An Internal Medicine Residency Hospitalist Pathway: A 2-year Follow Up

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Abstract

**Purpose:** The Stanford Hospitalist Advanced Practice and Education (SHAPE) Program was established in 2015 as a hospital medicine training track within an academic internal medicine residency program. It is unique because it was created and is currently run by residents with a goal of better preparing residents for careers in hospital medicine. The SHAPE curriculum is based on three principles: (1) clinical excellence in hospitalist-relevant clinical areas, (2) academic development through research and quality improvement, and (3) career mentorship. We provide a two-year follow-up since the establishment of SHAPE and resident attitudes toward the program’s effectiveness.

**Methods:** We assessed resident attitudes toward the SHAPE Program and subjective readiness to begin practice via electronic survey from 2015 to 2017.

**Results:** 154 out of 324 (47.5%) total internal medicine residents responded to the surveys. Of those, 17 out of 21 (81.0%) were members of SHAPE. Compared to non-hospitalist-bound residents, SHAPE residents reported improved readiness for independent practice (OR 3.39 [95% CI: 1.1-10.9]) and providing care within the specific domain of palliative care.

**Conclusions:** Here we describe the challenges of maintaining a hospitalist curriculum and the successes that have come from the first resident-run hospitalist training program in the country.

**Keywords:** Curriculum evaluation; Internal medicine; Clinical skills; Medical education research; Postgraduate medical education
Introduction

Over the past 20 years, hospitalist medicine has evolved into a unique specialty requiring a skillset separate from that of the outpatient internist or the sub-specialist (Steve Pantilat, 2006; Miller et al., 2017). Aside from their clinical duties, hospitalists are expanding their presence in surgical co-management, subspecialty consultation, medical education, research, hospital leadership, quality improvement, patient safety, and multiple other domains of expertise within the hospital (Wachter, 2002; O'Leary, Kevin J, Williams, 2008; Pete Welch et al., 2014; Seymann et al., 2016). Although these roles have solidified, the field has been challenged to determine how to best prepare future hospitalists for their expanding clinical and non-clinical duties (Glasheen, Goldenberg and Nelson, 2008; Huddle and Heudebert, 2008; Stillman, 2014).

To answer this rising demand, two residents established the Stanford Hospitalist Advanced Practice and Education (SHAPE) Program at an academic internal medicine residency program in 2015 (Kumar et al., 2016). The program provides augmented exposure to previously underemphasized areas of hospital medicine training, including palliative care, bedside ultrasonography, and surgical co-management (Kumar et al., 2016). Since its inception, the SHAPE Program continues to be primarily resident-run with input from hospitalist faculty and residency program leadership. This "bottom-up" leadership model provides several potential benefits, including improved resident buy-in, little to no budget costs, a curricular redesign that is in-tune with ever-changing training climates, and practical experience in programmatic leadership for trainees. Now two years since the establishment of this program, we describe the challenges of program sustainment, trainee attitudes, and qualitative assessments of its effectiveness.

Methods

Setting and Participants:

Participants: Residents in their second and third years interested in careers in hospital medicine applied for enrollment in SHAPE. First-year residents could participate with mentorship and meeting attendance but could not fully enroll in clinical activities until the second year when their career plans were more firmly solidified and their schedules could be modified to incorporate the SHAPE requirements.

Program Description:

Curriculum: The SHAPE curriculum was implemented at the start of 2015 academic year in a large university-based internal medicine residency program. The ongoing goal of the curriculum is to better prepare graduating residents for careers as hospitalists during their three years of internal medicine residency. The curriculum was based on three principles: (1) clinical excellence: by training in hospitalist-relevant clinical areas, (2) academic development: with required research and quality improvement projects, and (3) career mentorship: through the formation of resident and faculty mentorship groups (Kumar et al., 2016).

Program Evaluation:

Survey and Participants: To assess resident attitudes toward the SHAPE Program, we developed an electronic survey using Qualtrics® that was administered via email on an annual basis at the end of the academic year from 2015 to 2017. The survey assessed self-reported competence in procedural and clinical care activities relevant to hospital medicine, the perceived usefulness of a hospitalist training program, and its ability to prepare residents for independent practice (see Supplementary File A for survey). Survey responses were graded using a 5-point Likert scale. The survey was sent to all residents in our internal medicine program at the end of each academic year (late spring/early summer). The respondents were analyzed as four groups: Group (1): current SHAPE residents (hospitalist-bound-intervention), Group (2): residents interested in hospital medicine but not enrolled in SHAPE (hospitalist-bound contemporaneous control), Group (3): residents not interested in hospital medicine (non-
hospitalist-bound contemporaneous control), and Group (4): residents interested in hospital medicine prior to the creation of the SHAPE Program (hospitalist-bound historical control) (Figure 1). Surveys were sent to all residents from 2015-2017. Notably, the 2015 survey was sent just prior to the start of the SHAPE Program, which allowed it to serve as a pre-intervention baseline. From the 2015 survey, group 4, the historical control, was established. The 2016, 2017 surveys were used to assess groups 1-3. This was deemed to be QI exempt by Stanford IRB.

Figure 1: Survey participants and groups by year.

| Academic Year | 2015 | 2016 | 2017 |
|---------------|------|------|------|
| **Hospitalist Bound** | Non-SHAPE (Group 4 Historic Controls) | SHAPE Participants (Group 1 Intervention) | Non-SHAPE (Group 2 Contemporaneous controls) |
| Non-Hospitalist Bound | None-SHAPE (Group 3 Contemporaneous controls) | | |

Statistics:
Survey responses and number of years of training among the four groups were described. Although, it is probable that a resident may have taken the survey more than once, due to the anonymity of survey, each survey was considered as independent of previous. All survey Likert scale responses were dichotomized. Frequency and percent of participants who choose response options of 4/5 (competent/highly competent or prepared/highly prepared or important/highly important) over options 1/2/3 (not competent at all/slightly competent/moderately competent or not prepared at all/slightly prepared/moderately prepared or not important at all/slightly important/moderately important) were detailed. A logistic regression model, adjusted for years of training, was utilized to estimate the odds ratio of self-reported preparedness among current SHAPE residents (hospitalist-bound-intervention) and residents interested in hospital medicine but not enrolled in SHAPE (hospitalist-bound contemporaneous control group 1), compared to residents not interested in hospital medicine (non-hospitalist-bound contemporaneous control group 2).

Results
From 2015-2017, 154 out of 324 (47.5%) total residents responded to the surveys. Amongst 2016 and 2017 SHAPE participants (group 1, intervention), 17 out of 21 (81.0%) responded to the 2016-17 surveys (post-intervention surveys (Table 1). There was a total of 33 residents interested in hospital medicine but not enrolled in SHAPE who responded, including 24 residents from 2015 (Group 4, historical control) and 9 residents between 2016-2017 who chose not to enroll in SHAPE (Group 2, contemporaneous control). The remaining 104 respondents were those planning careers in primary care or a subspecialty (Group 3, contemporaneous control). The participants of the survey were distributed similarly between non-hospitalist and hospitalist-bound in terms of years of training and
practice setting of choice with the exception of contemporaneous control non-SHAPE hospitalists being more likely to prefer a mixed academic/community practice setting (Table 1). The hospitalist-bound and non-hospitalist-bound residents differed in the median number of years they saw themselves practicing (Group 1, SHAPE hospitalists: 20 years; Group 2, contemporaneous non-SHAPE hospitalist: 10 years; Group 3, non-hospitalists: 32 years; Group 4, historical control hospitalists: 20 years). The groups differed in their opinion of when residents should seek mentorship. The majority of non-hospitalist-bound residents preferred first-year of residency (92%) and hospitalist-bound residents preferred second-year of residency (50% historic control non-SHAPE hospitalist, 56% contemporaneous control non-SHAPE hospitalist and 47% SHAPE-residents). None chose third-year of residency (Table 1).

Table 1: Demographics and practice interests given in frequency and percent of survey participants. Abbreviations: Contemp=Contemporaneous

| Groups                           | SHAPE Hospitalist: Intervention Group 1 | Non-SHAPE Hospitalist: Contemp. Control Group 2 | Non Hospitalist: Contemp. Control Group 3 | Non-SHAPE Hospitalist: Historic Control Group 4 |
|----------------------------------|----------------------------------------|-----------------------------------------------|------------------------------------------|-----------------------------------------------|
| # of Participants                | 17                                     | 9                                             | 104                                      | 24                                            |
| PGY1                             | 6 (35%)                                | 3 (33%)                                       | 48 (46%)                                 | 6 (25%)                                       |
| PGY2                             | 4 (24%)                                | 5 (56%)                                       | 36 (34%)                                 | 9 (38%)                                       |
| PGY3                             | 7 (41%)                                | 1 (11%)                                       | 20 (19%)                                 | 9 (38%)                                       |
| Ideally, what setting would you like to practice in? | | | | |
| Academic                         | 12 (71%)                               | 4 (44%)                                       | 67 (64%)                                 | 17 (71%)                                      |
| Community or Private             | 2 (12%)                                | 0 (0%)                                        | 5 (5%)                                   | 1 (4%)                                        |
| Mixed academic & community       | 3 (18%)                                | 5 (56%)                                       | 32 (31%)                                 | 6 (25%)                                       |
| How long do you plan to be in your specialty? (in years) | | | | |
|                                  | 20                                     | 10                                            | 32                                       | 21                                            |
| When should individuals begin to seek mentorship? (% choosing R2 year) | | | | |
|                                  | 8 (47%)                                | 5 (56%)                                       | 7 (7%)                                   | 12 (50%)                                      |

The primary goal of the SHAPE program is to prepare residents for a career in hospital medicine. Our survey results revealed that 53% of SHAPE residents (Group 1) felt prepared or highly prepared (measured as a 4 or 5 on the Likert scale) (OR 3.39 [95% CI: 1.1-10.9] ref non-hospitalists-bound contemporary controls) compared to 42% of non-SHAPE-residents interested in hospital medicine (Group 4; historic control), and 33% of non-SHAPE residents interested in hospital medicine (Group 2; contemporaneous control). A similar trend was seen in preparedness to find a job (35% of SHAPE residents [Group 1], 33% non-SHAPE hospitalist-bound historic control [Group 4], 22% non-SHAPE hospitalist-bound contemporaneous control [Group 2]) (Figure 2).

Figure 2: Percent of survey participants who answered prepared/highly prepared to start/find a job or fellowship and answered important/highly important to mentorship in career development.
71% of SHAPE-residents felt competent or highly competent with providing palliative care, compared to 56% of non-SHAPE hospitalist bound (Group 2, contemporaneous control) and non-hospitalist bound residents (Group 3, contemporaneous control). Both Group 1 (SHAPE residents) and Group 2 (non-SHAPE but hospitalist bound) were more likely to feel competent in providing palliative care, however, the SHAPE group had the highest perceived levels of competency when compared to Group 3 (non-hospitalist bound) (SHAPE: OR 4.4 [95% CI: 1.3-14.7] and Group 2 (non-SHAPE but hospitalist bound; OR 2.6 [95% CI: 1.1-6.1]; Table 2). The 2016 and 2017 SHAPE residents had similar perceived competencies compared to the historic control (71% vs 63%). The four groups did not differ with regards to their perceived competence in providing critical care, inpatient neurological care, surgical co-management, procedures, and bedside ultrasonography (Table 2).

**Table 2: Frequency and percent of survey participants who answered competent/highly competent regarding their clinical & procedural skills. Abbreviations:**
Contemp=Contemporaneous

| Groups                      | SHAPE Hospitalist: Intervention Group 1 | Non-SHAPE Hospitalist: Contemp. Control Group 2 | Non Hospitalist: Contemp. Control Group 3 | Non-SHAPE Hospitalist: Historic Control Group 4 |
|-----------------------------|----------------------------------------|-----------------------------------------------|-----------------------------------------|-----------------------------------------------|
| Clinical Areas              |                                        |                                               |                                         |                                               |
| ICU                         | 4 (24%)                                | 0 (0%)                                        | 19 (18%)                                | 7 (29%)                                       |
| Palliative                  | 12 (71%)                               | 5 (56%)                                       | 35 (34%)                                | 15 (63%)                                      |
| Neurology                   | 0 (0%)                                 | 0 (0%)                                        | 4 (4%)                                  | 2 (8%)                                        |
| Consultation other specialties | 9 (53%)                              | 3 (33%)                                       | 40 (39%)                                | 8 (33%)                                       |
| Surgical Co-management      | 4 (24%)                                | 2 (22%)                                       | 17 (16%)                                | 5 (21%)                                       |
In 2015, 13 residents initially enrolled in the SHAPE program (out of 108 categorical residents; 12%), while in 2016 there were 11 initial enrollees (10%). Of the SHAPE participants, 82% felt the required clinical rotations were effective (defined as a 4 or 5 on a 5-point Likert scale) in preparing them as hospitalists. All of the residents (100%) would recommend SHAPE to their colleagues, while 82% of the residents agreed that SHAPE would help them achieve their career goals as hospitalists (defined as a 4 or 5 on a 5-point Likert scale).

In the inaugural year, 4 residents (31%) elected to leave the program, while 8 (73%) residents left in the second year of the program. All of these residents left the program because they had decided to pursue sub-specialty training or primary care. These specialties included: palliative care (1), cardiology (1), infectious diseases (1), oncology/hematology (3), rheumatology (2), endocrine (1), primary care (3). The residents left the program during either their first-year (5 first-years, 42%) or during their second-year of residency training (7 second-years, 58%).

Discussion

In 2015, we launched a resident-driven hospital medicine curriculum to better prepare aspiring hospitalists for both the clinical and non-clinical demands of a career in hospital medicine (Kumar et al., 2016). In a two year follow up, we found that residents who completed the hospital medicine curriculum felt more prepared to begin a job or fellowship compared to their colleagues interested in hospitalist careers but were not enrolled in the program. This was the initial main goal of our curriculum, and it appears to have been reached. SHAPE hospitalists also felt more prepared to find a job as compared to their counterparts interested in hospital medicine but not enrolled in the program.

When the individual aspects of the curriculum were investigated, the greatest differences for SHAPE participants were found in providing palliative care. As part of the curriculum, residents are required to rotate on an inpatient palliative care service while their co-residents are not. We believe this exposure improved their comfort with what has been a previously underemphasized area of hospitalist training (Kumar et al., 2016). However, we found no significant difference in perceived competency pre- and post- intervention. Interestingly, we found no difference in perceived competency for other aspects of the program, including: providing critical care, inpatient neurology, surgical co-management, procedures, and bedside ultrasonography. These were required rotations for the SHAPE program, and it suggests that rotational exposure alone may not be enough to prepare residents for careers in hospital medicine.

There were additional challenges to the program. As noted above, there was a high drop-out rate from the program.
This highlights the challenge of developing an inclusive program that is available to residents who may be potentially interested in careers in hospital medicine versus having a more stringent (but less inclusive) program designed to rigorously train residents who are fully committed to becoming hospitalists. We felt this high dropout rate occurred because residents could originally participate in SHAPE during their first-year. The application process was simple and did not require any written statements. To combat this, we modified the program requirements to only include second year residents (first-year residents could still be peripherally involved in the program) and now also require two written statements as part of the application.

A second challenge to the program was ensuring adequate resident buy-in from a leadership perspective. The SHAPE Program is run by residents (i.e. resident representatives who self-opt to lead the program). These representatives establish annual goals for the program reflective of the interests of the current SHAPE residents and execute these goals by continually re-designing the curricular requirements, screening applications to the program, developing novel avenues to engage the core group of SHAPE residents, and designing research projects to further investigate the usage of training pathways at preparing residents for careers in hospital medicine. While we have found this model ensures more resident buy-in, it also requires a consistent and motivated group of leaders.

We recognize there are several limitations to this research. We have a small number of participants from a single institution. The curriculum was developed based on a local needs assessment and curricular outcomes reflect differences at this institution only (Kumar et al., 2016). Resident perception of preparedness does not equate to differences in job performance or satisfaction.

Conclusion

Overall a resident-created hospital medicine curriculum lead to participants having superior perception of preparedness to find and begin a job compared with the non-participating resident population at the same institution. We plan to continue studying subsequent years of participants and refine our survey to better understand what aspects of the curriculum are most useful. We would also like to follow graduated residents to assess career decisions post-graduation.

Take Home Messages

1. A resident directed hospitalists curriculum can be sustained within an academic medical center.
2. Resident perception of readiness for independent practice can be improved with a hospitalist track.
3. Programmatic buy in from residents and administration is key to success.

Notes On Contributors

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Appendices

None.
Declarations

The author has declared that there are no conflicts of interest.

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Ethics Statement

This study was deemed to be QI exempt as part of hospital improvement by Stanford IRB on 3/28/2018 IRB-43851.

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