

## **Impact of the COVID 19 Pandemic on Surgical Training by Specialty**

The disruption in surgical training caused by the COVID-19 pandemic has been profound primarily because of loss of exposure to non-emergency procedures and decreased outpatient and hospital experiences critical for the development of the ACGME competencies in future surgeons. Based on the ACS Academy Special Committee Survey, surgical educators rapidly responded to the challenges of continuing educational programs necessary for further development of core knowledge and problem solving by wide adoption of virtual conferences. However, the absence of patient contact made it difficult to address the competencies of professionalism, communication, and technical skills. The latter was further compounded by the frequent suspension of simulation training. Although these common themes emerged across all surgical specialties, the question remains about whether there were differences in the degree of impact based on the unique training characteristics and requirements for each of the specialties.

### **Purpose**

Hence, we sought to answer the question of how the impact of the COVID 19 pandemic may have differed by surgical specialty. We separated the results of the Academy Survey by specialty and performed a descriptive analysis to determine if there were **trends** specific to each specialty.

### **Methods**

The Survey was sent to the following specialties (n= number of respondents) : Cardiothoracic Surgery(CT) n= 24, Colon and Rectal Surgery (CRS) n=32, Neurological Surgery (NS) n=33, Obstetrics and Gynecology (OBGYN) n=61, Ophthalmology (Oph) n=74, Orthopedic Surgery(Ortho) n=44 , Otolaryngology(Oto) n=14, Pediatric Surgery(Peds) n=22, Plastic and Reconstructive Surgery ( Plastics) n=14,Surgical Oncology ( Surg Onc ) n=28, Vascular Surgery ( Vascular) n=26, General Surgery ( Gen Surg) n=187. The total number of respondents was 559 and included chairs, program directors and clerkship directors. These were included in the demographic analysis.

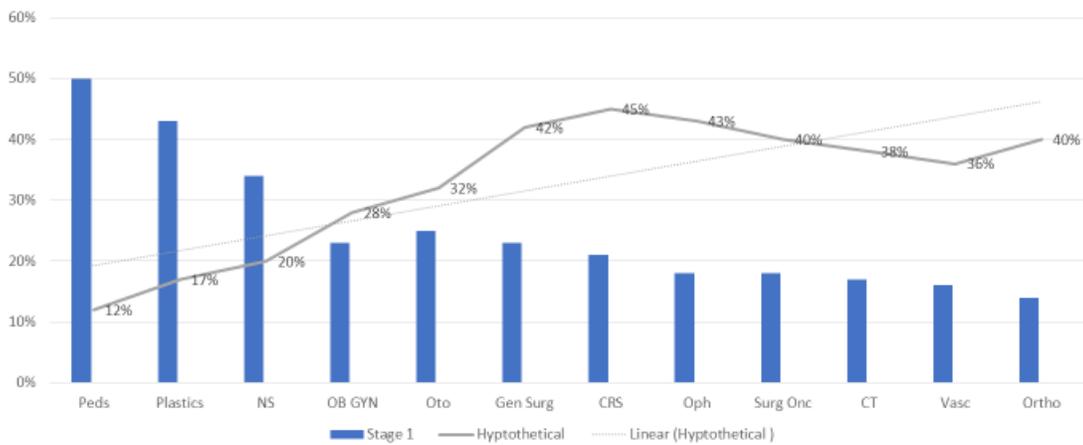
The survey questions concerning the impact on residents and surgical trainees were answered by 401. Responses were excluded from specialties with less than 12 respondents and Clerkship directors who received questions on the impact of medical students rather than residents.

Based on the combined survey results there was a significantly less educational impact in respondents of reporting institutions at Stage 1(Business as Usual). Hence, we compared the impact in each specialty to the proportion of respondents for each question of interest in that specialty and the proportion reporting Stage 1. The analysis of the combined data indicated that Stage 1 institutions were 50-80% less likely to have educational programs and learner wellbeing severely impacted. The results are reported as the proportion of responses of all specialties combined which indicated a severe impact as mean % + standard deviation for each question. To assess variations and trends by specialty , the results are presented as custom combination charts consisting of bars that represents the frequency of Stage 1 respondents in descending order and lines that represent the proportion of responding that there was a severe impact ( Likert type scale 4-5) for each specialty. It is hypothesized that if the impact were similar for each specialty that the impact trend would be positive slope and follow the proportion of Stage 1 Institutions such that those institutions with higher proportions of Stage 1 would indicate less severe

impact and those with lower proportions of stage 1 a greater impact . Contrarily, if the impact varied by specialty there would be fluctuations by specialty with a trend line approaching a slope of zero.

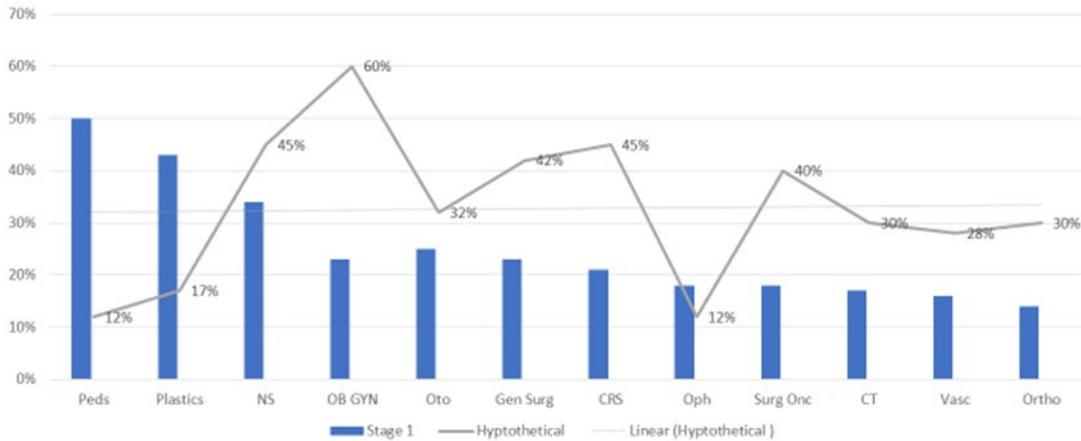
A hypothetical example showing variation by stage primarily is shown below.

## Hypothetical Impact by Stage and Specialty Showing No Variation by Specialty



The hypothetical example below shows variation primarily by specialty.

# Hypothetical Impact by Stage and Specialty Showing Variation by Specialty



## Disclaimer

The observations below must be considered with an understanding of the variability in response rates for each specialty. In addition, descriptive statistics alone were used to identify trends and unique features of the various specialties. These were not assessed for statistical significance. The goal is to identify possible variations by specialty that would warrant further attention and study.

## Regional and Stage Distribution

Of the 559 respondents 26% were in the NE with the greatest proportion being in NS (39%), Ortho (38%), and Surg Onc (46%). Of the respondents, 31% were in the South with the greatest proportion being in OBGYN (38%), Oph(38%), Ortho(36%), Peds (45%), and Vascular( 42%); 28% were in the Midwest with the greatest proportions being in CT (42%, CRS(44%), and Plastics( 43%); 13% were in the west with a homogeneous distribution except for lower proportions in CRS(6%), Ortho (7%), Plastics (8%), and Vascular( 8%).

The ACGME Stage distribution was Stage 1 26% ± 11% (Range 16% (Vascular)-50%(Peds) ), Stage 2 45%± 10%\_ ( Range 22%(Plastics)-65%(CT), Stage 3 30% ± 11%( Range 9% (Peds)-44%(Vascular +Surg Onc).

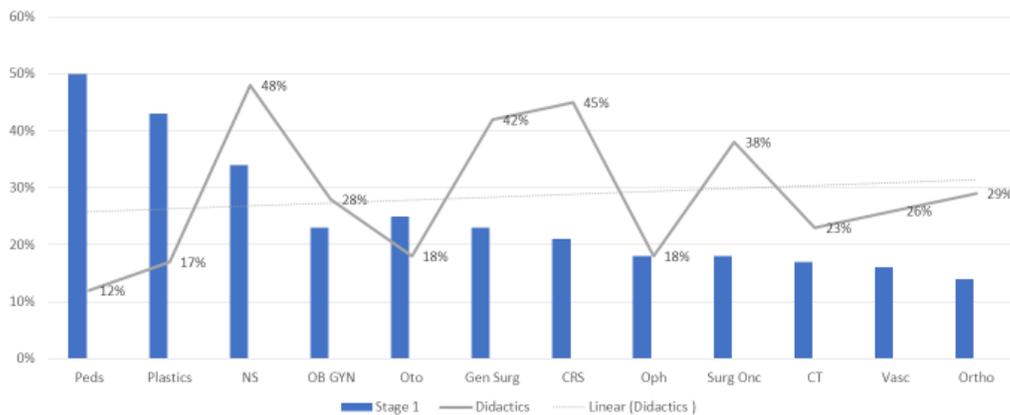
***There was consistency as to the ACGME Stage indicated by the respondents by specialty with the exception of Stage 1 being most frequent in Peds (50%) and Plastics (43%).***

**Impact on Didactic and Clinical Education, Operative Experience, Learner Health**

Didactic Education

A severe impact on didactic education averaged 29%±12%. This ranged from 17%(Plastics) – 48%(NS). There were some specialty specific variations that could not be accounted for by Stage alone. Notably was a lower proportion indicating severe impact in Peds (12%) and Plastics (17%) likely related to stage, however there was also a lower proportional impact in Oto and Oph possibly unrelated to stage. Programs derivative to Gen Surg (Gen Surg, CRS, Surg Onc) tended to report a greater impact on didactics. NS was also noted to have a greater impact on didactic education that seemed greater than other specialties with similar frequency of Stage 1 designation.

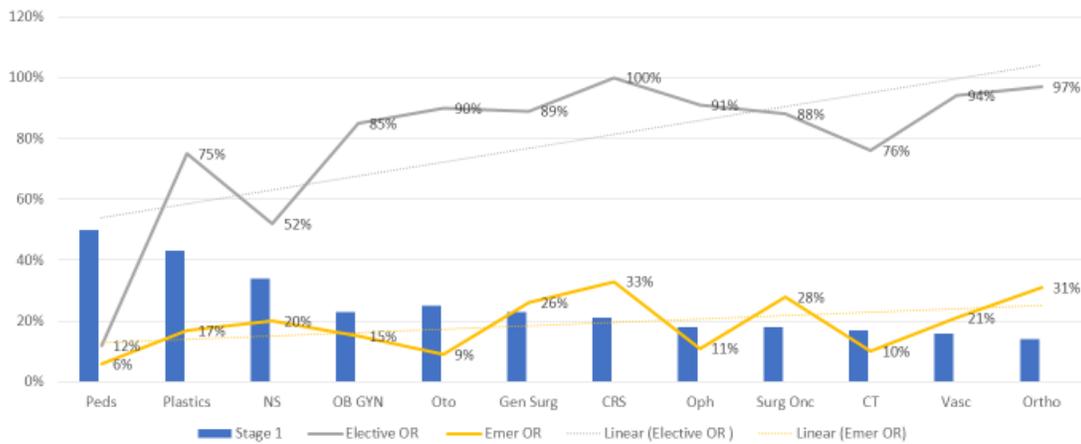
## Impact on Didactics By Stage and Specialty



## Operative Experience and Outside Rotations

A Severe impact on non-emergency surgery averaged 84%±14% and ranged from **52%(NS)**-100%(CRS).  
 A severe impact on emergency surgery averaged 19%± 9% and ranged from **6% (Peds)**-33% (CRS, Ortho).  
 A severe impact on outside rotations averaged 46%± 17% and ranged from 12%(peds)-68%(Oph).

## Impact on Clinical Education Operative Volume by Specialty and Stage



**Although there was variability in clinical and operative experience by specialty that may be related to the unique features of the specialty (e.g. NS 52% severe impact on non-emergency surgery, 2 SD lower than the mean) most specialties were primarily impacted by ACGME Stage. The trend line for both**

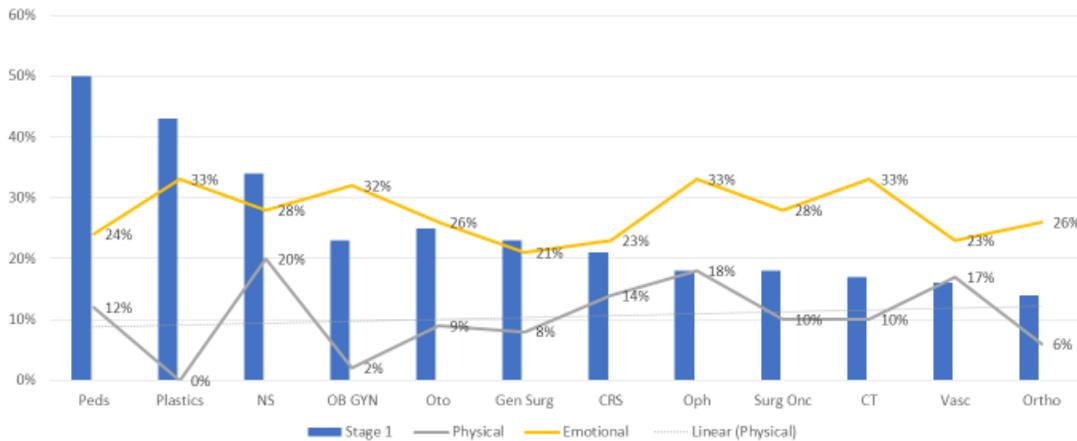
**non-emergency surgery and emergency surgery have a positive slope and followed that expected for decreasing Stage 1 proportion.**

Learner Health

A severe impact on learner health averaged 11% ±6% (physical health), 28% ± 4%(emotional health), and 16% ±8%(physical safety.) Physical health was least affected in Plastics (0%) and OBGYN (2%). **This may be accounted by ACGME Stage alone for plastics but may be specialty specific for OBGYN. In the combined study all parameters were related to stage.**

The impact on emotional health was greater than physical health in all specialties. In addition, there was no substantial variation on emotional health by specialty.

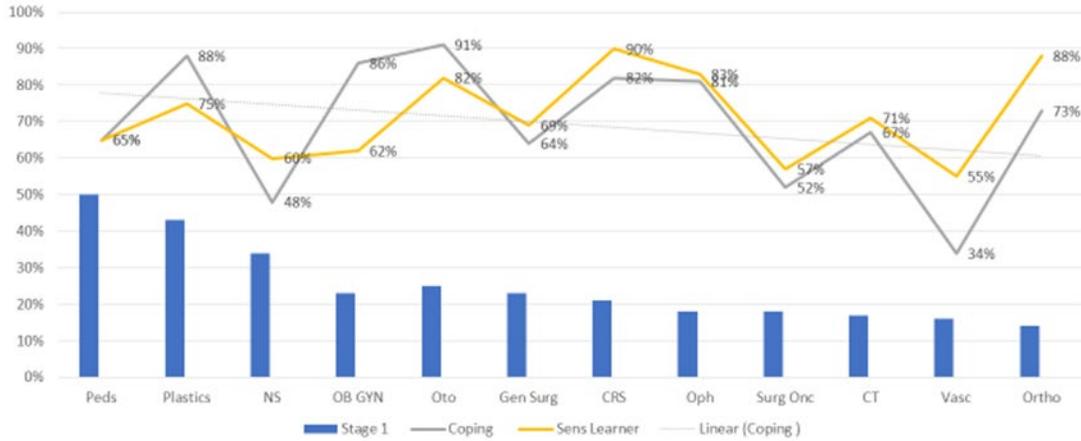
## Physical and Emotional Health By Stage and Specialty



Program adaptations for Learner Health and Education

Availability of coping assistance was a common adaptation according to the responses which averaged 69% and ranged from 34%(Vascular)-86%(OBGYN). Sensitivity to learners needs averaged 71% and ranged from 60% (NS)-88%(Ortho). Sensitivity to faculty needs averaged 58% and ranged from 34%(Plastics)-86%(Ortho).

## Adaptations for Emotional Health By Stage and Specialty



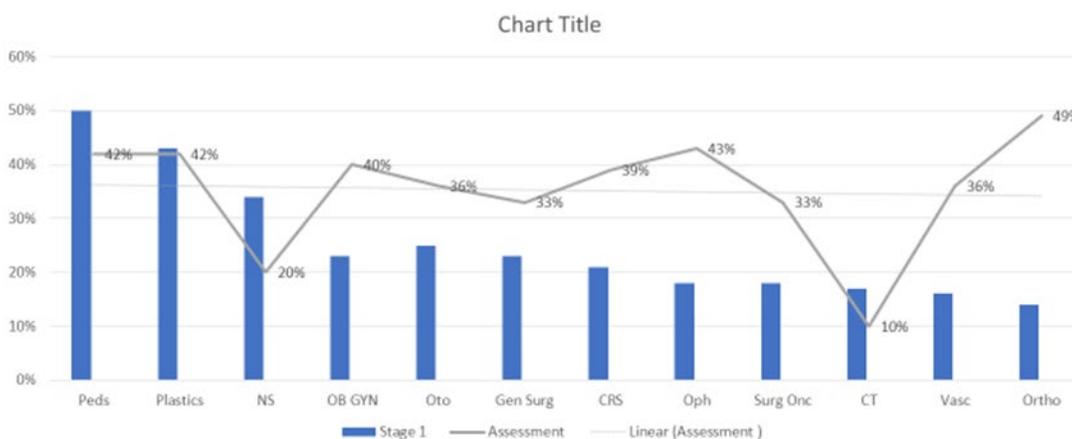
**Addressing learner health in the combined study was not uniformly related to stage. The trend line for coping implementation has a negative slope. There seemed to individual variations by specialty. Implementation of coping assistance was less common in NS (48%), Surg Onc (52%), Vascular (34%).**

## Assessment of Learners

Severe impact of the assessment of learners averaged  $33\% \pm 12\%$  and ranged from 10%(CT)-49%(Ortho).

***The specialty variability in the severe impact on assessment cannot be completely explained by stage (CT 10% vs Ortho 49%) and may be related to unique characteristics of the specialty.***

## Severe Impact on Assessment of Learners By Stage and Specialty

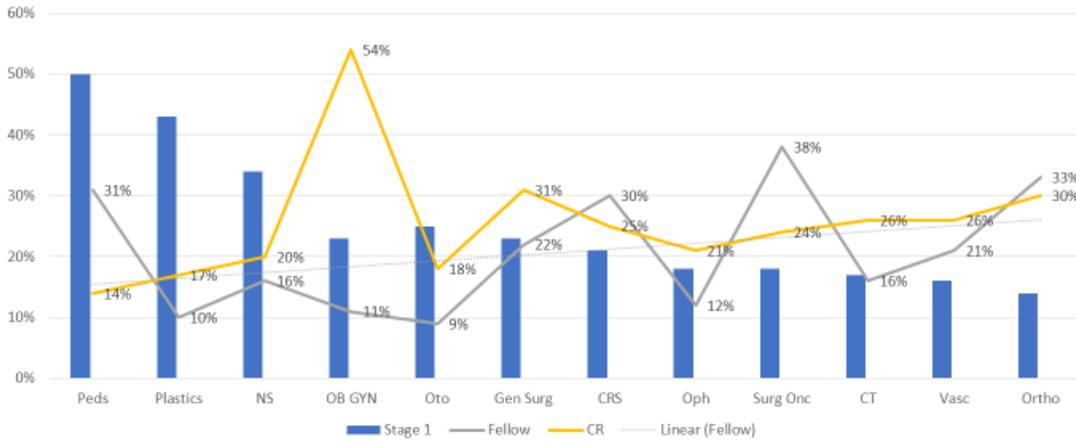


## Operative Case Experience and Progression to Autonomy

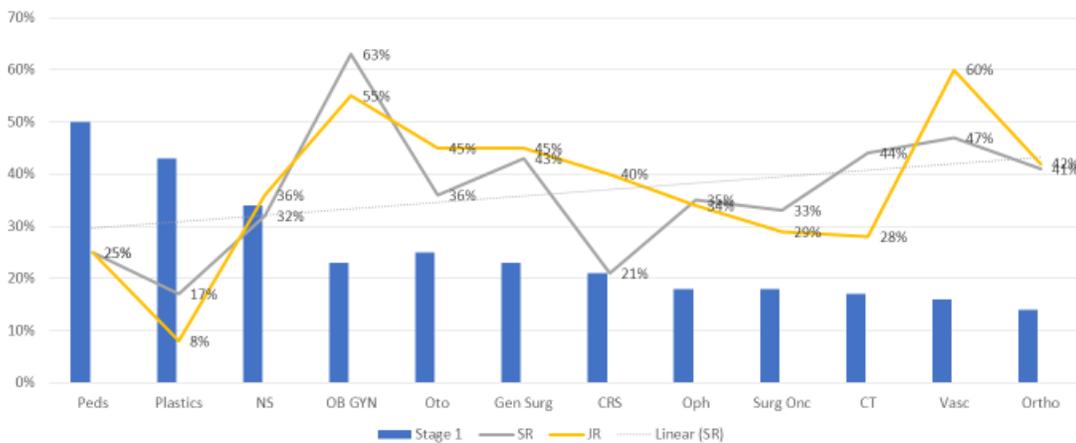
### Expected Minimal Requirements Numbers

A severe impact on expected minimum case numbers averaged  $21\% \pm 10\%$  (fellows);  $26\% \pm 10\%$  (CR);  $36\% \pm 13\%$  (SR) and  $37\% \pm 14\%$  (JR). The severe impact on fellows ranged from 9% (Oto and Plastics)-38% (Surg Onc). Other specialties with severe impact were CRS (30%), Ortho (33%), and Peds (31%). The severe impact on CR ranged from 14%(Peds)-54%(OBGYN). The severe impact on SR ranged from 17%(plastics)-63% (OBGYN). The severe impact on JR ranged from 8%(Plastics)-60%(Vascular). In general, the impact was greatest in SR and JR. In the combined study the impact on achieving expected case numbers was not uniformly related to stage.

## Minimal Case Requirements for Fellow and CR By Stage and Specialty

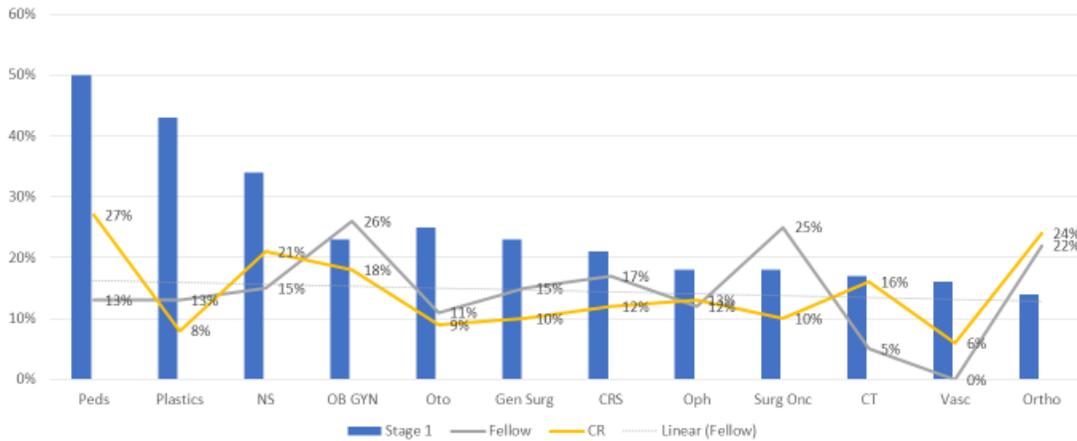


## Minimal Case Requirements for SR and JR By Stage and Specialty

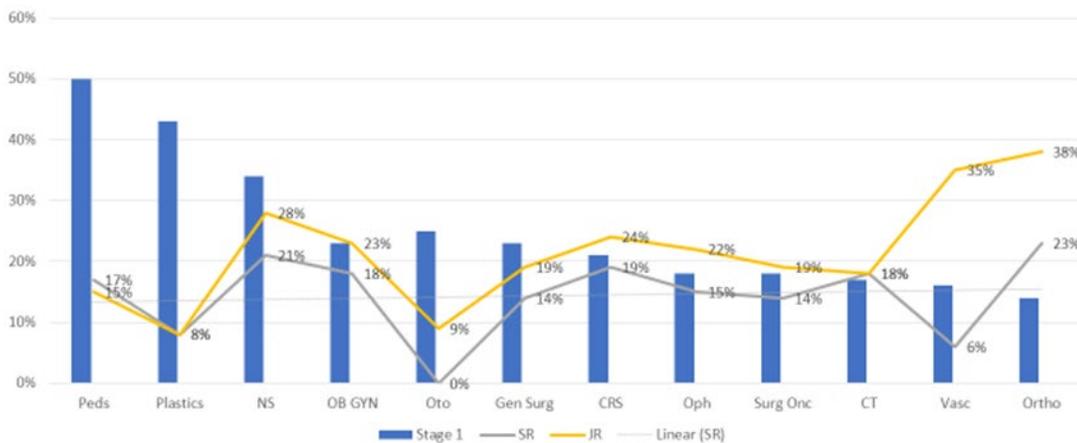


A severe impact on progression to autonomy averaged  $15\% \pm 8\%$  (fellows);  $15\% \pm 7\%$  (CR);  $14\% \pm 7\%$  (SR) and  $23\% \pm 8\%$  (JR) . The ranges were Fellows (0%(vascular)-26% (OBGYN+Surg Onc); CR 6%(Vascular)-27%(Peds); SR 0%(Oto)-23%(Ortho); JR 9%(Oto)-38%(Ortho). In the combined study progression to autonomy was not uniformly related to stage.

## Autonomy Progression for Fellow and CR By Stage and Specialty



## Autonomy Progression for SR and JR By Stage and Specialty

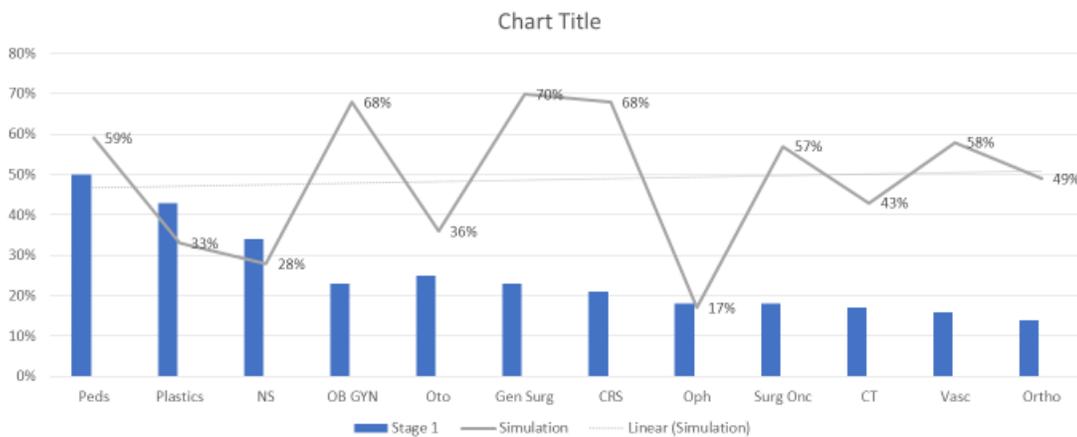


***Expected minimal case numbers and progression to operative autonomy is not solely dependent on ACGME Stage. In the combined study the impact was not uniformly related to Stage. Impact may be related to the unique features of the surgical specialty.***

Suspension of Educational Programs

The most common suspended education programs across all specialties included Visiting Professors which averaged 60% ± 16% and ranged from 47%(OBGYN) -86% (Surg Onc). The second most common program suspended was simulation which averaged 49%± 17% and ranged from 17%(Oph)-70% (General Surgery).

## Suspension of Simulation By Stage and Specialty



***Simulation was not suspended in some specialties and this seemed independent of ACGME Stage; NS 28%; Oph 17%) and hence may be related to unique simulation strategies used in these specialties.***

Addressing ACGME Core Competencies

The majority of respondents by specialty indicated that they tried address the core competency of knowledge using nationally available curricula, average 97% ± 4%% (range 92%-100%). Addressing the other competencies was less frequent: Problem Solving averaged 63% ± 11%(Range 53% (Peds)-

90%(CRS); Communication averaged  $51\% \pm 8\%$ (Range 40%(CT)-67%(Plastics); Professionalism averaged  $56\% \pm 8\%$ (Range 42%(OBGYN)-67%(Plastics). On average  $31\% \pm 11\%$ of the specialties addressed technical competence during the pandemic (Range 12%(Vascular)-50% (Surg Onc). There was minimal variation between specialties.

***There was a consistent lack of addressing development of technical competencies across most specialties.***

#### Education Statement in the Institutional Disaster Plan.

Of the respondents 79% thought the disaster plan should have a statement about education. The range was 60%(Plastics)-94%(Peds).

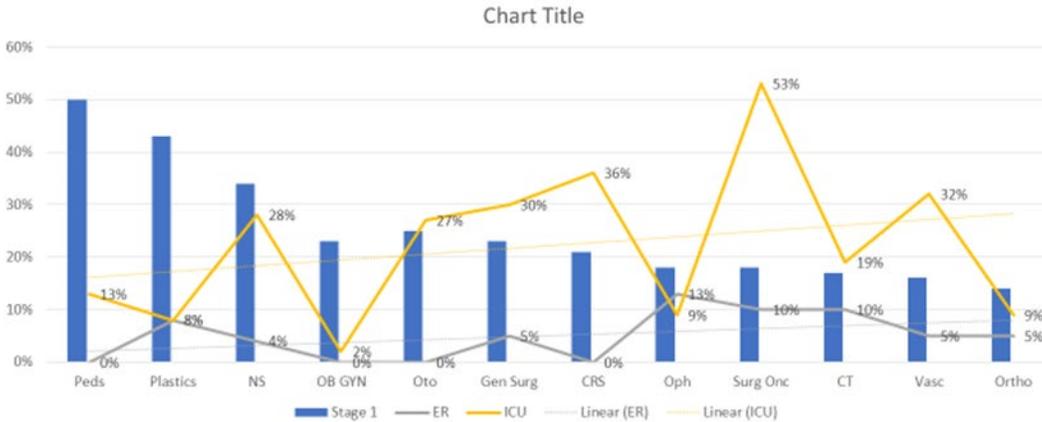
***There is uniform agreement that an institutional disaster plan should include a statement on education.***

#### Deployment of Trainees to the Intensive Care Unit (ICU)and Emergency Room (ER)

Deployment of trainees to the ICU averaged  $22\% \pm 15\%$ . This was greatest in Gen Surg programs (30%) and in those programs derivative to general surgery including Surg Onc 53% , CRS 36% , and Vascular 32%. In addition, NS reported ICU deployment in 30%. This tended to be more common in higher stage institutions (Lower % of Stage 1)

Deployment of trainees to the ER was less common and averaged  $6\% \pm 5\%$  with no clear trends between specialties and most likely related to advancing stage (Lower % of Stage 1).

# Deployment to ICU and ER By Stage and Specialty



## Deployment of Trainees Non-Surgical Services

The deployment of residents to a non-surgical service averaged  $25\% \pm 11\%$  and ranged from 8%(Plastics)- 45% (Surg Onc). Other specialties with high deployment rates for trainees included CRS (37%) and NS (38%). The deployment of faculty to non-surgical services averaged  $15\% \pm 9\%$  and ranged from 0-2% (Plastics and OBGYN)-32%(CRS).

***Deployment to non-surgical services seemed dependent on the unique skill set of the specialty with certain specialties such as OBGYN, Peds and Plastics being deployed less often than those with training derivative to general surgery.***

## Summary

Although the impact on the surgical specialties seemed to be predominantly related to ACGME Stage, there were some instances where the unique characteristics of the surgical specialty may have affected the responses.

1. Programs derivative to Gen Surg (Gen Surg, CRS, Surg Onc) tended to report a greater impact on didactics. NS was also noted to have a greater impact on didactic education that seemed greater than other specialties with similar frequency of Stage 1 institutions.
2. Although there was variability in clinical and operative experience by specialty that may be related to the unique features of the specialty (e.g. NS 52% severe impact on non-emergency

surgery, 2 SD lower than the mean) most specialties were primarily impacted by ACGME Stage. The trend line for both non-emergency surgery and emergency surgery have a positive slope and followed that expected for decreasing Stage 1 proportion.

3. Physical health was least affected in Plastics (0%) and OBGYN (2%). This variation may be accounted by ACGME Stage alone for plastics but may be specialty specific for OBGYN.
4. The impact on emotional health was greater than physical health in all specialties. In addition, there was no substantial variation of the impact on emotional health by specialty.
5. Addressing learner health seemed to vary by ACGME Stage. However, the trend line had a negative slope suggesting an inverse relationship with stage and that other factors may be important. For example, implementation of coping assistance was less common in NS (48%), Surg Onc (52%), Vascular (34%).
6. The specialty variability in the severe impact on assessment of learners cannot be completely explained by stage (CT 10% vs Ortho 49%) and may be related to unique characteristics of the specialty.
7. Expected minimal case numbers and progression to operative autonomy is not solely dependent on ACGME Stage. Impact may be related to the unique features of the surgical specialty.
8. Simulation was not suspended in some specialties and this seemed independent of ACGME Stage (NS 28%; Oph 17%) and hence may be related to unique simulation strategies used in these specialties.
9. There was a consistent lack of addressing technical competency across most specialties.
10. Deployment of trainees to the ICU was greatest in Gen Surg programs (30%) and in those programs' derivative to general surgery as well as NS.
11. Deployment of trainees to the ER was less common with no clear trends between specialties and most likely related to advancing stage.
12. Deployment to non-surgical services seemed dependent on the unique skill set of the specialty with certain specialties such as OBGYN, Peds and Plastics being deployed less often than those with training derivative to general surgery.

### **Conclusion**

Although there were common themes that emerged in the overall assessment of the results, there are variations between specialties that cannot be completely explained by ACGME Stage. It is plausible that some variations are unique to the training characteristics of each specialty. Hence, it is recommended that each specialty group review the quantitative results as well as the respondents' comments of the survey provided by the Academy Special Committee. This may help identify opportunities to address specific future concerns for education and learner well-being that may occur during a future surges of COVID 19 or a similar national crisis.