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Speaking notes for remarks for panel “Designing the Science: A
Biostatistician’s Perspective”

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NOTE: These slides were not displayed as part of the presentation. They served as speaking notes only.

Biostatisticians and Basketball

- My background:
 - collaborative biostatistician, and it's what I love doing
 - Have been involved extensively with biostatistics, epidemiology, and research design KFC in the CTSA program, and
 - yes, I also play (and played) basketball.
- Playing basketball is the analogy I'll stick to for these remarks.
 - Some people use football, but I don't play it. Problem with using a sport that women generally don't play (in an organized fashion at least) and women are underrepresented in science?

Teams can get a lot better with time

- It can be extraordinary to watch a team who has played together for some time – on the court, 5 people's movements are choreographed as one.
- It takes a while for teams to gel.
- Big difference between 5 basketball players together for the first time versus 5 people who play together on a team regularly.
- When you've played together for a while, you know where your teammates will be before they get there on the court. Before that point, you can miscommunicate, bump in to each other, set moving picks, etc.
- Individual basketball players pass differently. You have fewer turnovers if you have experience playing with who is passing you the ball.

Scientific teams can get a lot better with time

- I design better studies and data analysis plans when I've worked in the area long enough to understand the science, am familiar with the outcome measures, and have internalized the aims. Takes some time to learn the area. (Christina great example)
- I can fill in at the last second, but it's going to be suboptimal. This is like subbing for a team but only speed reading their playbook in the locker room before the game starts.
- Track record of publications together looks stronger on grant applications.
- Submitting proposals: good teams win some, and sometimes lose too. Sometimes takes quite a few tries to get that first win as a team.
- Sometimes teams have conflict. The teams that work through it are better for the experience. "Storming" phase. Same with scientific teams.

Everyone on the team deserves credit

- The team captain does not deserve all the credit for the wins (or the losses).
 - Like this analogy better than the quarterback analogy for the PIs. PI as team captain makes sense.
- The basketball team can't function without a point guard. But the point guard may not be your team captain.
 - PI isn't just one position. Sometimes it's the clinician, sometimes it's the basic scientist, sometimes it's even the biostatistician.

Plays out in promotion and tenure

- Science is changing to be bigger – need bigger teams that have a bigger variety of expertise.
- Presents a challenge in terms of traditional metrics for promotion and tenure that look at being PI on grants or having first/last author publications.
- The biostatistician may be essential to the success and conduct of both, but is unlikely to be first/last author. Chis Austin touched upon this – “current systems in academic medicine mitigate against [team science]”

Promotion and tenure, cont'd.

- Some thoughts on this (from Welty et al. in *Academic Medicine* and Mazumdar and Messinger, et al., under review).
 - Institutions that have p & t guidelines that provide a clear and appropriate path for promotion for team scientists will be better at recruiting and retaining team scientists, including biostatisticians.
 - It is critical for team scientists to document their contributions to manuscripts and/or proposals.
 - This documentation can include categories such as minor, medium, major involvement.
 - Co-investigators needs to document in their professional statement and summary how they have been involved. (biostat example of new method for research area]
 - It can also be incredibly helpful to have documentation from the PI or first/last author about the biostatisticians role – such letters or summaries can inform the chair's letter for promotion, or actually be part of the p & t package itself.
 - Education and service contributions may not look entirely traditional but should be similarly documented.
 - Example: biostatistician service on IRB or review panels. If they review methods for all proposals, this is a huge job.

Can't play on too many teams at once

- Can't play on too many teams at once:
- It's certainly possible to be a multi-sport athlete.
 - Continuing the sports analogy, this would mean I spend all my time running between the basketball court, the volleyball court, and the tennis court. With all the shoe/equipment changes, there's little time to remember if I should be dribbling, passing, or hitting.
 - Happens in biostatistics – if I have too many projects, I can't meaningfully contribute to any single one.
 - One could spend all their time just jumping in the game and not honing those skills that are useful for one sport. E.g. shooting practice for basketball, or lifting weights.
 - The same is true in biostatistics – I need to have time for background reading on emerging methods that may make sense for our data.
- This necessitates thoughtful management of biostatistics (and team science) resources. I find it's optimal to have no more than a few 'large' projects and then a few smaller projects.

Need to understand roles & strengths of other team members

- The point guard needs to know the role and purpose of the center.
- They don't need to know exactly how to fulfill each other's roles – the center should not be working to have the skills of a point guard – but they should be familiar with those roles and recognize the others' strengths.

Role of biostatisticians

- People associate biostatistics with power and sample size calculations and sometimes don't approach for other things. But that's kind of like thinking your center is only useful for blocking shots.
- Biostatisticians can do more:
 - Refining specific aims. Biostatisticians are really good reviewers, esp thinking about logic but not necessarily being experts in your area of science.
 - Study design that's efficient, appropriate, good chances of answering your research question.
 - Data capture, database design. Rather not have people come to us with Excel spreadsheets when it's 'too late.'
 - Writing up manuscript, results. I read your introduction, discussion!

Knowing each other's strengths/roles

- You should be familiar with the biostatistics methods, I should be familiar with the science. Makes us both better team members. Akin to the “alley-op” – guards passing skills and the center's skills near the basket.

Closing

- May you and your teams have many 'alley-op' moments and win many championships.