The Skeleton Key Group: The Impact of Fellow Led Education in Nephrology

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Research article

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Abstract

Background

The Skeleton Key Group (SKG) is an online collective of trainees working to generate free, open-access medical education (FOAMed) focusing on electrolyte disorders. Trainee created and edited materials include a case report supplemented by visual abstracts, tweetorials, and quizzes.

Methods

The group formed in September 2019, and members were continually added. In May 2020, anonymous surveys were sent to SKG members and readers to assess educational impact.

Results

Member response rate was 62.5% (n=20) with 13 nephrology fellows and 4 residents. 85% (n=17) of respondents reported improved medical knowledge, and 70-80% (n=14-16) noted improved manuscript construction. Members' primary goal of joining was to learn (n=18), and 60% (n=12) met all and 30% (n=6) met some of their goals with similar rates among low-engagement members (n=10).

Of the 130 audience responses, the majority were nephrology fellows (41, 32%) and residents (42, 32%). Case reports were considered high quality, scoring 91±15.5 (0, low to 100, high). Tweetorials were the most useful and reported utility increased compared to the case report as training level progressed. 79% (n=103) confirmed their educational experience was impacted by the COVID-19 pandemic, and 90% (n=116) found the SKG an effective educational tool during this period.

Conclusions

The SKG is an innovative collaborative experience and valuable educational resource. Involvement led to positive changes in members' reported medical knowledge and writing skills. Our data also reinforces the ability of FOAMed to cater to different learning styles and to complement traditional medical education specifically during periods of social distancing.

Background

Social media is being adopted by healthcare professionals as a platform for education. For the busy, multitasking, and millennial learner, the interest and appetite for free open access medical education (FOAMed) continues to grow. This presents challenges to the educator by shifting from didactic based learning (behaviorist learning) to collaborative creative learning (constructivist learning). Behaviourism is instructor centered with a passive learning style, however constructivism involves student centered construction and is a more active method of learning.(L. Flynn et al., 2015) Social media and FOAMed are fraught with critiques of how one ensures high quality educational materials which are externally valid. In the Emergency Medicine literature, organizations have tried to develop different criteria and scoring

systems.(Chan, 2018; Lo et al., 2018) Arguably even when compared to one another, recommended quality appraisal tools may be no better than looking at popularity and gestalt.(Ting et al., 2020) However, others argue that the open access forum itself helps to police the dissemination of erroneous information and foster open and instant communication.(Nettle, 2018; Panahi et al., 2016)

The Skeleton Key Group (SKG), named after the classic “fishbone” skeleton (Fig 1) used by clinicians to write down serum electrolytes in shorthand form, is an online collective of nephrology fellows dedicated to learning and teaching electrolyte pathophysiology. The group started in September 2019 with one faculty member and two fellow editors. The vision was to develop a collective of trainee-based, peer to peer education involving nephrology fellows around the world. The primary goal of the group is to further participants’ education on electrolytes. Group members teach each other skills of electrolyte pathology and how to present and teach electronically via social media. group members are continually added based on expressed interest and include interns, resident physicians, and fellow physicians and are as involved in the discussion and construction of group materials per their discretion.

Fig 1. Derivation of the “Skeleton Key” based off “fishbone” skeleton format to write in shorthand form serum electrolytes

Multiple educational materials from this collaboration are generated. First, a foundational case report is constructed with key learning points. The case report follows a familiar “morning report” premise with case presentation, detailed discussion on differential diagnosis, further work-up, and management. There is a focus on electrolyte abnormalities in terms of symptoms, work up, pathophysiology, and management in terms of manipulating the kidney’s ability to handle electrolytes. The monthly case reports are constructed off de-identified, real-patient case data. Group members discuss the case and other materials using a private message service on Twitter to provide critique, constructive criticism, and additional bits of knowledge. Other materials build on the case report to cater to different learning styles and to enhance the educational value and key points of the case report. These include visual abstracts, tweetorials, follow up quiz questions. Group members volunteer to construct any of the materials, and input from all members are encouraged.

What little data exists on the impact of social media and tangible educational outcomes is conflicting. Overall social media is considered to have a positive impact on learners, and in one medical school, up to 50% of students utilized social media to enhance their learning.(Cheston et al., 2013; Friedman et al., 2019) Despite most people reporting utilization of social media to stay engaged in continuing medical education (CME) and benchmarks for clinical practice, social media did not result in an uptake of CME materials despite using a varied media approach.(S. Flynn et al., 2017; Panahi et al., 2016) Tangible results regarding measurable outcomes is varied. There is little data about use of social media affecting educational performance. In a review, there was no difference in test scores among students who did and did not use social media for medical knowledge, however active participants in online blogs did have higher test scores than those who posted less often.(Cheston et al., 2013; Panahi et al., 2016) This suggests that a reported positive educational impact may translate to measurable educational outcomes.

In light of this history, we sought to identify the educational impact of the SKG. Our primary objective was to determine if trainees involved in the SKG felt the experience added to their medical education in terms of medical knowledge and manuscript construction. Secondarily, we assessed whether involvement in the group was able to impact the self-reported ability to cultivate skills needed for scholarly activity, such as ability to evaluate and edit manuscripts and the ability to collaborate and teach. We were also interested in assessing if our readers/users found our educational materials useful especially during the COVID-19 pandemic.

Methods

We designed an anonymous internal assessment survey to gather information from the SKG members. This data was censored May 2020. Another anonymous external survey was promoted and disseminated on Twitter to gather information from our audience. Questions were designed as multiple-choice or qualitative responses. A continuous rating scale (0, low - 100, high) was utilized to measure the reported quality of our blog posts and teaching methods. Low, medium, and high quality were arbitrarily decided to score 49 and lower, 50-74, and 75 or higher respectively.

Results

For the internal survey, there were 32 group members in the SKG Twitter direct messaging group. Response rate was 62.5% (n=20) with the majority as nephrology fellows (13, 65%). The remaining breakdown included interns and residents (4, 20%) and attendings/independently practicing nephrologists (3, 15%). The self-reported impact of the involvement in the SKG on members was positive. Eighty five percent (n=17) of respondents felt the experience improved their medical knowledge, and 70-80% (n=14-16) noted improvement in manuscript construction (Fig 2). Despite a reported improvement in medical knowledge of manuscript construction, only half (n=10-11) stated an improved ability to edit, review, and write for a peer reviewed publication (Fig 3). Over 75% (n=15) of respondents reported an improved ability to educate and mentor trainees.

The majority of surveyed group members were interested in learning (n=18). Other goals noted by members included networking (n=8), teaching (n=8), publishing (n=6), and other (n=1). Sixty percent (n=12) met all and 30% (n=6) met some of their goals. Among low-engagement members (n=10), defined as involved in the group less than 25% of the time, a busy work/life schedule (n=5) and computer literacy (n=5) were the largest barriers. Other barriers included medical knowledge (n=2), time zone differences (n=4), and other (n=2). yet still 50% (n=5) of low-engagement members met some and 30% (n=3) met all of their goals.

Of the four interns and/or residents who completed the survey, three mentioned a desire to pursue Nephrology training, and seven of the eight of the first- and second-year nephrology fellows expressed a desire to continue and/or pursue additional nephrology training.

For external review of our audience, there were a total of 130 responses from 32 countries. The majority of respondents were interns/residents (n=42, 32%) and nephrology fellows (n=41, 32%). The remainder were either staff attending/private practice (30, 23%), medical students (7, 5%) or other (10, 8%). The majority coming from developed nations (75, 58%). Overall, feedback was positive with 95% (n=123) of surveyors finding our educational materials useful. With the continuous rating scale, our case report was ranked high quality (score 91±15). Specifically, regarding education during the COVID-19 pandemic, the majority (103, 79%) admitted their educational experience was affected, but also found the SKG (116, 90%) was an effective educational adjunct during this time period.

In regard to ranking the usefulness of our products, 104 respondents completed the full rank order. Tweetorials were considered the most useful product (52, 50%) from the group (fig 4). Interestingly tweetorials were considered more useful as training level progressed, and the case report became less useful as training level progressed. (Fig 5)

Conclusions

The SKG proves that a collaborative fellow led learning environment is a valuable educational tool to group members and readers and can be achieved through distance-based learning. The self-assessed educational value of the SKG to the members is impressive such that even low engagement leads to improvement in reported medical knowledge and skills such as manuscript construction which allows one to continue scholarly activity. This further supports the role of the constructivist learning theory in the current generation of learners. Around a quarter of audience members found each product to be “the most” or “second most” useful indicating we are reaching learners with distinct learning preferences. More data is needed to confirm if active or low participation results in tangible differences in test scores and patient care outcomes.

The positive feedback received from our audience, specifically trainees whose educational experience was affected by the COVID-19 pandemic, re-emphasizes the ability of distance based FOAMed as a useful adjunct to medical education. given almost half of our readership comes from undeveloped countries, FOAMed and the SKG this may be a useful resource to collaborate and coordinate educational resources and concepts to developing countries, although significantly more research is needed before a determination can be made.

We believe our products have high quality compared to a solo produced product due to group collaboration and active generation of content emphasizing critical thinking skills which are enhanced by online discussion. But our data highlights the continued need for trainee mentorship. Group involvement helps lay the groundwork for scholarly activity, but continued and consistent mentorship, guidance, and networking garnered from programs and attending physician mentors are irreplaceable. Distance based learning cannot replace the patient care experience and should be used as a platform to foster continued discussion and learning at home institutions.

Our data is clearly limited by response and reporting bias. Although readers admitted the SKG was an effective educational tool, the response rate was very low. As of June 13, 2020, The Skeleton Key Group Twitter handle @TheSkeletonKG had 1090 followers, and the average number of views for each case report published on the renal fellow network was 3705 views. Reasons for low reader response is likely because the survey was only disseminated on Twitter. This reporting bias also skews the exceptional rating of our effectiveness as an educational product overall and during the COVID-19 pandemic. Internally, we did not assess how many group members already published manuscripts or works in process or in review. Although we did ask surveyors to focus just on the impact of the SKG in their abilities, it is sometimes impossible to dissociate where one's skills are learned. There is also significant self-selection bias towards members interested in education and self-motivated, skewing our data towards those who reported positive outcomes in medical knowledge and achievement of goals as group members, even low participant members, chose to be involved in an educational collective outside of their usual duties.

Social media and FOAMed are here to stay. More data is needed to codify tangible results in test scores, patient care, and changes in physician practice. It is possible despite best efforts to quality control and assess FOAMed, we may just find that "social media is just media."(Sherbino & Frank, 2014) If this is the case, perhaps FOAMed and social media can help promote nephrology and recruit interested trainees. With the dwindling nephrology fellowship applicant pool, this potential influence should not be overlooked. However, our data suggests that social media and FOAMed has a real educational impact to readers and has the ability to create a meaningful collaborative learning environment for trainees.

Abbreviations

FOAMed: Free Open-Access Medical Education

SKG: Skeleton Key Group

CME: Continuing Medical Education

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Figures

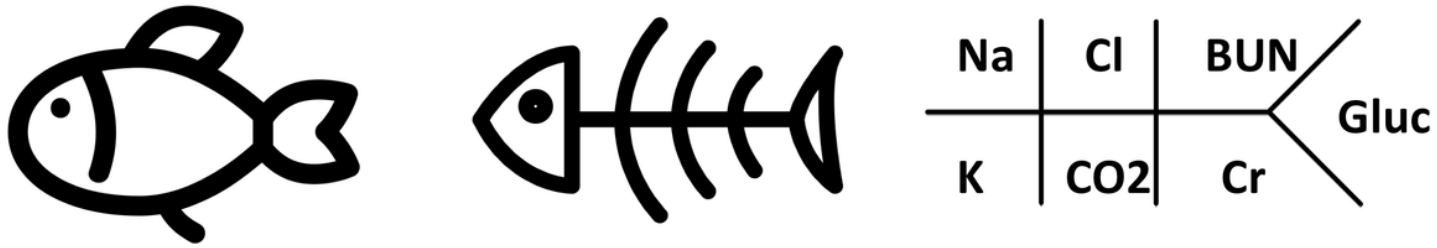

Figure 1

Derivation of the “Skeleton Key” based off “fishbone” skeleton format to write in shorthand form serum electrolytes

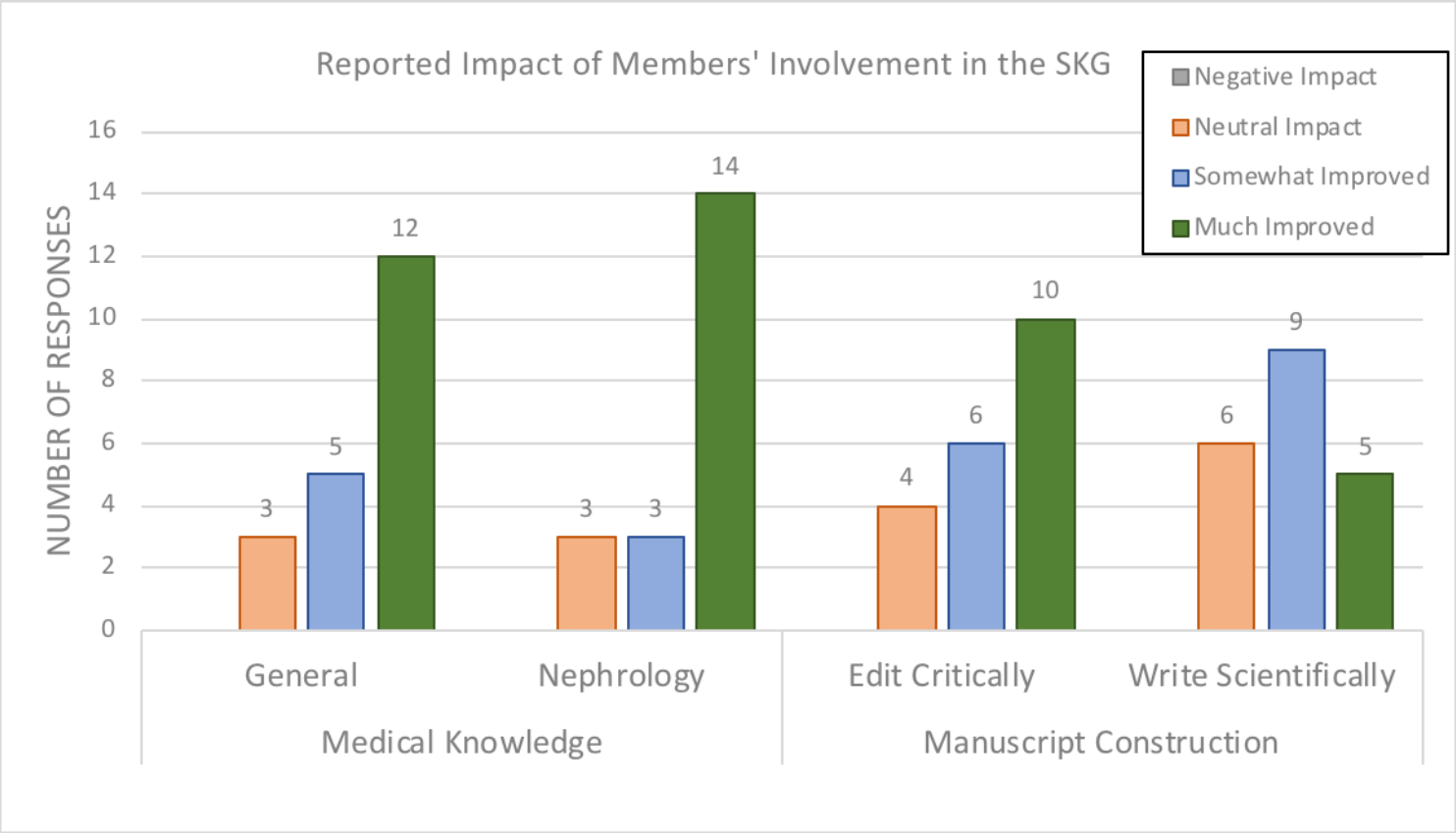

Figure 2

Impact of involvement in the SKG on medical knowledge and manuscript construction

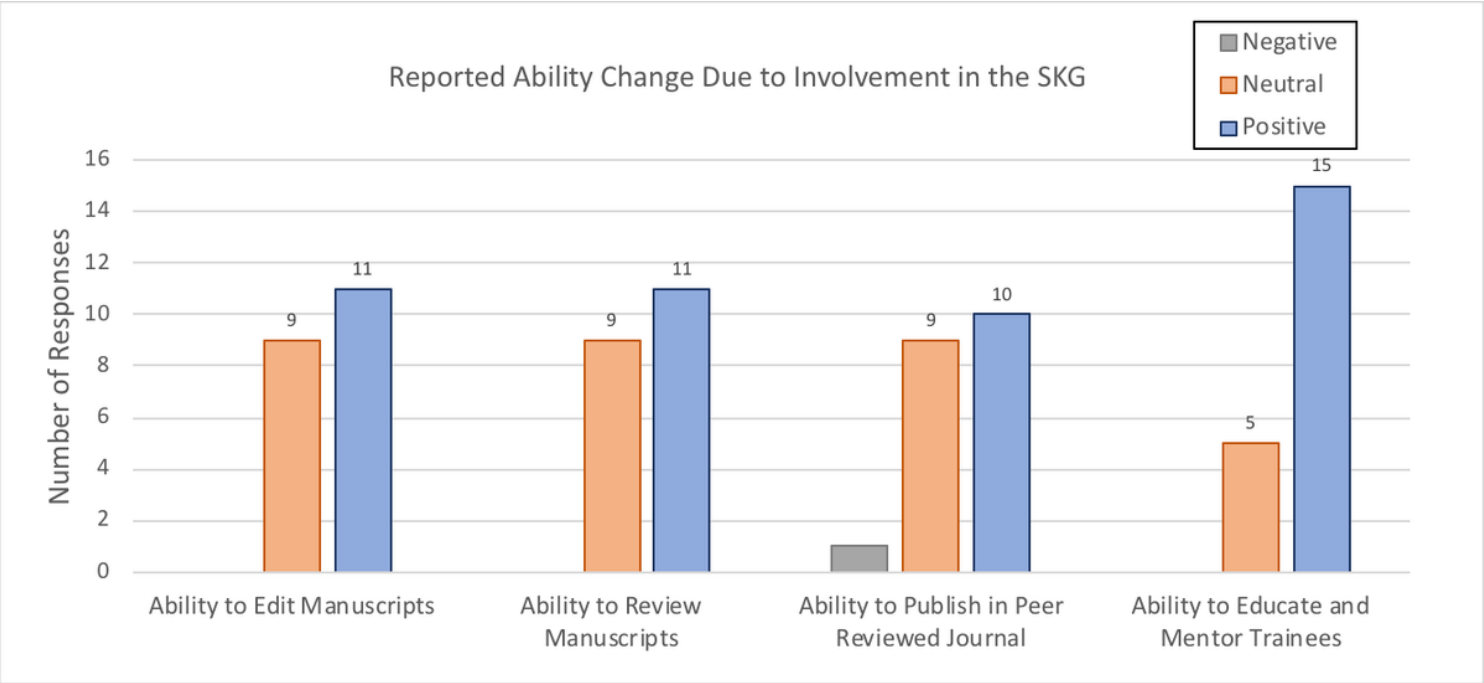

Figure 3

Change in reported ability after involvement in the SKG

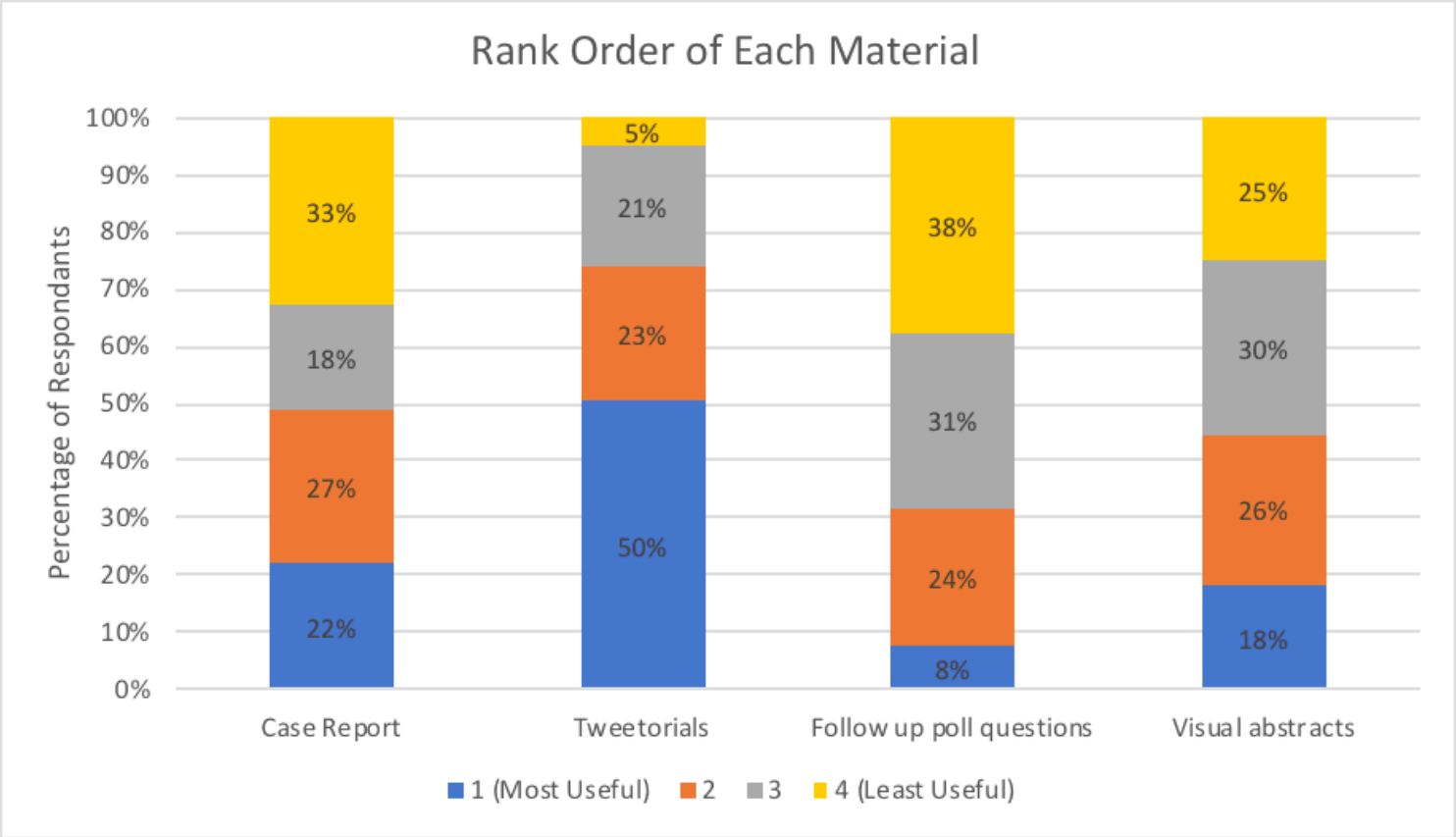

Figure 4

Rank order of each material based on usefulness

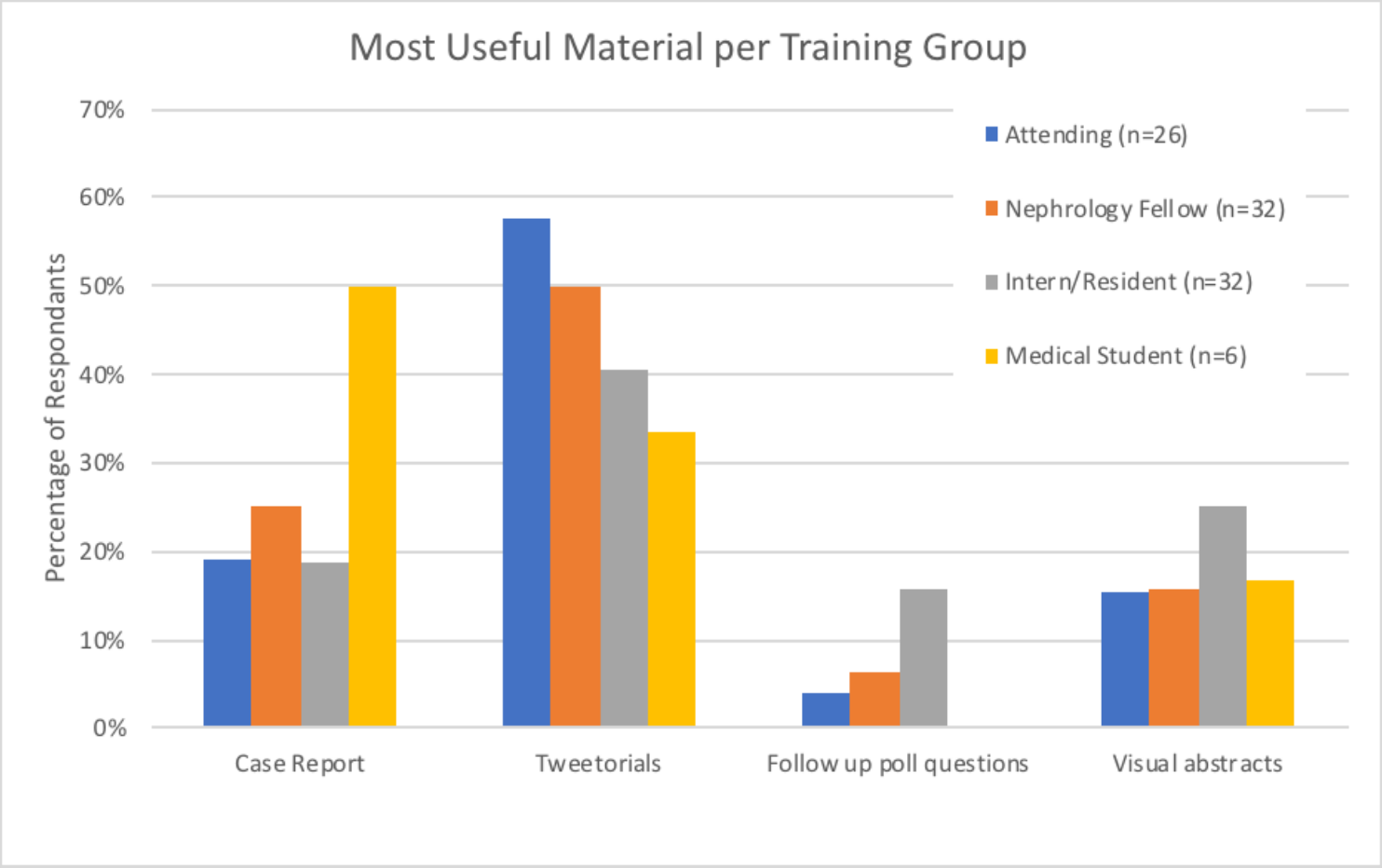

Figure 5

Usefulness of material by training group

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Survey2.pdf
- Survey1.pdf