How to Prepare a Poster

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Posters offer a critical introduction to scientific research in any field. There are numerous media resources available to help researchers with the technical details needed to create effective poster presentations to communicate their data to their scientific community. This chapter will focus on major principles associated with designing and presenting a poster at a scientific meeting. First, there will be an introduction to the purpose and relative importance of posters in academic settings. Next, the qualities of an effective poster and common pitfalls associated with an ineffective poster will be described. Finally, this chapter will outline a systematic approach to preparing and presenting a poster in a scientific setting.

Poster presentations in academic meetings are used to convey knowledge through visual representation by a wide spectrum of scientific subspecialties [1]. They may also be considered an effective vehicle for introducing new and soon to be published scientific data. The impact of posters on the transfer of academic knowledge is generally well accepted, with the visual appeal combined with effective author presentation of academic content being among the more influential factors on successful impact [2]. However, this impact is sometimes disputed, with concerns in some fields that data from poster presentations are too preliminary and may not survive the rigor of academic peer review [3–5]. Moreover, some have observed that poster sessions serve limited function compared to other components of an academic program benefiting mostly young investigators and poster chairpersons [6]. Nevertheless, most agree that poster presentations offer an ideal opportunity to disseminate research findings [7] and can assist in manuscript preparation [8]. They also help fellows and early-career faculty members think critically, develop a national reputation, network and develop collaborations, facilitate promotion in academic positions, and can even create new job opportunities [8]. For anyone considering an academic career, these benefits become apparent fairly early in academic tenure when scientific results can be shared in a nonthreatening and collegial atmosphere.

What makes a good poster? Many sources consistently suggest that readability, organization, and succinctness are qualities that make an effective and successful poster [9, 10]. Researchers need to first determine the main message or thesis of the poster and then assemble components to provide supporting evidence and illustration of the message, which can be communicated fairly succinctly to anyone viewing the poster. Smith et al. [11] argue that first impressions count and found that posters ranked as among the best were reliably identified based on factors such as presentation, message, and star quality. Facts, originality, and the science presented in a poster were less reliable indicators

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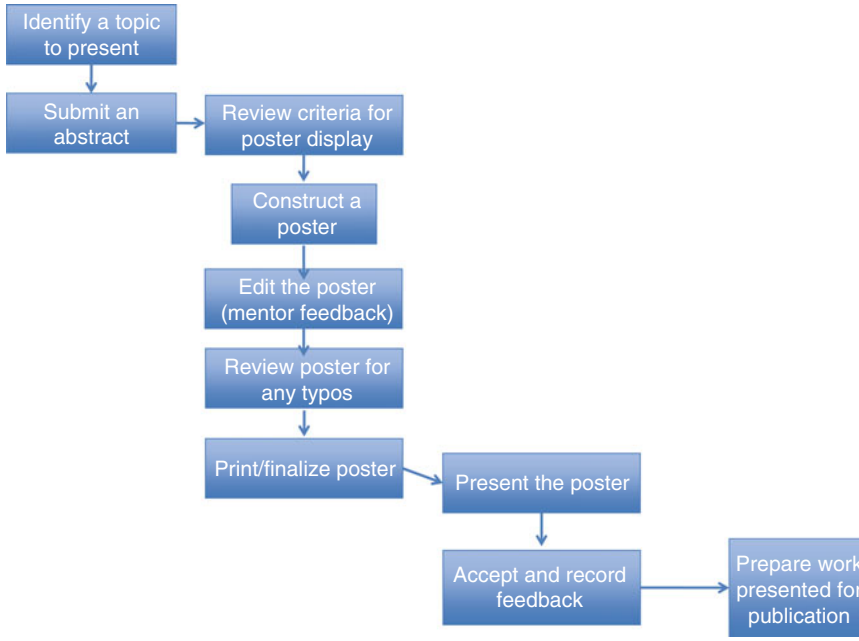

Fig. 36.1 Steps needed to prepare a poster

of top-ranked posters. Poster-scoring guidelines have been proposed based on these results.

Problems with posters most commonly arise when they are given less importance than oral presentations or published papers [12]. Miller et al. [10] outline several important pitfalls associated with ineffective posters. First, presenters may fail to appreciate the opportunity offered by a poster to convey their findings while interacting with individual viewers. In addition, they may neglect to adapt detailed narratives and statistical tables into readable text bullets and charts. These missteps render the poster difficult to read, and readers have a hard time quickly grasping its key points. Moreover, by simply posting pages from a paper, one risks having people merely skim the work while standing in the conference hall. Brief narrative descriptions summarizing one's work can serve to initiate a conversation with colleagues about the key message being conveyed, which may then lead to important feedback or collaboration. Presenters may also forget the range of specialties and training backgrounds to which they are presenting. Knowing your audience is essential for effective and respectful scientific communication and does not leave those visiting your poster with the onerous task of interpreting your statistical findings, particularly if they are complex or difficult to understand. In most contemporary scientific settings, it is helpful to be prepared for an interdisciplinary research audience and communicate a message that has real-world application [13].

I will now discuss the nuts and bolts of how to make an effective poster. Figure 36.1 provides a flow chart summary of the stepwise approach we outline here. The first step is to identify a topic of interest or scientific question. Topics suitable for a poster may be broad ranging and can report on any stage of a particular research project. For example, you may choose to report an original study (descriptive, observational, retrospective, or experimental), evaluation of a method, device, or protocol, or present a case report or case series. Once a scientific question and the corresponding data have been identified, an abstract can be written.

Abstracts are submitted to professional meetings based on the abstract topic or the theme of the academic meeting. Organizations hosting professional meetings will offer an open invitation to

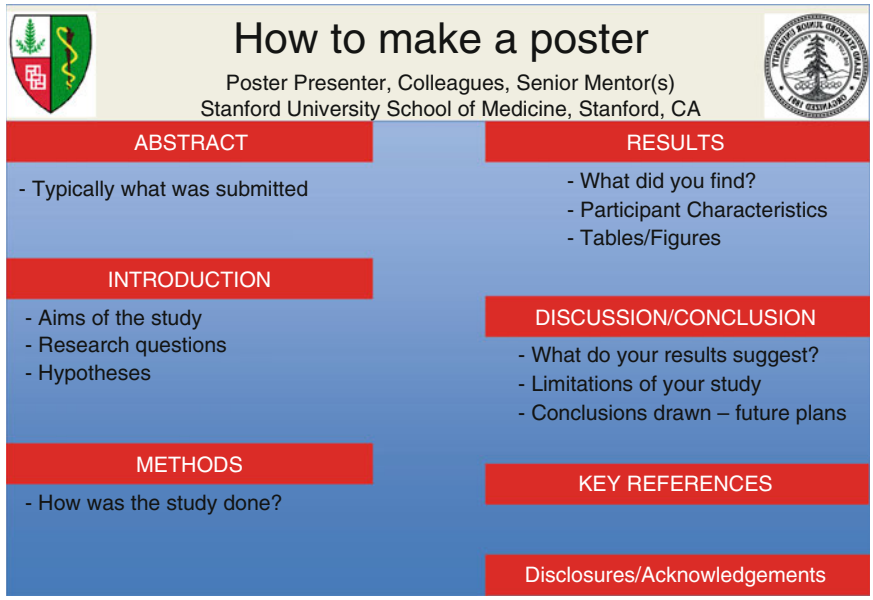

Fig. 36.2 General layout of a poster

submit an abstract several months before the meeting and provide specific guidelines for abstract submission. A committee of peers is tasked by the organization to compile a scientific program for the meeting and carefully reviews the abstracts. There are several factors that lead to the acceptance of abstracts: adherence to the submission guidelines (some organizations will plainly state in their guidelines that abstracts will automatically be rejected if they do not adhere to such guidelines), presentation of new and original data (versus previously presented data or a review of the literature), and scholarship with inclusion of references, innovation, indication of comparisons or control groups and standardized measures, and complete studies (versus incomplete studies that promise later results).

Once a well-prepared abstract is accepted, it can be used as the outline for the poster content. Before laying out the components of your poster, carefully read any instructions that may have been sent by the organizers of the meeting regarding your presentation. Specifically, they will often send instructions about the size requirements of the poster and the date, time, and location you have been assigned to present your poster. It is important to review the size dimensions prior to constructing your poster, as it can be tedious to adjust the size once all of your content has been laid out. If it is not the right size, either your poster will not be permitted for presentation or it will stand out at the meeting in an undesirable way. Your aim is to invite positive rather than negative attention to your work, so reviewing the criteria for poster display is a critical initial step.

Most abstracts follow a specific format, which includes components such as an introduction or background, methods, results, discussion, and conclusion. These components can then be broken down into separate sections of the poster (Fig. 36.2). Typically, the abstract will be the first component and gives the audience a chance to take a cursory summary of your work. The abstract may be placed directly under the banner of the poster, which, in some instances, is considered the most important part of the poster because it is the most eye-catching. Some meetings require that the title in the banner and poster be a specific size and font so that it is easily readable to the audience from a typical distance of 3 ft [9]. The title of your poster will correspond to the title of the abstract you submitted and should be relatively short but informative about the

nature of your study. Directly under your title would be the author names and then institutional affiliations. Contributions to the work you present in your poster will vary from one individual to another, but this is an excellent opportunity to acknowledge the hard work of your entire research team. It is helpful to review with your mentor who to include as a coauthor on your poster and in what order. In some instances, organizations will place identifiers on the banner of your poster to signal the audience if your poster won an award or if you are a new investigator or mentor. It is also helpful, if you do not typically carry a business card or handouts of your poster, to have your contact information listed in the corner of your banner to invite people to contact you in the future. The abstract that follows under the banner is typically written exactly as was submitted unless your results have significantly changed after interim analyses. These changes or updates are more common than not, leading to discrepancies between abstracts submitted and published in proceedings handbooks and actual poster presentations. In fact, one study found that up to 76% of abstracts in a proceedings handbook were discrepant from their corresponding poster presentations, suggesting that attending the poster was the best way to get this information [14]. The abstract should be consistent with the data you are presenting in your poster because the abstract and the banner will likely be the most frequently read portions of your poster. It will summarize the objectives of the study, the methodological approach employed, the results, and the major conclusions drawn from the results. These are then elaborated in subsequent components of your poster.

The introduction section follows generally under the abstract and provides a background context and purpose for conducting the study you are presenting. It is helpful here to expand on the importance of your study and why it might be particularly relevant to your audience. You will then propose your research question and follow it with your predictions about the outcome of your study. These hypotheses may be informed by prior literature, which you should reference, or may be based on predictions of work you have previously presented. When you are presenting this section of your poster, it is helpful to get the background of your audience to facilitate their engagement with your presentation.

The next component is the methods section of the poster. Here, bulleted text is often preferred to provide succinct, clear statements about how you conducted your study. The information should be sufficient for another researcher to be able to replicate your approach [9], but since space is limited, this may be an area that you expand on during a discussion with your audience or in response to a question that is posed to you. Your methods should demonstrate a valid approach to answering your scientific question, providing sufficient information about your sample (from which population it was derived, selection criteria, group assignment), the materials or interventions you used, and your statistical approach to analyzing your primary and secondary outcome measures. It is easy to get bogged down in this section and provide too much detail that may not be within the scope of a poster presentation. One may be particularly vulnerable to losing the interest of his audience while presenting this component of the poster. Decide what is the most important aspect of the methods you need to communicate, and reassure yourself that you will be able to provide additional detail to anyone requesting it while you present your poster.

The results section is another component of the poster that will likely receive relatively more attention than other sections. Many are interested in understanding how you answered your scientific question and how the groups you studied compared to one another on the major outcome measures studied. Graphical presentation of your data is often necessary and helps to illustrate your data in ways words cannot. It is important to make sure that any tables and figures used are clear and self-explanatory, with appropriate use of error bars to define variance around results and legends to define variables.

In the discussion section of your poster, take time to reflect on the significance of your findings in the context of the current study, as well as in the context of your broader field. It is useful to

review the literature on related studies and offer some insights about how your study compares to those already published. It is very likely that your results will either support the extant literature on your topic or contradict them, warranting an explanation for differences in findings. Offer limitations of your current study and suggestions of future directions to address the scientific question you proposed. This section requires some inferential thinking and may spark fruitful discussions at your poster. It is possible that you might derive more ideas from your audience about the interpretation of your results so it is important to be attuned to that. A concluding statement should relate your initial research question and predictions to your study results, tying the poster together.

Below your discussion and conclusions is a place to include references to any literature you have related to your study. The format of the references should be consistent with the text. Including references is an important gesture that adds to the validity of your work and acknowledges how your work may be related to the larger field. It is quite possible that someone you have referenced will come to see your poster, at which point it will be important for you to have knowledge both of your work as well as that of the authors you cite. If you should strike such luck as to meet an author you have cited, take advantage of the opportunity to learn more about her work as it impacts your study.

Finally, many organizations are now requiring you to report on your poster all relevant funding sources for your study and disclose any potential conflicts of interests. This has become an essential component of many posters and will certainly be required if you decide to publish your work. The integrity of the work requires disclosures of any potential distorting influences where they may exist, and the audience may then judge and determine the impact of bias on the information being presented. Investigators should not view this requirement as punitive or avoid engaging in studies involving interventions or devices sponsored by industry. This is simply a part of being a scientist in an era of open disclosure.

Once your components have been developed and assembled, your poster is ready to be constructed. After reworking your initial drafts, seek feedback from your mentors. You will likely have several months between the time your poster is accepted to the actual date of presentation. Do not procrastinate and leave your preparation until the last minute [15]. Your mentors will appreciate the advanced notice and the ability to provide you with meaningful feedback well before the meeting. Remember that they, too, will likely have to prepare for presenting at the same meeting. Moreover, if this is your first time presenting, your research team may be engaged to provide you with some helpful preliminary feedback and simulate the poster experience so that you are ready to address any questions that might be posed to you about your work. Another set of eyes is always useful to check for any typos and stylistic or grammatical errors of which you may not be aware in your preparation. It is sometimes also helpful to get feedback from individuals who are not in your field to get a sense of how your work might be evaluated by someone in a less related area. Upon finalizing your poster, you may choose a variety of different ways to print or display your poster. In recent years, the scientific community has made tremendous strides in poster production [12, 16, 17], which eventually may lead to more technologically advanced formats, eliminating the need for paper in the future.

The next step in the process is to actually present the poster. Some meetings offer an opportunity for early viewing of posters and request that you place your poster on its designated board the morning of your presentation. It is important to be on time for your poster session, and try to remain at your poster as much as possible to be available to answer any questions by those viewing your poster. It is helpful to have a 2-min summary of your poster, when, if requested, you can walk people through the various components in a relatively efficient manner. Be open to interruption and feedback during this presentation because among other reasons, it may improve your study if you are preparing it for publication. A 2-min summary of your poster will become

easier to present as the session carries on because you will become adept in gauging your audience, revising your approach, and getting to the heart of your message efficiently. This iterative process in a relaxed, nonthreatening environment [18] makes a poster presentation unique and very enjoyable for both you and your audience.

After your poster session, it is helpful to record some of the feedback you received from the people you met. This will enrich your discussion with your mentors and colleagues after the meeting to debrief on the experience and plan for next steps related to your study or future projects. Among the most rewarding aspects of presenting a poster is the ability to utilize that medium to facilitate publication of your work. If publication is seen as the final step to the poster process, then poster preparation can be a fruitful way to becoming a prolific author because academic faculty members often attend several meetings a year, and while manuscripts often do not have deadlines ascribed to them, abstracts for meetings do. Thus, there is no better way to take advantage of that stimulus to produce and analyze data than to simply move that work from poster to publication. Posters also provide a helpful template for the initial draft of a manuscript. That template combined with the feedback you receive at your poster can help you write and submit a manuscript that has already anticipated concerns that would be raised by reviewers. For these reasons, the last step for presenting a poster should be preparing it for publication.

In this chapter, we reviewed the purpose and importance of poster presentations and described the qualities and pitfalls of this medium. Current opinion based on a review of the literature is that posters offer an opportunity to clearly and succinctly communicate research findings to colleagues, mentors, and potential future collaborators. The presentation of a poster offers academicians a chance to network with peers and receive feedback on their work. Eventually, this can lead to recognition, establishment of expertise, and possibly career advancement. Posters can serve as effective vehicles for the publication of scientific work and, if prepared and presented systematically, can be highly rewarding for an academician throughout his or her career.

Words to the Wise

- Start early and give yourself enough time to receive feedback from your mentors prior to presenting your poster—they can improve the presentation of your poster and help you anticipate questions.
- Target meetings that will enable you to share your work with colleagues and leaders in your field. This will allow you to make substantive improvements to your work as you prepare it for publication.
- The feedback you receive on your poster may help you anticipate questions reviewers might have about your work as you try to publish it. Take this feedback seriously to address any flaws in your design or approach or to recognize the importance of your work to the field.
- Use the poster session to network with individuals in your field and related fields. If you want people to stop by and see your poster, return the courtesy to them.
- Convert the content of your poster into the first draft of your manuscript.

Ask Your Mentor or Colleagues

- Can we identify some data that would be suitable for me to present in a poster?
- Which academic meetings would promote my research? Who is and should be my audience?
- What kinds of questions should I be prepared to answer while presenting my poster? What if I get stumped?
- Who should be listed as a coauthor on the poster and in what order?
- Which poster sessions should I attend when I am not presenting my own poster?
- What strategies can I use to convert to publication the work I present in a poster?

References

1. Rowe N, Ilic D. Poster presentation—a visual medium for academic and scientific meetings. Paediatr Respir Rev. 2011;12(3):208–13.
2. Rowe N, Ilic D. What impact do posters have on academic knowledge transfer? A pilot survey on author attitudes and experiences. BMC Med Educ. 2009;9:71.
3. McCormick MC, Holmes JH. Publication of research presented at the pediatric meetings. Change in selection. Am J Dis Child. 1985;139(2):122–6.
4. Schrager S. Transforming your presentation into a publication. Fam Med. 2010;42(4):268–72.
5. Weale AR, Edwards AG, Lear PA, Morgan JD. From meeting presentation to peer-review publication—a UK review. Ann R Coll Surg Engl. 2006;88(1):52–6.
6. Salzl G, Gölder S, Timmer A, Marienhagen J, Schölmerich J, Grossmann J. Poster exhibitions at national conferences: education or farce? Dtsch Arztebl Int. 2008;105(5):78–83.
7. Halligan P. Poster presentations: valuing all forms of evidence. Nurse Educ Pract. 2008;8(1):41–5.
8. Wood GJ, Morrison RS. Writing abstracts and developing posters for national meetings. J Palliat Med. 2011;14(3):353–9.
9. Shelledy DC. How to make an effective poster. Respir Care. 2004;49(10):1213–6.
10. Miller JE. Preparing and presenting effective research posters. Health Serv Res. 2007;42(1 Pt 1):311–28.
11. Smith PE, Fuller G, Dunstan F. Scoring posters at scientific meetings: first impressions count. J R Soc Med. 2004;97(7):340–1.
12. Johns M. Planning and producing scientific posters. J Audiov Media Med. 1998;21(1):13–7.
13. Sorian R, Baugh T. Power of information: closing the gap between research and policy. Health Aff (Millwood). 2002;21(2):264–73.
14. Zelle BA, Zlowodzki M, Bhandari M. Discrepancies between proceedings abstracts and posters at a scientific meeting. Clin Orthop Relat Res. 2005;435:245–9.
15. Boullata JI, Mancuso CE. A "how-to" guide in preparing abstracts and poster presentations. Nutr Clin Pract. 2007;22(6):641–6.
16. Bach DB, Vellet AD, Karlik SJ, Downey DB, Levin MF, Munk PL. Producing picture-perfect posters. AJR Am J Roentgenol. 1993;160(6):1303–7.
17. Bozdag AD. A new technique for presentation of scientific works: video in poster. World J Surg. 2008;32(7):1559–61.
18. Sherbinski LA, Stroup DR. Developing a poster for disseminating research findings. AANA J. 1992; 60(6):567–72.