⁵

Objective

We sought to evaluate guideline documents and their recommendations for the largest subspecialties of internal medicine.

METHODS AND FINDINGS

Clinical guideline documents and recommendations by major societies in cardiology, pulmonology, gastroenterology, nephrology,

hematology/oncology, endocrinology, and infectious diseases were collected from 2012 to 2022 (Tables 1 and 2). Each document was evaluated for transparency on methodology, conflicts of interest, class of recommendation, and level of evidence (LOE) for recommendations. Identification of any trends over time was evaluated using the Mann-Kendall test.

There was a notable increase in professional society guidelines over the past decade

owing to increases in the cardiology, gastroenterology, and hematology/oncology documents (Figure A) ($P < .001$). Within cardiology, the increase was solely because of increased guideline production by the European Society of Cardiology (Figure B) ($P < .001$). All guideline documents provided relationships with industry and 59.2% documented methodology. There are 21,141 recommendations that have been made by

TABLE 1. Recommendation Numbers and LOE Data Collected from 2012 to 2022 for Societies within Major Internal Medicine Subspecialties^a

Specialty society	Recommendations, n (%)				Level of evidence, n (%)		
	Total	Class I	Class II	Class III	A	B	C
Cardiology							
AHA/ACC	2883	1363 (47)	1249 (43)	271 (9)	283 (10)	1611 (56)	989 (34)
ESC	4164	2244 (54)	1531 (37)	389 (9)	738 (18)	1212 (29)	2214 (53)
Total	7047	3607 (51)	2780 (39)	660 (9)	1021 (15)	2823 (40)	3203 (46)
Hematology/oncology							
ASCO	2837	1403 (49)	1270 (45)	164 (6)	717 (25)	733 (26)	1387 (49)
ASH	393	60 (15)	245 (62)	88 (22)	13 (3)	71 (18)	309 (79)
NCCN	2424	157 (6)	2267 (94)	0 (0)	2161 (89)	106 (4)	0 (0)
Total	5654	1620 (29)	3782 (63)	252 (4)	2891 (51)	910 (16)	1696 (30)
Pulmonary							
ATS	511	177 (35)	286 (56)	48 (9)	25 (5)	140 (27)	346 (68)
ACCP	1076	401 (37)	675 (63)	0 (0)	65 (6)	295 (27)	716 (67)
SCCM	541	128 (24)	338 (59)	75 (14)	27 (5)	107 (20)	407 (75)
Total	2128	706 (33)	1299 (61)	123 (6)	117 (5)	542 (25)	1469 (69)
Gastroenterology							
ACG	1195	556 (47)	621 (52)	18 (2)	82 (7)	308 (26)	805 (67)
AGA	825	489 (59)	253 (31)	83 (10)	40 (5)	192 (23)	593 (72)
Total	2020	1045 (52)	874 (43)	101 (1)	122 (6)	500 (25)	1398 (69)
Endocrinology							
AACE	936	419 (45)	481 (51)	36 (4)	314 (34)	285 (30)	337 (36)
ES	711	226 (32)	336 (47)	79 (11)	46 (6)	181 (25)	404 (57)
Total	1647	645 (39)	817 (50)	115 (7)	360 (22)	466 (28)	741 (45)
Infectious Disease							
IDSA	1546	1115 (72)	65 (4)	365 (24)	166 (11)	493 (32)	887 (57)
ASM	32	25 (78)	3 (9)	4 (13)	8 (25)	9 (28)	15 (47)
Total	1578	1140 (72)	68 (4)	369 (23)	174 (11)	502 (32)	902 (57)
Nephrology							
NKF	888	293 (33)	456 (51)	139 (16)	122 (14)	228 (26)	538 (61)
ASN	449	148 (33)	296 (66)	5 (1)	N/A	N/A	N/A
Total	1337	441 (33)	752 (56)	144 (11)	122 (14)	228 (26)	538 (61)
Total (all)	21,141	9204 (43)	10,372 (48)	1764 (8)	4807 (23)	5971 (28)	9947 (47)

^aAbbreviations: AACE, American Association of Clinical Endocrinology; ACC, American College of Cardiology; ACCP, American College of Chest Physicians; ACG, American College of Gastroenterology; AGA, American Gastroenterologic Association; AHA, American Heart Association; ASCO, American Society of Clinical Oncology; ASH, American Society of Hematology; ASM, American Society for Microbiology; ASN, American Society of Nephrology; ATS, American Thoracic Society; ES, Endocrine Society; ESC, European Society of Cardiology; IDSA, Infectious Diseases Society of America; LOE, level of evidence; N/A, not applicable; NCCN, National Comprehensive Cancer Network; NKF, National Kidney Foundation; SCCM, Society of Critical Care Medicine.

TABLE 2. Level of Evidence Data for Class I Recommendations Published from 2012 to -2022 for Societies within Major Internal Medicine Subspecialties^a

Specialty society	Level of evidence, n (%) ^b			
	Total class I recommendations	A	B	C
Cardiology				
AHA/ACC	1363	220 (16)	723 (53)	420 (31)
ESC	2244	582 (26)	600 (27)	1062 (47)
Hematology/oncology				
ASCO	1403	518 (37)	362 (26)	523 (37)
ASH	60	12 (20)	30 (50)	18 (30)
NCCN	157	Not reported	Not reported	Not reported
Pulmonary				
ATS	177	21 (12)	86 (49)	70 (39)
ACCP	401	58 (14)	197 (49)	146 (37)
SCCM	128	23 (18)	56 (44)	49 (38)
Gastroenterology				
ACG	556	78 (14)	222 (40)	256 (46)
AGA	489	30 (6)	117 (24)	342 (70)
Endocrinology				
AACE	419	246 (59)	97 (23)	76 (18)
ES	296	46 (16)	133 (45)	117 (39)
Infectious disease				
IDSA	1115	136 (12)	395 (35)	584 (53)
ASM	25	4 (16)	6 (24)	15 (60)
Nephrology				
NKF	293	81 (28)	112 (38)	100 (34)
ASN	148	Not reported	Not reported	Not reported
Total (all)	9274			
Total (LOE)	8969 (97)	2055 (23)	3136 (35)	3778 (42)

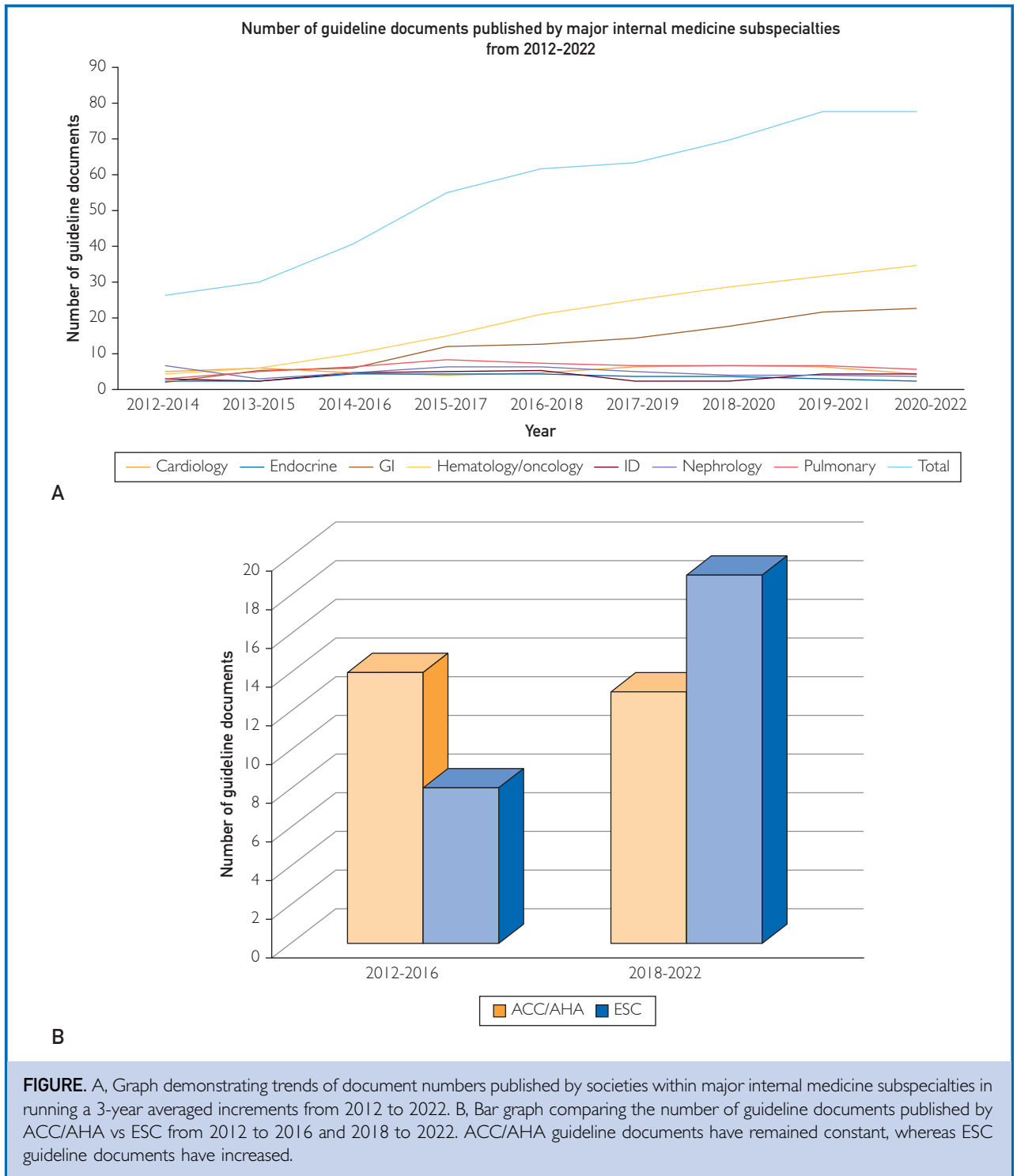
^aAbbreviations: AACE: American Association of Clinical Endocrinology; ACC, American College of Cardiology; ACCP, American College of Chest Physicians; ACG, American College of Gastroenterology; AGA, American Gastroenterologic Association; AHA, American Heart Association; ASCO, American Society of Clinical Oncology; ASM, American Society for Microbiology; ASN, American Society of Nephrology; ASH, American Society of Hematology; ATS, American Thoracic Society; ESC, European Society of Cardiology; ES, Endocrine Society; IDSA, Infectious Diseases Society of America; NCCN, National Comprehensive Cancer Network; NKF, National Kidney Foundation; SCCM, Society of Critical Care Medicine.

^bLevel of evidence A: data from well-designed randomized controlled trials or diagnostic studies; level of evidence B: large number of observational studies with consistent results; level of evidence C: limited observational studies or expert opinion.

guidelines documents. Significant variation of recommendation numbers and class of recommendation (I, II, or III) exist among different specialties and among different societies within a single specialty (Table 1). Although different evidence ranking systems have been developed, guidelines from major professional societies use an evidence ranking system of A, B, and C for high, moderate, and low quality of evidence, respectively (Table 1).^{1,2} Collectively, the LOE for recommendations is most likely C (47%), followed by B (28%), and A (23%). For 6 of the 7 specialties and 13 of

the 15 professional society documents, more than 45% of recommendations have LOE C. LOE C recommendations have increased when using 3-year averages from less than 1000 in the first third of the study period to greater than 1300 in the last third. For class I recommendations, 42% showed LOE C with a range of 30%-70% depending on the specialty (Table 2).

Within the cardiology specialty, the American College of Cardiology, American Heart Association, and the European Society of Cardiology have published 140 nonguideline



documents and 1812 recommendations using the guideline verbiage, with 74% of the recommendations supported by the lowest LOE.

Nonguideline documents have increased over time with 55 (11 per year) nonguideline documents produced from 2012 to 2016 and 85

(14 per year) from 2017 to 2022. Information on the methodology used for recommendations was not included in the documents.

DISCUSSION

Since the initial development in the 1990s, there has been an increase in professional society-generated guidelines by internal medicine subspecialties because of increases within hematology/oncology, gastroenterology, and cardiology. The guideline documents have been inconsistent in following certain recommendations put forth by the IOM.² The IOM discourages plurality of guidelines and differing recommendations.⁶ There are now more than 20,000 recommendations, and almost half are supported by the lowest LOE C, wherein recommendations are on the basis of expert opinion or limited observational data. It is notable that there is significant variability within specialties for the number of recommendations, class of recommendation, and LOE. This likely reflects not only the strength of evidence in different topical areas of medicine but also the variability among groups for interpreting the strength of evidence.

Cardiology professional societies have produced nonguideline documents that provide recommendations using the standard guideline format or guideline verbiage. Nonguideline documents provide consensus advice from experts to support clinicians in treating conditions that remain understudied. The motivation to generate nonguideline documents is to provide real-time, focused, and point-of-care guidance to aid in individualistic patient care, as opposed to comprehensive reviews and large-scale trials.⁷ However, with the shift from guideline to nonguideline documents, authors have been using verbiage that implies a particular class of recommendation. Many recommendations consequently have a limited evidence base. Significant unintended consequences may occur if these recommendations are used as guideline-derived recommendations and extended without additional considerations to assessment of quality of care, medical liability, and payment.³⁻⁵

CONCLUSION

The increase in guideline documents is partly a reflection of the increased complexity in medicine, and guideline documents are helpful to the clinician when considering diagnostic and

treatment strategies for an individual patient. However, many recommendations in medical subspecialty guideline documents are on the basis of limited evidence. The development of nonguideline documents plays an important role in guiding clinicians in areas that remain understudied. However, the methodology of nonguideline documents is inconsistent or not clearly stated, and the guideline-like verbiage used often implies a class of recommendation despite the absence of a high-quality evidence base. A multi-specialty strategy for developing collaborative guideline and nonguideline documents would be beneficial by reducing the total number of recommendations, ensuring consistency among recommendations, minimize recommendations on the basis of low-quality evidence, and acknowledge clinical situations associated with a limited evidence base.

POTENTIAL COMPETING INTERESTS

The authors report no competing interests.
Online Data

Abbreviations and Acronyms: IOM, Institute of Medicine; LOE, level of evidence

Correspondence: Address to Nikita Jhawar, MD, Department of Internal Medicine, Mayo Clinic, 4500 San Pablo Road S, Jacksonville, FL 32224 (Jhawar.nikita@mayo.edu).

ORCID

Nikita Jhawar:  <https://orcid.org/0000-0001-9071-5074>

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