



## A Pediatric Department's Innovative Grant Writing Workshops

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**S**ustaining the pipeline of engaged, productive physician-scientists in pediatric departments is crucial to the mission of academic pediatrics. Today, however, physicians are less likely to pursue biomedical research than ever before.<sup>1-7</sup> Although retention, promotion, and tenure guidelines are changing at academic institutions, obtaining extramural funding remains one of the most important measures of scholarship.<sup>1</sup> Despite the academic importance of extramural funding, grant awards from the National Institutes of Health (NIH) and other funding agencies to physician-scientists are declining.<sup>8-12</sup> Here we describe our innovative investments to prepare fellows and faculty (“participants”) to write impactful grant applications that are competitive at the national level. The investments are made through the Department’s Grant Writing Workshop, a 2.5-day immersive-writing program at which participants develop their grant applications.

### Workshop Attendees

Participants applying for our intramural Primary Children’s Hospital Foundation Career Development Award are required to attend the workshop prior to submission. Faculty who are transitioning from K to R awards also attend the workshop. The number of participants is generally capped at 10, the majority of whom are members of the Department of Pediatrics.

Faculty-mentors are established investigators with a history of NIH funding as Principal Investigator. At least one-half of the faculty mentors are also members of NIH study sections. A biostatistician also attends the workshop.

Women and under-represented minorities (URM) are included in the workshop at both the participant and faculty-mentor levels. Under-represented minority participants and faculty-mentors are recruited from within the Department of Pediatrics and from other departments at the School of Medicine.

### Workshop Overview

Innovations of the workshop are active writing, with immediate one-on-one feedback, and 3 days of off-site, uninterrupted writing time. The workshop is held in November and April at a local ski resort (~\$15 000 total cost per workshop). The dates allow participants ample time to prepare their ap-

plications for our Primary Children’s Hospital Foundation Career Development mechanism and NIH submission cycles. The structure of the workshop presupposes protected time for research and provides active writing immersion with faculty-mentor engagement ([Appendix](#); available at [www.jpeds.com](http://www.jpeds.com)).

Didactic sessions are minimal and cover concepts of clear writing, the specific aims page, statements of significance, innovation, scientific premise, and project impact, as well as the approach section, including study design with supporting data, budget and justification, and assembling an application. Discussion of career development (K-series) awards takes place in separate break-out sessions. The didactic sessions provide participants with framework and examples to assess their proposals in the context of NIH applications and peer review.

To facilitate active learning through one-on-one writing critique by faculty-mentors, with immediate rewriting by the participants, we maintain a participant:faculty-mentor ratio of 2:1 to ensure maximum time for one-on-one interactions. Participants interact with all faculty-mentors, including faculty-mentors whose expertise is outside the area of an application. Writing skills introduced in the didactic component are honed through the one-on-one discussions.<sup>13</sup> The discussions also expose weaknesses in feasibility and study design. Outcome is step-wise improvement in the clarity and focus of the sections of each grant application. The statistician provides one-on-one advice on study design and statistical assessments. Resource books complement effective writing skills.<sup>14,15</sup>

Workshops also include 2 additional group activities to reinforce the importance of clear writing and the value of favorably engaging reviewers. The first is a mock study section of an NIH grant application, the purpose of which is to impress the participants on how quickly a grant application is reviewed. A deidentified NIH grant application is critiqued by primary, secondary, and tertiary reviewers selected from the faculty mentors. The application receives harsh reviews and is scored poorly, intentionally. The participants then prepare for a repeated mock study section of the same proposal, at which they will be the reviewers. Three participants are randomly selected as reviewers. After review from the participants, one of the faculty mentors adds overwhelmingly positive comments in the discussion phase of review. The

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champion’s perspective demonstrates the effect of having a reviewer argue persuasively that an application will be impactful.

The other activity involves participants orally presenting the specific aims page of a fellow-participant on the workshop’s final day. Immediately before the presentations, the specific aims pages are collected and redistributed randomly to the participants, who are given 10 minutes to read and consider the project before giving a 3-minute presentation to “sell” the project, outlining the topic, hypothesis, and specific aims, significance, innovation, scientific premise, primary piece of supporting evidence, and project impact.

Through both activities, participants begin to appreciate the concept of reader interpretation to reinforce the importance of writing with clarity for easy understanding by reviewers.

### Measures of Effectiveness

From 2007 through 2015, the period for which we have complete data, 125 participants attended a workshop; 89 were fellows or faculty in the Department of Pediatrics or a Pediatric Clinical and Translational Scholar.<sup>16</sup> The remaining 36 participants were from other departments. Of all participants, 52% were female, 74% were physician-scientists (MD, DO, MD-PhD), 26% were basic scientists (PhD), and 5% were URM. Notably, 40% of participants received federal funding within 24 months of attending a workshop.

Breakdown of the number and direct costs of funded and unfunded applications by application type and sex for participants from the Department of Pediatrics is shown in the **Table**. Application types submitted to federal agencies include career development awards (K-series), investigator-initiated (R-series), as well as programmatic grants (U-series). Among these application types, success rates were highest for K-series grants and lowest for R-series (**Table**). Encouraging outcomes were similar success rates for male and female participants for K-series grants (60% for male and 62% for female), non-

R01 R-series grants (31% for male and 33% for female), and nonfederal agencies (38%-100% for male and 33%-100% for female). Also encouraging, budget award amounts were higher for female participants for about one-half of the awarding agencies and award types. However, female participants applied for fewer R01 and equivalent grants, with none of their applications being awarded. Both outcomes are recognized nationally as contributors to lower NIH R01 success rates for women.<sup>17-19</sup> We do not know why female participants submitted fewer applications than male participants. Upon follow-up, we learned that more female participants did not resubmit an application following an unsuccessful submission compared with male participants. Our current efforts are to discover reasons for these disparities.

Participant evaluations completed at the conclusion of each workshop are overwhelmingly favorable. Participants repeatedly identified “protected time to write, with immediate feedback from the faculty-mentors” and “uninterrupted time to focus on their proposal” as the most valuable aspects.

Measures introduced by the Department of Pediatrics Research Enterprise prospectively encourage persistence and support by facilitating mentoring from within, and outside, the Department, providing a forum for junior faculty to discuss their application and resubmission plan with senior faculty via a “chalk-talk,” and encouraging junior faculty to use the University of Utah’s CCTS grant review opportunity.

A limitation of assessment of the workshop’s effect on success rates is lack of a comparison group in our department that did not attend the workshop over the same period. We did not make this comparison because the latter group is dominated by more senior, successful faculty. We also did not compare against historical success rate within our department because the grant-funding environment and overall success rates at the NIH have changed over the years. For these reasons, comparison is limited to similarities to overall 2016 NIH success rates of ~40% for K-series awards and 18% for R-series awards,<sup>12</sup> showing that the workshop participants have similar success rates.

**Table. Proposals submitted (funded and unfunded) by Department of Pediatrics Workshop Participants (2007-2015)**

Agencies	Award type	Male participants			Female participants		
		Funded number of awards (total costs)	Unfunded number of awards (total costs)	Success rate	Funded number of Awards (total costs)	Unfunded number of awards (total costs)	Success rate
Federal	R01/DP2	3 (\$5 617 204)	8 (\$19 908 410)	27%	0 (\$0)	6 (\$12 367 453)	0%
	R03/R21/R18*	5 (\$3 001 488)	11 (\$4 354 250)	31%	6 (\$1 413 077)	12 (\$3 577 623)	33%
	K01//K08/K23/K24	6 (\$4 313 129)	4 (\$2 915 779)	60%	10 (\$5 357 058)	6 (\$3 864 486)	63%
	U01/U18/P30/P54*	1 (\$1 309 003)	2 (\$5 000 000)	33%	4 (\$2 797 691)	3 (\$8 480 757)	57%
	Other*	5 (\$2 116 437)	8 (\$5 575 305)	38%	6 (\$425 977)	4 (\$13 373 439)	60%
Association or foundation	PCHF	20 (\$566 883)	4 (\$100 000)	83%	25 (\$666 434)	5 (\$125 000)	83%
	Other*†	33 (\$6 367 121)	55 (\$14 238 409)	38%	17 (\$1 560 139)	25 (\$7 433 645)	40%
University‡	Total	8 (\$413 606)	12 (\$800 007)	40%	14 (\$1 074 977)	7 (\$607 990)	67%
Industry§	Total	4 (\$194 416)	3 (\$502 384)	57%	5 (\$47 500)	10 (\$1 130 817)	33%
State of Utah¶	Total	2 (\$71 727)	0 (\$0)	100%	9 (\$2 485 937)	0 (\$0)	100%
Clinical Trial	Total	8 (\$1 041 343)	0 (\$0)	100%	17 (\$2 048 630)	2 (\$280 035)	89%

PCHF, Primary Children's Hospital Foundation.

\*Higher rates of funding for male, compared with female, participants reflect awards with greater budget allocations.

†Includes Doris Duke, Robert Wood Johnson, Thrasher, March of Dimes, American Heart Association.

‡Includes University Center for Clinical and Translational Science and non-University of Utah university funding.

§Includes Pfizer and Nestle.

¶Includes Utah Center for Birth Defects and Birth Defect Network, Salt Lake Valley Health Department.

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