Intramural pilot funding and internal grant reviews increase research capacity at a school of nursing

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ABSTRACT

Background: Strategies for increasing research capacity such as internal funding mechanisms and internal peer reviews for grants are essential for schools of nursing. Although these are documented in the literature, their processes and outcomes have not been reported.

Purpose: The purposes of this study were to describe three protocols for building research capacity at a school of nursing—intramural pilot grants, Specific Objectives and Aims Reviews, and mock reviews—and quantify their outcomes.

Methods: We assessed outcome data on 14 intramural pilot grants and 88 external grant applications from 2012 to 2016.

Findings: Pilot grants produced 16 peer-reviewed articles, 33 presentations, and 11 funded grants. For grant applications that underwent any type of internal review, 41.7% (20/48) received funding compared with 20% (8/40) that did not participate, $p = .03$. Given the resources required to prepare grant applications, internal funding and reviews can enhance return on investment.

Conclusion: Schools of nursing should consider implementing intramural pilot grants and internal review sessions.


Introduction

Because of the highly competitive environment for securing grant funding, strategies to support and increase research capacity are essential for schools of nursing to develop the next generation of nurse scientists and establish and maintain a funding base for ongoing research. Building the infrastructure to provide such support takes time and resources, but it is essential to sustain an externally funded research program. Components of such infrastructure include, for example, internal funds to support pilot work and enable new and early stage investigators to obtain preliminary data for larger grant applications, statistical consultation, mentoring, and rigorous expert internal review of proposals prior to submission for external funding (Conn, Porter, McDaniel, Rantz, & Maas, 2005; DeMarco, Horowitz, & McCurry, 2005; Froman, Hall, Shah, Bernstein, & Galloway, 2003; Kulage et al., 2013, 2015). Such expert peer review helps ensure research aims are clearly articulated and feasible, provide new insights,
and identify areas for improvement, ultimately increasing the likelihood of funding.

To address the critical need for research infrastructure, in 2012, our School launched an intramural pilot grant program open to postdoctoral fellows and faculty at all levels, but with a preference for funding junior faculty and National Institutes of Health (NIH)–defined early stage investigators (National Institutes of Health Office of Extramural Research, 2016c). At the same time, the School’s Office of Scholarship and Research Development (OSR) began coordinating a two-part internal review process for planned grant applications consisting of a Specific Objectives and Aims Review (SOAR) followed by a formal mock review. These sessions are mandatory for predoctoral students and strongly encouraged for all postdoctoral fellows and faculty submitting grant applications for internal (e.g., intramural pilot grant) or external (e.g., NIH) sources of funding. These initiatives have evolved and been refined over time to enhance their ongoing productivity and usefulness.

Although a simple Google Internet search and reviews of school Web sites confirm that numerous research-intensive schools of nursing provide opportunities for internal pilot funds for faculty to launch larger research projects, we are not aware of any reports in the nursing literature that describe the systematic process or quantify long-term outcomes (e.g., subsequent rates of funding) of such pilot projects. Similarly, although the use of mock reviews by schools of nursing is evident from Internet searches and has been mentioned in the nursing literature as a way to strengthen the likelihood of funding. These initiatives have evolved and been refined over time to enhance their ongoing productivity and usefulness.

Setting

The protocols were developed and utilized in a school of nursing at a research-intensive academic health center in a large, urban community in the Northeast region of the United States. The School’s annual sponsored project funding portfolio averages 50 active research, training, and career development grants with budgets of approximately $7 million and a submission volume of around 60 applications. The School has 28 doctoral-prepared faculty, associate research scientists, and postdoctoral fellows actively seeking research funding, and eight doctoral students in the past 5 years have submitted federal grant applications to support their dissertation work.

Intramural Pilot Grant Protocol

**Purpose, Requirements, and Expectations**

The purpose of the intramural pilot grant program is to fund small research projects to collect preliminary data or support other scholarly work for grant preparation and submission. Up to three 1-year pilot grants are available annually with a maximum budget of $10,000 each. Applicants must have a doctoral degree and be a school of nursing faculty member, associate research scientist, or postdoctoral fellow. They must identify an external source for future significant funding (i.e., ≥ $50,000) that will be pursued subsequent to the pilot work, including an agency (e.g., NIH, foundation, professional organization) and a targeted opportunity (e.g., request for applications, program announcement). Awardees are required to submit interim and final progress reports, make a formal presentation to faculty and students on the results, and disseminate findings via a publishable manuscript, abstract, and/or other professional conference presentation.

**Funding Priorities**

Priority for intramural pilot grants is first given to individuals beginning their research careers, followed by faculty members who have had externally funded research but have identified a promising area that has good potential for continued external funding and requires the collection of preliminary data. Pilot projects can either contribute to the aims and priorities of one of the School’s research centers or represent research within the principal investigator (PI)’s scope of expertise but beyond center aims. In either case, the project should enhance and expand the applicant’s professional portfolio and career development. Other funding priorities include projects that enhance collaboration among nursing faculty members, particularly clinical and research scholars, and those that incorporate interdisciplinary and translational research.

**Submission Procedure**

Applicants are encouraged to work with the School’s Grants Management Office to prepare the budget and the OSR to develop the proposal. This is especially important if the project includes any “to be hired” personnel or part-time research assistants to ensure the proper salary level or rate of pay is established. At least 2 weeks prior to submission, applicants are required to participate in a SOAR. All applications must be submitted through the School’s intranet portal where they are stored on a secure, dedicated network. The site is password protected and requires that applicants log in with their university credentials. Applications can only be uploaded once, after which no further changes are allowed.
**Application Format**

The application must be uploaded as a single Adobe PDF file, prepared in NIH format (i.e., half-inch margins, font type Arial, font size 11) and include following section headings: Abstract (30 lines); Specific Aims, Research Strategy, and Timeline (four pages); Budget and Justification (one page); Human Subjects; and References (no page limitations). Of note, a 2-year timeline is required and must include the scientific timeline of the research project that shows feasibility of completion within 1 year, the anticipated timeline of scientific dissemination (e.g., manuscripts, presentations), and submission of a subsequent larger application for future funding during the following year. Budgets can include operational costs such as research assistant support, participant incentives, and translation services, but PI salary support and costs for services freely available through the OSR (e.g., statistical support, data management assistance) are unallowable.

**Review Process**

The review process is managed by the School’s Associate Dean for Research and OSR staff. Each application is assigned to two experienced reviewers within the School, and the applicant may suggest these reviewers. Each application is scored based on criteria adopted from the NIH review process (National Institutes of Health Office of Extramural Research, 2016b). Additional funding criteria are also considered (e.g., identification of a specific call for future funding, feasible timeline) to ensure funded projects align with the goals of the program; these are marked as “acceptable” or “unacceptable.” Reviewers can indicate “Fund,” “Do Not Fund,” or “Counsel to Resubmit,” and the funding decision is made by consensus. Resubmissions, which are sent back to the original reviewers, must include a one-page introduction that summarizes how the applicant addressed reviewer concerns.

**Timeline**

Applications are typically due 6 to 8 weeks after the announcement is released. Reviews are completed within 2 to 3 weeks, and project start dates are 1 month later. This timeline has allowed opportunity for resubmissions that are due 2 weeks after the initial decision.

**SOAR Protocol**

The SOAR is an informal meeting during which the PI presents the specific aims of a proposal in development to faculty members for guidance, feedback, and suggestions for revision. A SOAR is scheduled 2 to 3 months prior to the submission deadline. PIs are asked to complete and submit the SOAR Request Form 1 week in advance of the date they would like to have the session. They list the names of three or four potential reviewers either within the School or in outside departments; the OSR also assists in identifying appropriate reviewers and confirms their participation. OSR staff also provide administrative support to schedule the session, obtain the draft of the specific aims from the applicant, and distribute to the reviewers a minimum of 3 days prior to the SOAR session.

Because a SOAR is designed to be preparatory to writing the proposal, only the specific aims are distributed and discussed. The purpose of the SOAR is to assure, before development of the protocol, that the aims are clear, logical, important, well-articulated, feasible, and include a cogent and logical rationale. Generally, each session takes 30 minutes, and reviewers are not expected to provide written comments as the session is an opportunity for informal discussion and interchange. Following the SOAR session, PIs are required to contact their reviewers via e-mail to indicate what changes they plan to implement after the discussion. Based on previously collected data (Kulage et al., 2015), we estimate that total preparation and session time required per SOAR is approximately 1 hour for OSR staff and 2 hours for faculty reviewers.

**Mock Review Protocol**

A mock review is a live peer review of a grant by experts before it is submitted to a funding agency and is conducted in a manner similar to an NIH study section. The rationale for the mock review is that even if the PI feels that the grant is as near “perfect” as possible, fresh eyes can pick up ways to improve the flow, make the presentation more motivating, or identify flaws not previously recognized. PIs are asked to submit the Mock Review Request Form several weeks in advance of the date they would like to have the session and suggest reviewer names. To better replicate the mixture of individuals likely to review their grants at a funding agency study section, PIs are encouraged to identify both junior and senior faculty as well as those familiar and unfamiliar with the topic area. The OSR provides administrative support in securing commitments from reviewers and handles all logistics (i.e., sets the date and time, schedules the conference room, and sends out e-mail reminders). The OSR also requests the draft of the grant files from the applicant and distributes them to reviewers 1 week prior to the mock review. To enhance effectiveness, it is critical that reviewers critique a near-final version of the application. Mock reviews are scheduled 4 to 6 weeks prior to grant submission deadlines to allow the PI time to incorporate comments and suggestions into the protocol.

Because a mock review is an excellent learning opportunity, it is recommended that reviews be open to other faculty and graduate students to observe. This also improves the quality of the overall discussion. However, if the PI prefers, a closed review with only the
research team and reviewers is arranged. If an open session is planned, the OSR sends invitations to appropriate faculty, staff, and doctoral students and distributes the specific aims to attendees. A faculty or staff moderator convenes and moderates the review, introduces participants, and provides an overview of the process.

If the mock review is open, the moderator begins the session by reading the mock review introduction (Box 1) to set the stage for all participants and emphasize that the session is open to them in the spirit of learning and mutual support.

Although additional components such as budget, resources, and biographical sketches are required in the full grant submission, the reviewers only review the following sections because the purpose is to improve the scientific quality of the proposal: Previous Summary Statements and Introduction to the Application (for resubmissions only), Project Summary (Abstract), Specific Aims, and Research Strategy. Reviewers are asked to assess the Significance, Innovation, and Approach sections of the Research Strategy following the standard NIH criteria (National Institutes of Health Office of Extramural Research, 2016b).

If there are additional specific criteria provided by a funding agency (e.g., NIH K, F, or T awards or foundation awards), OSR staff will provide guidance for reviewers. For example, in a Predoctoral F31 National Research Service Award application, the scientific research plan and the applicant’s career development plan are weighted with equal importance. Therefore, key documents addressing both elements (i.e., Specific Aims, Research Strategy, Biographical Sketch, Applicant’s Background and Goals for Fellowship Training, Respective Contributions, and Selection of Sponsor and Institution) are provided, and reviewers are asked to assess the application based on the NIH F31 Guide for Reviewers and the Definitions of Criteria and Considerations for F Critiques (National Institutes of Health Office of Extramural Research, 2016a).

The primary reviewer is responsible for verbally providing a full review of each component of the grant, similar to an NIH study section. The secondary reviewer then either agrees with these points (without repeating what has already been said) or provides an alternative view and adds any other comments or insights not raised by the primary reviewer. Of note, reviewers are not expected to provide a score but rather specific, actionable feedback. OSR staff and/or the PI take thorough notes, and written comments are provided by reviewers.

Because in the “real” external review no one from the research team is present and each grant must stand on its own as written, members of the research team are instructed to listen, take notes, and observe but not provide additional information or “explain” anything that seems to be confusing. If the mock review is “open,” after the reviewers have provided their comments, the moderator opens the discussion up to attendees who often ask questions or provide additional comments for the PI’s consideration. In particular, doctoral students may focus on procedural and methodologic questions.

Finally, the moderator opens the discussion up to the PI and research team members who have until now remained silent observers. An informal discussion ensues during which the PI can address reviewer concerns, indicate changes they may have already made since the grant was sent to reviewers, ask questions to clarify any of the reviewers’ points, and inquire as to how they might best address their concerns in the next draft. As with the SOAR, after the mock review PIs are required to contact their reviewers via e-mail to thank them for their efforts, summarize the major points made during the review, and describe the changes they will make in their application. The ultimate purpose of the mock review is to obtain feedback from a friendly, supportive group to improve grant quality before it is submitted to the funding agency. Based on the data previously collected (Kulage et al., 2015), a conservative estimate of the time required from faculty reviewers and OSR staff in coordinating, preparing for, and conducting one mock review is ≥10 hours.

**Methods**

**Data Sources**

**Intramural Pilot Grants**

Intramural pilot grant submissions were tracked in the School’s internally maintained Microsoft Access grant database. Data on outcomes from these grants were gleaned from both informal e-mail communication and progress reports submitted by PIs. Details were

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**BOX 1 - MOCK REVIEW INTRODUCTION**

"Before we begin, it is important that attendees understand and appreciate the ‘spirit’ of an open mock review. It is an example of the reality that giving—and receiving—thoughtful, critical feedback is a real part of academic life that is essential for success. As evidenced by the varied group of individuals here, none of us are ‘beyond’ this important aspect of academia. We have gathered here as colleagues. It is rare for graduate students, postdocs, research scientists, and faculty to come together in a single forum and share knowledge, experience, and expertise. The PI has generously allowed this audience to be part of this process in the spirit of learning. Any investigator—whether a student, postdoc, junior or senior faculty member—is bold in choosing to have an open mock review which puts them in a place of vulnerability in front of students and colleagues. Let us embrace this unique opportunity that the PI has generously enabled us to share in with an attitude of support, collegiality, and gratitude."
solicited on peer-reviewed manuscripts, peer-reviewed and non-peer-reviewed presentations, and subsequent grant applications emanating from the projects. PIs were specifically asked to “List all grant applications you have submitted related to this pilot project. Include those that were intended to continue or expand the work of this pilot study or were informed by this pilot study (e.g., via preliminary data). Include both intramural and extramural funding sources.”

SOARs and Mock Reviews
Data on the status of submitted external grants were also extracted from the Microsoft Access database and correlated with data on the use of SOARs and mock reviews. Applications were coded as to whether they had a SOAR, mock review, both, or neither prior to submitting to an agency for funding consideration.

Inclusion and Exclusion Criteria
Intramural pilot grants funded from 2012 to 2016 were assessed for outcomes and subsequent productivity. To examine the impact of internal reviews on grant outcomes, applications for external funding submitted from 2012 to 2016 were included in the SOAR and mock review analyses. Inclusion criteria included research grants (e.g., R01s, fellowships, or career development grants that are primarily research focused); requested budgets ≥$50,000; competitive submissions (e.g., not industry solicited); and external sources of funding (e.g., federal, foundation). Exclusion criteria included supplement applications (e.g., diversity, administrative) that were not competitively reviewed, training or clinical programs, scholarships, internal sources of funding (e.g., the School’s intramural pilot grant program), and grant applications pending a funding decision. If there were multiple submissions of one grant, whether or not to the same agency or announcement, grants were “counted” only once. If the SOAR or mock review was performed on multiple versions of the grant, those were also counted only once.

Statistical Analyses
Chi-square analysis was performed comparing the proportion of grants funded among those that participated in any category (SOAR only, mock review only, or both) with those that participated in none of the internal review protocols.

Results

Intramural Pilot Grants
Nineteen intramural pilot grant applications were submitted, several of which were revised and resubmitted for a second round of reviews. Fourteen were funded with PIs including five senior faculty, seven junior faculty, one associate research scientist, and one postdoctoral fellow; three of these were repeat recipients. Ten funded grants were aligned with the aims of one of the School’s research centers, and four represented research within the PI’s scope of expertise but beyond center aims. The cumulative financial investment to fund these intramural grants was $127,376 with a budget range of $4,394 to $10,000 per grant and an average budget of $9,100. These pilot grants provided preliminary data for 14 subsequent grant applications; 11 of these have been funded ($3,235,523, Table 1), 2 are pending, and 1 was not funded. Federally funded projects (i.e., NIH, Agency for Healthcare Research and Quality) include one R01 ($1,391,760), two R03s ($259,200), one K99/R00 Pathway to Independence Award ($928,650), one Clinical and Translational Science Award (CTSA) career development award ($250,000), and one CTSA pilot grant ($40,000). Foundation-funded projects include one Robert Wood Johnson Foundation Nurse Faculty Scholars Award ($349,913) and four small foundation research grants ($16,000). One pending R01 ($3,227,596 requested) received a score of 18 (third percentile) and another pending R01 ($2,637,969 requested) received a score of 30 (16th percentile).

As of 2016, scholarly dissemination from these projects included 16 peer-reviewed journal articles, with 8 additional manuscripts under review, in preparation, or planned. These projects have also produced 24 peer-reviewed professional conference presentations (i.e., oral and poster) and 9 non-peer-reviewed institutional, community, or invited presentations (e.g., university seminars, grand rounds). Only one pilot project failed to produce a scholarly product.

Table 1 – Subsequent Funding for Intramural Pilot Grants, 2012 to 2016

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<tr>
<th>Number of Pilot Grants</th>
<th>Financial Investment in Funding</th>
<th>Number of Federal Grants Awarded</th>
<th>Federal Funding Obtained</th>
<th>Number of Foundation Grants Awarded</th>
<th>Foundation Funding Obtained</th>
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<tr>
<td>6</td>
<td>$58,691</td>
<td>6</td>
<td>$2,869,610</td>
<td>5</td>
<td>$365,913</td>
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<tr>
<td>8</td>
<td>$68,685</td>
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SOARs and Mock Reviews

A total of 88 grant applications met inclusion criteria. Seventy-two were submitted to federal agencies and 16 were submitted to foundations. Seventy-five applications were submitted by faculty, of which 22 were funded (29%) and 13 applications were submitted by postdoctoral trainees or predoctoral students, of which 6 (46%) were funded. Twenty-seven underwent at least one type of internal review protocol. Seven applications had only a SOAR, two of which were funded (29%). Twenty-three applications had only a mock review, 12 of which were funded (52%). Eighteen applications had both a SOAR and a mock review, six of which were funded (33%). Forty applications did not have a SOAR or mock review session, eight of which were funded (20%).

For external grant applications that underwent any type of internal review, whether SOAR, mock review, or both, compared with those that did not participate, 41.7% (20/48) received funding as compared with 20% (8/40) that did not participate, $p = .03$ (Table 2).

Discussion

Intramural Pilot Grants

At face value, the School’s $127,000 investment in funding over 5 years for intramural pilot grants has led to over $3 million in external funding. Although this is an impressive number, it is inflated because it does not take into account the additional, real costs associated with the time and effort for OSR staff, faculty reviewers, or pilot project PIs. Nor does it consider the costs for preparing and submitting the subsequent external applications that were ultimately funded, which have been previously reported as being as high as $13,000 for one R01 submission (Kulage et al., 2015). However, we believe it still represents a sound investment for the School and for launching the research careers of postdoctoral fellows and junior faculty.

SOARs and Mock Reviews

The research funding enterprise of a school of nursing represents a large investment of money and resources with a slim likelihood of success in the current funding environment. Given the significant amount of time spent and high costs incurred by a school of nursing in preparing and submitting a grant application, it is critical that these research projects have the highest possible potential for a strong return on investment. Although strategies such as SOARs and mock reviews also represent a significant investment of time and effort, statistically significant results demonstrated that grant applications that underwent any type of internal review were more than twice as likely to be funded compared with those that did not undergo internal review. In addition to the direct benefits for PIs, the School’s culture has also benefited from the atmosphere of transparency and collegiality created by conducting open mock reviews. This promotes the breakdown of research “silos,” stimulates interdisciplinary collaboration, and models a professional attitude of openness and mutual support for predoctoral students.

Limitations

An important limitation to consider is that the SOARs and mock reviews are mandatory for predoctoral students but voluntary for faculty; therefore, it is possible that PIs willing to participate in an internal review of their grant applications may have had “better” science to begin with than those who opted not to have one. If all applications were required to undergo internal review, outcomes may have been different. In addition, our outcomes likely benefitted from the fact that we have a cadre of experienced mid-career and senior nurse scientists with active funding portfolios on faculty to participate in internal reviews. Many of these faculty also have experience serving on NIH and other federal scientific review groups, enhancing the quality of the recommendations provided during internal review sessions.

Conclusions and Recommendations

Over a 5-year time frame, our School’s intramural pilot grant program produced peer-reviewed publications, conference presentations, and subsequent external grant funding that likely would not have otherwise been generated. Additionally, our internal review protocols for grant applications resulted in a greater than two-fold increase in the likelihood of securing external funding. However, we recognize that schools of nursing that are seeking to expand their research portfolios but do not have ample faculty with funding experience to serve as reviewers may face challenges implementing internal review processes such as SOARs or mock reviews and ensuring that the quality of such reviews promotes expansion of research capacity and infrastructure. First, these schools may seek faculty members in other schools or departments to serve as internal reviewers to help

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<th>Table 2 – Success Rates of Grant Applications by Use of Internal Review Mechanisms, 2012 to 2016</th>
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<td><strong>SOAR, Mock Review, or Both, N (%)</strong></td>
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<tr>
<td>Funded</td>
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<td>Not funded</td>
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**Note.** SOAR, Specific Objectives and Aims Review. Chi square comparing funding success among those who participated in a SOAR, mock review, or both with those who participated in neither (41.7% and 20%, respectively), $p = .03$. |
balance the level and quality of reviews and serve as role models for junior faculty who are inexperienced at the grant peer-review process. In addition, to successfully implement these initiatives and continue to secure external funding, such schools should encourage their junior faculty, once federally funded, to volunteer to participate in NIH study sections to gain the firsthand experience needed to be an effective internal peer reviewer. Finally, we recommend these schools recruit mid-career and senior-level faculty members with active funding portfolios to expand their range of research and review expertise and provide mentorship to junior faculty.

Strategies such as internal funding and grant reviews help ensure that a school of nursing’s valuable time and resources are being spent on research proposals that are more likely to have higher success rates. Based on our results, it would seem that these initiatives represent a clear return on investment in the future success of nursing faculty as well as expand the funding portfolio of the school. Schools of nursing should consider implementing mechanisms such as intramural pilot grants and internal review sessions to provide infrastructure to expand their scholarly dissemination and research funding portfolios.

REFERENCES


