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Don't forget the posters! Quality and content variables associated with accepted abstracts at a national trauma meeting

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Abstract

BACKGROUND—As a primary venue for presenting research results, abstracts selected for presentation at national meetings should be of the highest scientific merit and research quality. It is uncertain to what degree this is achieved as the methodological quality of abstracts submitted to national surgical meetings has not been previously described. The objective of this study was to evaluate abstracts presented at a leading trauma meeting for methodological quality.

METHODS—All abstracts accepted for the 2009 American Association for the Surgery of Trauma meeting were reviewed and scored for methodological quality based on 10 criteria (scores, 0–10; 10 being the highest). Criteria were based on nationally published methodology guidelines. Two independent reviewers who were blinded to institution, region, and author reviewed each abstract.

RESULTS—A total of 187 abstracts were accepted for presentation (67 oral and 120 posters). The most frequent clinical topics were shock/transfusion (23%), abdomen (12%), and nervous system (11%). Shock/transfusion abstracts were more common in the oral presentations (31% vs. 19%; $p = 0.06$). Abstracts from the northeast and south regions were the most common in both oral (26% and 29%) and posters (25% and 24%). Basic science accounted for 12% of accepted studies,

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AUTHORSHIP

L.A.D., B.A.C., and J.B.H. designed this study. L.A.D. and B.A.C. conducted the literature search. E.E.F., D.J.D., V.Z., R.K., J.S., and W.W. collected data. L.A.D. and B.A.C. performed data analysis. L.A.S., W.G.C., J.B.H., and B.A.C. interpreted the data. All authors participated in writing, revising, and editing the manuscript. L.A.D., W.G.C., J.B.H., and B.A.C. prepared the figures and tables.

DISCLOSURE

The authors declare no conflicts of interest.

while 51% were clinical and 28% were health services/outcomes. Only 8% of abstracts presented randomized data and only 11% reported null findings. Overall abstract scores ranged from 3 to 10 (median, 7; mean, 7.4). Abstracts selected for poster presentation had an overall higher score than those selected for oral presentation (7.4 ± 1.7 vs. 6.8 ± 1.7 ; $p = 0.02$).

CONCLUSION—Although oral presentations traditionally receive the most attention and interest, the methodological quality of abstracts accepted for poster presentation equals (and sometimes exceeds) that of oral abstracts. Attendees of these national meetings should reconsider their time spent in viewing and visiting these poster sessions as with the oral presentations. In light of our findings, we highly encourage that all members and guests attend the American Association for the Surgery of Trauma Poster Rounds at each year's scientific assembly.

Keywords

Trauma; abstract; meeting; quality; methodology

National and regional surgical meetings represent the key venue in which investigators present research results and a frequent source of continuing medical education for community and academic-based providers.^{1,2} Results from the presented research are often reprinted in the lay press, allowing results to reach thousands more nonattendees and in some cases, the public. Because of this potential for such “high-profile” dissemination, research selected for presentation should be of the highest scientific merit and research quality. Despite this, abstracts submitted to societal meetings typically do not undergo the same critical peer review as published manuscripts. Many academic societies do not have formal qualifications for abstract reviewers nor do they publish standardized reviewing or selection criteria. The most frequently used quality measure of a meeting's scientific merit has been the number of abstracts presented that go on to peer-reviewed publication. A number of authors have described the publication rates for abstracts presented at national and international meetings, reporting proportions of 23% to 55% with publication delays of 12 months to 28 months.^{3–5}

It is possible that these low publication rates indicate a lack of methodological quality in presented abstracts that do not ultimately stand up to peer review. Rather than basing abstract acceptance on methodological quality, other criteria, such as institutional affiliation and authorship, may play a role in selection. In addition, it is possible that particularly “hot” clinical topics are preferentially selected without particular attention to research methodology. A lack of methodological scrutiny can provide seriously flawed research the opportunity to attain a high-profile platform. It is also possible that such flaws are detected in manuscript review and result in the work not being published. We sought to describe the level of methodological detail reported in the abstracts presented at a major, national and international surgical meeting. We hypothesized that accepted abstracts would rate high on the key methodological factors selected and we further hypothesized that oral presentations would rate higher than poster presentations.

METHODS

We performed a survey of all abstracts accepted for either oral or poster presentation for the 2009 Scientific Assembly of the American Association for the Surgery of Trauma (AAST). These abstracts are published and publically available. We also received approval from the AAST Board of Directors for pursuing this investigation. Abstracts were classified by several criteria. Clinical topic was assigned to categories according to 1 of the 18 AAST topics (abdominal, acute care surgery, burns, cardiopulmonary critical care, education, emergency surgery nontrauma, extremity fractures/hand, genitourinary, infection and sepsis, neurologic, nutrition/gastrointestinal critical care, outcomes/guidelines, shock/transfusions, socioeconomic/ethics, soft tissue/eye/head and neck, thoracic, trauma systems, and vascular). Each abstract was also classified according to the type of research (basic/bench, translational, clinical, health services/outcomes, and education) and study design (case report or series, retrospective cohort, prospective cohort, randomized trial, or other).

Abstracts were rated on the level of detail or completeness of reporting on key research methodological factors. Scores for methodological quality were assigned by independent reviewers based on a combination of the criteria from the following sources:

1. The World Health Organization STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) statement which includes guidelines for reporting observational studies.⁶
2. The CONSORT (Consolidated Standard for Reporting Trials) statement which is a “evidence-based, minimum set of recommendations for reporting randomized controlled trials.”⁷
3. The STARD (Standards for the Reporting of Diagnostic Accuracy Studies) statement.⁸

The combined criteria used for abstract rating are summarized in Table 1 and the actual scoring sheet used for grading is illustrated in Figure 1. Reviewers were research professionals with masters or doctoral level training in research design and statistics. Specifically, this group consisted of individuals who are physician scientists, epidemiologists, and biostatisticians at the University of Texas Health Science Center and School of Public Health and the Vanderbilt University School of Medicine. Individuals were blinded to the identifiers for each abstract including authorship, institution, and acceptance status. Two reviewers scored each abstract. In cases where the scores were different between reviewers, a third reviewer was added for adjudication of the score. The most discrepant review was excluded and the remaining two reviews were averaged to produce a single score for each abstract. None of the reviewers had submitted an abstract to the 2009 AAST meeting or to any previous meeting of the organization. Once the reviews were completed, identifiers were reestablished, noting geographic region from which the abstract originated, whether it was civilian or military and whether it was international.

Statistical Analysis

The primary outcome measure was the overall score (averaged across reviewers) on the 10-item rating scale (possible scores ranging from 0 to 10). Secondary outcomes included the

distribution of clinical topics and study designs, the number of multicenter studies, the number of studies with “null” findings, and the number of studies that were deemed likely to be underpowered. Normally distributed continuous variables were summarized by reporting the mean and standard deviation and compared across subgroups of interest (e.g., poster vs. oral presentation) using the two-sample student *t* test. Nonnormally distributed variables were summarized by reporting the median and interquartile range and compared across subgroups using the Wilcoxon rank-sum test. For discrete variables, proportions were compared across subgroups using the chi-squared test. Given the available number of accepted abstracts, a 2:1 ratio of accepted poster to oral presentations, a type I error of 0.05, and an estimated standard deviation in scores of 1.5, we had 99% power to detect a 1.0-point difference in overall score and 58% power to detect a 0.5-point difference.

RESULTS

A total of 187 abstracts were accepted for presentation to the 69th Annual Meeting of AAST held in Pittsburgh, PA, in 2009. Of the accepted abstracts, 35% (*n* = 67) were chosen for oral presentations and 65% (*n* = 120) were selected for poster presentations. Background characteristics of the accepted abstracts are summarized in Table 2. The majority of submissions (84%) come from nonmilitary US institutions, with most from the northeast (25%), south (26%), and west (22%) geographic regions. Ten percent of submissions were from international institutions, whereas another 6% of presentations were from military facilities. Clinical research (51%) accounts for the majority of presentations with health services/outcomes accounting for another 28%. Only 12% of presentations were classified as basic science. Of the clinical topics, shock/transfusion (23%), abdomen (12%), and nervous system (11%) were the most frequently presented topics. All other clinical topics accounted for less than 10% of presentations. The study designs most frequently presented were retrospective (48%) and prospective (26%) cohort studies. Only 8% of presented studies were randomized.

Most of the 10 key methodological details were reported in the accepted abstracts with a median of 7 (inter-quartile range, 6–9) items covered adequately (Table 3). Less than 15% of abstracts adequately covered 5 or fewer items, whereas only 6% (*n* = 12) of the abstracts sufficiently covered all 10 items. Abstracts selected for poster presentation had an overall higher score than those selected for oral presentation (7.4 ± 1.7 vs. 6.8 ± 1.7 ; $p \pm 0.02$). Of the 10 key methodological factors, 5 were covered adequately in more than 80% of abstracts: (1) explanation of the scientific background and rationale, (2) statement of the specific objective, (3) definition of the eligibility criteria, (4) report of the number of individuals in the study, and (5) summary of the key results. A description of the setting, locations, and interventions was present in 61% of abstracts. A definition of outcomes, exposures, and modifiers was present in 57% of studies.

Most of the deficiencies involved statistical principles: (1) only 61% of abstracts reported an appropriate study size, (2) only 48% of abstracts described the statistical methods, and (3) only 56% of abstracts reported effect estimates and if applicable, confounder-adjusted effect estimates with their precisions. The only difference in specific measures between oral and poster presentations was the reporting on the scientific background and rationale for the

investigation which was present in 88% of poster abstracts and only 65% of oral abstracts ($p = 0.001$). Twenty-eight percent of studies were multicenter which increases the ability to generalize the data of the presented abstracts. A potential concern was the observation that only 6% ($n = 11$) of abstracts had a “null” finding (i.e., no statistical difference) as its main conclusion, which raises significant concern for presentation/publication bias.

DISCUSSION

Abstracts presented at national surgical meetings represent a key means of continuing medical education and dissemination of new ideas, but abstracts and data presented in these settings may not be subjected to the same level of scrutiny as peer-reviewed publications. Publication rates of abstracts presented at national meetings range from 23% to 55%, with delays of 12 months to 28 months for those eventually reaching publication.^{3–5} This raises the concern that the data presented do not ever undergo the scrutiny of a detailed peer review or that these abstracts do not meet publication standards. Although it remains unclear what accounts for a low percentage of presented abstracts from going on to publication and what accounts for the delay among those that are published, it is critical for abstracts presented at prestigious meetings such as the AAST to be of the highest scientific merit. Given the higher methodological quality that we noted in the AAST abstracts (both oral and posters), it is not surprising that those presented at this meeting have higher than reported acceptance rates. In fact, manuscripts of abstracts presented at the 2009 AAST, and submitted to *Journal of Trauma*, had a 78% acceptance rate for oral presentations and a 61% acceptance rate for poster presentations (Basil Pruitt, MD, personal communication December 12, 2011, Editor, *Journal of Trauma*).

These results are important in understanding the quality of data presented at a major, national surgical meeting. Although results would be expected to vary to some degree by year and society, it is likely that abstracts presented at other national meetings may have similar characteristics. We noted that the number of key methodological details reported by accepted abstracts is generally high with presented abstracts including a median of 7 of 10 items. Although the number and specific indicators chosen for this study could be debated/critiqued, each item is included in at least one (if not more than one) set of national reporting guidelines.^{6–8} The items most often missing from the presented abstracts were largely statistical in nature. Many abstracts did not include information on statistical methods or an appropriate sample size. Although this may be due in part to strict word requirements (250 words or less for the AAST), these methodological features are critical for meaningful hypothesis testing and critical evaluation from the program committees.

Interestingly, despite similar word restrictions, abstracts selected for poster presentation reported more key methodological details than those selected for oral presentation. Although there are no data to support the premise that oral presentations are more effective than poster presentations in disseminating information, oral presentations presumably reach more meeting attendees. As such, where these abstracts are showcased (podium or poster hall) may have dramatic impact on the level of scrutiny and peer and press attention received. As has been increasingly promoted at the AAST meeting, surgical societies should be proactive in setting aside generous, dedicated time to view, discuss, and debate posters presentations.

Such sessions should be promoted and their attendance should be highly encouraged. By placing well-known, senior surgeons as moderators and posters discussants, the AAST has demonstrated their level of commitment in supporting the poster program. Finally, representatives of medical and lay press should also be encouraged to view the poster halls and review with equal interest (and a critical eye) those presentations.

Despite these positive findings, these data also illustrate potential areas for concern regarding the data presented at national meetings. First, the majority (92%) of clinical studies presented were not randomized trials. This result is not surprising given the significant financial and time resources often needed to conduct randomized trials. As such, studies that are randomized should be given a high priority for presentation because they represent the most rigorous of data acquisition. If abstract reviewers do not follow standardized guidelines for selecting abstracts, or are not knowledgeable in methodology, abstracts within “hot” clinical topics may be chosen over higher quality abstracts in less interesting clinical areas.

As well, only 6% of the studies accepted presented “null findings”—findings with no difference between two exposure or treatment groups. Because we did not have access to the rejected abstracts, we cannot determine whether this represents a “submission bias” or an “acceptance bias.” Investigators may not submit their work with null findings, or program committee reviewers may not accept abstracts with such negative findings felt to represent “failed studies.” Whichever the cause, program coordinators, abstract reviewers, and meeting participants should be aware of this potential bias and encourage the submission and acceptance of work based on rigorous hypothesis testing rather than “interesting” results. Previous studies describing the characteristics associated with eventual publication have documented that studies with negative findings are less likely to be published.

What can be done? First, societies such as the AAST can provide detailed criteria for abstract submission such as the checklists provided by the CONSORT and STARD statements. Authors can use these guidelines to ensure that their work meets minimum methodological and reporting standards, and reviewers can score abstracts objectively across clinical topics and research methodologies. Societies can also ensure the abstract reviewers are free from bias and appropriately knowledgeable about research methods. In an effort to decrease the percentage of abstracts presented which do not go on to publication, societies can require manuscripts be submitted for consideration of publication as a prerequisite for acceptance, which is done for those submitted to the AAST. This would not only serve to improve the quality of the data presented (as it will require the study is complete and all analysis is final) but it would also serve to decrease the delay between presentation and peer review. As well, it would limit significance to the abstract content after submission.

This study represents a rigorous review of accepted abstracts by objective, blinded research professionals, providing information regarding key methodological details of abstracts presented at the 2009 meeting of AAST. Despite this, there are several important limitations. First, we did not have access to the abstracts submitted for consideration that were rejected. As such, we do not know whether abstract reviewers selected the highest quality abstracts or not. However, this study noted that abstracts selected for oral presentation reported fewer

methodological details than those chosen for poster presentation. We also do not have information regarding abstracts that were accepted for presentation but then were not presented. It may be that author decision accounts for this observation regarding meeting attendance and travel. In addition, we only reviewed abstracts for 1 year of one national meeting. Abstracts presented during a different year or at another societal meeting could be of differing characteristics. As well, our study fails to capture those select abstracts that evaluate a subject or an approach to patient care that is extremely novel, innovative, or cutting edge. In addition, an idea could be so “outside the box” that it would be selected for presentation from the podium of such a meeting and discussed in the most public of forums, regardless of stated methodological quality.

More importantly, the quality of the abstract does not necessarily reflect the quality of the study. It is possible that a well-designed study was just poorly described in the abstract and that the reviewers involved in this manuscript were unable to discern whether these studies were well designed and executed if the corresponding abstract did not describe it well. Finally and perhaps the most significant limitation involves the AAST restrictions on abstract volume per author and institution. The AAST program committee limits a first author to one oral presentation and each institution to two oral presentations per year. As well, the committee further limits the abstract total to four per institution. Thus, the rules set forward to achieve some diversity of representation will artificially influence the potential quality of both oral and poster presentations. The program committee is tasked with difficult choices when reviewing hundreds and hundreds of abstracts. The reviewers must attempt to balance individual authors, institutions, and geographic representation within the program. As well, they must balance the clinical and basic science contributions from all submissions.

CONCLUSIONS

Abstracts accepted for presentation at the 2009 AAST annual meeting achieved high methodological quality. Although classically dismissed as of “lesser” value or interest by some attendees, abstracts accepted for poster presentations were actually of equal or higher methodology compared with those accepted for oral presentation. As such, both press and audience attendees should take note of the quality of content that the AAST Poster Sessions offer. This is reflected in the dedicated time that the Association yields to the poster sessions and the assignment of well-recognized and senior members of the trauma community to lead these rounds. Therefore, meeting attendees should be encouraged to increase their time spent in viewing these posters and should strive to attend and participate in the poster rounds. Finally, academic societies should consider a 10-point grading system to improve the quality of all presented research.

Acknowledgments

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Abstract ID# _____

Institutional Region ☐ Northeast ☐ South ☐ Midwest ☐ West ☐ International

Clinical Topic ☐ Abdominal ☐ Acute Care Surgery ☐ Burns
 ☐ Cardiopulmonary Critical Care ☐ Education ☐ Extremity Fracture/Hand
 ☐ Genitourinary ☐ Infection & Sepsis ☐ Neurological
 ☐ Nutrition/GI Critical Care ☐ Shock/Transfusion ☐ Socioeconomic/Ethics
 ☐ Soft Tissue/Head and Neck ☐ Thoracic ☐ Trauma Systems
 ☐ Vascular

Research Type ☐ Basic Science ☐ Transitional ☐ Clinical Research
 ☐ Health Services/Outcomes ☐ Other

Study Design ☐ Randomized Trial ☐ Prospective Cohort ☐ Retrospective Cohort
 ☐ Case Series ☐ Other

Multicenter Study ☐ Yes ☐ No

Negative Finding ☐ Yes ☐ No

Abstract Rating	
1. Explains the <u>scientific background and rationale</u> for the investigation being reported.	☐ Yes ☐ No
2. <u>States specific objective</u> including any pre-specified hypotheses.	☐ Yes ☐ No
3. Describes the <u>setting, locations</u> and relevant dates, exposure, follow-up and data collection. Describes the <u>technical specifications</u> of material and methods involved, if applicable. Describes the <u>interventions</u> intended for each group, if applicable.	☐ Yes ☐ No
4. Gives the <u>eligibility criteria</u> of participants and the methods of control selection. Gives the number of controls per case, if applicable.	☐ Yes ☐ No
5. <u>Defines all outcomes, exposures, predictors, potential confounders and effect modifiers</u> . Gives diagnostic criteria, if applicable.	☐ Yes ☐ No
6. Provides an appropriate <u>study size</u> for adequate statistical power.	☐ Yes ☐ No
7. Describes the <u>statistical methods</u> including those used to control confounding.	☐ Yes ☐ No
8. Reports the <u>number of individuals in the study</u> , including the number completing followup.	☐ Yes ☐ No
9. <u>Gives unadjusted estimates</u> and, if applicable, <u>confounder-adjusted estimates</u> and their precision (e.g. 95% confidence interval).	☐ Yes ☐ No
10. <u>Summarizes key results</u> with reference to study objectives	☐ Yes ☐ No
Each YES=1, Each NO=0	Total Score

Figure 1.
Example of the Abstract Grading Sheet used.

TABLE 1

Criteria Used for Abstract Grading

1	Explains the <i>scientific background and rationale</i> for the investigation being reported
2	<i>States specific objective</i> including any prespecified hypotheses
3	Describes the <i>setting, locations</i> , and relevant dates, exposure, follow-up, and data collection; the <i>technical specifications</i> of material and methods involved, if applicable; and the <i>interventions</i> intended for each group, if applicable
4	Gives the <i>eligibility criteria</i> of participants and the methods of control selection; and the number of controls per case, if applicable
5	<i>Defines all outcomes, exposures, predictors, potential confounders, and effect modifiers</i> ; and give diagnostic criteria, if applicable
6	Provides an appropriate <i>study size</i> for adequate statistical power
7	Describes the <i>statistical methods</i> including those used to control confounding
8	Reports the <i>number of individuals in the study</i> , including the number completing follow-up
9	<i>Gives unadjusted estimates</i> and, if applicable, <i>confounder-adjusted estimates</i> and their precision (e.g., 95% confidence interval)
10	<i>Summarizes key results</i> with reference to study objectives

TABLE 2

Region, Clinical Topic, and Study Design Characteristics of Abstracts Accepted to the 2009 AAST Annual Meeting

	Total (n = 187)	Poster (n = 120)	Oral (n = 67)
Institutional region, n (%)			
Northeast	48 (25)	31 (25)	17 (26)
South	48 (26)	29 (24)	19 (29)
Midwest	20 (11)	9 (8)	11 (17)
West	42 (22)	27 (22)	15 (26)
International	18 (10)	15 (13)	3 (5)
US military	11 (6)	9 (8)	2 (3)
Clinical topic, n (%)			
Abdominal	22 (12)	16 (13)	6 (9)
Acute care surgery	9 (5)	3 (2)	6 (10)
Burns	7 (4)	3 (3)	4 (6)
Cardiopulmonary critical care	14 (7)	12 (10)	2 (3)
Education	5 (3)	4 (3)	1 (2)
Extremity fracture/hand	7 (4)	5 (4)	2 (3)
Genitourinary	3 (2)	2 (2)	1 (2)
Infection and sepsis	5 (3)	2 (2)	2 (5)
Neurological	20 (11)	14 (12)	6 (10)
Nutrition and gastrointestinal critical care	5 (3)	5 (4)	0 (0)
Outcomes/guidelines	11 (6)	9 (8)	2 (3)
Shock/transfusions	43 (23)	23 (19)	20 (31)
Socioeconomic/ethics	1 (1)	1 (1)	0 (0)
Soft tissue, head, and neck	0 (0)	1 (1)	0 (0)
Thoracic	2 (1)	2 (2)	0 (0)
Trauma systems	17 (9)	9 (8)	8 (12)
Vascular	6 (3)	3 (2)	3 (5)
Other	10 (5)	6 (5)	4 (6)
Research type, n (%)			
Basic science	23 (12)	12 (10)	11 (17)
Translational	6 (3)	3 (2)	3 (5)
Clinical research	95 (51)	58 (50)	36 (52)
Health services/outcomes	53 (28)	38 (31)	15 (23)
Other	10 (5)	8 (7)	2 (3)

TABLE 3

Quality Indicators of Abstracts Accepted to the 2009 AAST Annual Meeting

	Total (n = 187)	Accepted Poster (n = 122)	Accepted Oral (n = 65)	<i>p</i>
Median quality indicators present (IQR)	7 (6, 9)	8 (6, 9)	7 (5, 8)	0.02
Mean quality indicators present ($\pm$ SD)	7.3 $\pm$ 1.7	7.4 $\pm$ 1.7	6.8 $\pm$ 1.7	0.03
Inadequate sample size (%)	59 (32)	38 (31)	21 (32)	0.08
Main result is a negative finding (%)	11 (6)	2 (3)	9 (7)	0.23
Multicenter study (%)	53 (28)	35	18	0.71

IQR, interquartile range; SD, standard deviation.