

# Effect of the COVID-19 pandemic on the ability of level 1 trauma centers to meet American College of Surgeons research requirements

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## ABSTRACT

**Introduction** The COVID-19 pandemic has had major effects on hospitals' ability to perform scientific research while providing patient care and minimizing virus exposure and spread. Many non-COVID-19 research has been halted, and funding has been diverted to COVID-19 research and away from other areas.

**Methods** A 28-question survey was administered to all level 1 trauma centers in the USA that included questions about how the pandemic affected the trauma centers' ability to fulfill the volume and research requirements of level 1 verification by the American College of Surgeons (ACS).

**Results** The survey had a 29% response rate (40/137 successful invitations). Over half of respondents (52%) reported reduced trauma admissions during the pandemic, and 7% reported that their admissions dropped below the volume required for level 1 verification. Many centers diverted resources from research during the pandemic (44%), halted ongoing consenting studies (33%), and had difficulty fulfilling research requirements because of competing clinical priorities (40%).

**Discussion** Results of this study show a need for flexibility in the ACS verification process during the COVID-19 pandemic, potentially including reduction of the required admissions and/or research publication volumes.

**Level of evidence** Level IV, cross-sectional study.

## INTRODUCTION

The wide-ranging effects of the COVID-19 pandemic have included major impacts on scientific research. This is especially true of research conducted at facilities that also provide patient care. To reduce potential exposure to and spread of the virus, as well as ensure adequate resources are directed towards patient care, many facilities have halted all research not directly related to COVID-19 and moved all non-essential research and activities to remote work.<sup>1–5</sup> Time-sensitive biomedical, laboratory, and animal research has been particularly affected,<sup>1</sup> and residents have reported being unable to perform ongoing research needed to complete their programs or have been reassigned from their normal rotations to COVID-19 patient care.<sup>6–8</sup> Funding from major sources such as the National Institutes of Health has been diverted to COVID-19 research and away from other areas.<sup>2,3</sup> Most, if not all, major scientific conferences have been moved

to a virtual format.<sup>9–11</sup> To attempt to minimize long-term setbacks in non-COVID-19 research, flexibility has often been allowed by academic and funding organizations in areas such as grant spending and project timelines.<sup>5</sup>

Facilities designated as level 1 trauma centers by the American College of Surgeons (ACS) are comprehensive regional resources that provide the highest level of specialized trauma care.<sup>12–14</sup> Verification as an adult level 1 trauma center has requirements that include a volume threshold ( $\geq 1200$  adult trauma admissions, or  $\geq 240$  admissions with Injury Severity Score  $>15$ , per year), as well as an active and productive research program.<sup>15</sup> The research program requirements include either 20 publications per 3-year review period or a combination of 10 publications and participation in research activities such as lectures at national conferences and leadership in major trauma organizations.<sup>15</sup> In response to the COVID-19 pandemic, the ACS has postponed all verification site visits scheduled for March to December 2020 and has extended all verifications expiring in 2020–2023 for an additional 1 year; centers with expiration dates in 2021–2023 must also adjust their 3-year reporting period to reflect the new verification date.<sup>16</sup> This study aimed to determine the effect of the pandemic on trauma centers' ability to fulfill ACS level 1 admission and research requirements by administering a survey to all ACS-verified level 1 trauma centers nationwide.

## METHODS

A 28-question survey was designed with input from the trauma medical directors and clinical research coordinators at six level 1 trauma centers in four states. The survey was organized into five sections that explored many facets of the centers' research programs; one of these sections queried specifically about the effect of the COVID-19 pandemic on ongoing research activities and trauma admission volumes (the survey questions described in this article are included as online supplemental figure 1). The preferred contact at each trauma center was the trauma program director or trauma program manager; if this position did not exist or no email contact information was available, the survey was instead sent to the trauma medical director. The ACS website was used to obtain the current list of all ACS-verified level 1 trauma centers, which included 175 facilities as of November 1, 2020. Websites and phone numbers for the trauma centers were

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**Table 1** ACS-verified level 1 trauma centers and the effect of COVID-19 on research activities

	All n=40	Academic n=34 (85%)	Non-academic n=6 (15%)	Total responses
<b>Facility characteristics</b>				
Type of facility				40
Academic	34 (85%)	–	–	
Non-academic	6 (15%)	–	–	
<b>Profit status</b>				
Non-profit	32 (82%)	29 (88%)	3 (50%)	39
For profit	2 (5%)	0 (0%)	2 (33%)	
Government	5 (13%)	4 (12%)	1 (17%)	
<b>Part of a hospital system</b>				
Total licensed beds (median (IQR), range)	509 (400–700), 249–1000	545 (400–710), 249–1000	440 (330–600), 250–800	38
Approximate adult trauma admissions in the past 12 months (median (IQR), range)	2300 (1500–3000), 1200–4800	2190 (1450–3100), 1200–4800	2450 (1500–3000), 1500–3100	38
Years of ACS level 1 verification (median (IQR), range)	20 (7–28), 1–36	20 (7–28), 1–36	14 (4–28), 3–30	40
<b>Effects of the COVID-19 pandemic</b>				
Trauma service admissions reduced during COVID-19	14 (52%)	11 (52%)	3 (50%)	27
Admission reductions to levels below those required for level 1 verification	2 (7%)	2 (10%)	0 (0%)	27
Scheduled for review during March to December 2020	14 (52%)	12 (57%)	2 (33%)	27
Resource diversion from research during COVID-19	12 (44%)	9 (43%)	3 (50%)	27
Consenting studies postponed during COVID-19	10 (37%)	7 (33%)	3 (50%)	27
Competing priorities during COVID-19 have made it difficult to fulfill level 1 requirements	10 (40%)	8 (42%)	2 (33%)	25

ACS, American College of Surgeons.

used to obtain contact email addresses. Survey administration was conducted via SurveyMonkey and included one invitation email and four reminder emails sent once a week to all non-respondents during the period November 12, 2020 to December 10, 2020. All responses were collected anonymously and were not able to be matched back to the respondent. The study was deemed not human subjects research by the Institutional Review Board at the principal investigator's institution.

Data were exported from SurveyMonkey and analyzed using SAS V.9.4. Descriptive statistics are reported as n (%) or median (IQR) and are shown for the overall study population, as well as the subgroups of academic and non-academic centers.

## RESULTS

Email contact information was able to be obtained for 152 of the level 1 trauma centers. Of the 152 survey invitations sent out, 14 bounced, and one participant opted out. The total number of successful invitations issued was therefore 137. Forty total responses were received (25 complete, 15 partial) for a response rate of 29%, representing 23% of all level 1 trauma centers nationwide (40/175). The survey section pertaining to the effect of COVID-19 on research received 27 responses for a response rate of 20% to this section, or an overall representation of 15% of all level 1 trauma centers. Eighty-five percent (n=34) of the responses were from academic centers, 15% (n=6) were from non-academic centers, and most were non-profit (82%, n=32) (table 1). The responding centers had a median of 509 licensed beds, 2300 adult trauma admissions in the previous 12 months, and had been ACS verified for a median of 20 years.

Over half of level 1 trauma centers reported reduced admissions during the pandemic period (52%, n=14). Two centers (7%, both academic) reported that these drops will likely reduce their admission volumes to levels below those required for ACS level 1 verification. Approximately half of centers (52%, n=14) were scheduled for ACS re-review during the period March to December 2020 (57%, n=12 academic compared with 33%, n=2 non-academic). Almost half of centers (44%, n=12) reported diverting resources away from research during the pandemic (43%, n=9 academic compared with 50%, n=3 non-academic), and over a third (37%, n=10) postponed or halted ongoing consenting studies during the pandemic (33%, n=7 academic compared with 50%, n=3 non-academic). Forty percent of survey respondents (n=10) reported that competing hospital priorities during the pandemic have made it difficult to fulfill ACS level 1 trauma center requirements.

## DISCUSSION

Recent studies and personal accounts have shown that the COVID-19 pandemic has forced halting of non-COVID-19 research activities and has diverted resources towards patient care and away from scientific research.<sup>1–6 17</sup> This study examined the effect of the COVID-19 pandemic on the research activities of level 1 trauma centers and their ability to continue to meet ACS level 1 verification requirements during the pandemic.

Survey results showed that during the COVID-19 pandemic, level 1 trauma centers have experienced challenges in meeting both the volume and research program requirements of ACS verification. Two academic trauma centers reported that the

reductions they experienced in admission volumes will likely drop them below the volume required for level 1 verification. Many centers reported diverting resources from research (44%) or postponing ongoing consenting studies (37%), and 40% reported that competing priorities during the pandemic have made it difficult to fulfill the level 1 research requirements. Over half of the responding centers (52%) were scheduled for reverification during the pandemic period of March to December 2020 and thus have had their reviews postponed.

### Limitations

As with all surveys, this study was subject to potential participation bias. Academic trauma centers were over-represented among respondents: a 2008 study estimated that ~66% of ACS-verified level 1 centers were associated with a university,<sup>13</sup> but 85% of respondents to this survey classified themselves as academic centers. The respondents here reported comparable bed size and hospital system participation as the centers described a previous inventory of all level 1 trauma centers nationwide,<sup>18</sup> although the current study showed under-representation of public/government centers (15% here, 34% in the previous study) and over-representation of private non-profit centers (80% here, 63% in the previous study). Additionally, assuming approximate equal distribution of reporting periods, it would be expected that ~28% of level 1 trauma centers would have been scheduled for review during the pandemic period of March to December 2020; however, 52% of centers that responded to this survey were scheduled for review during this period. It is possible that these centers were experiencing a high number of research setbacks during this period that directly affected ACS verification and were more likely to respond to this survey.

Because the section of questions pertaining to the effect of COVID-19 on research was near the end of the larger survey on research programs in general, this section had a lower response rate than the overall survey (n=40 completed at least one survey section compared with n=27 completed the COVID-19-related section). Despite these limitations, this study offers insights into how resources were diverted from research during the COVID-19 pandemic among the level 1 centers that did respond.

### CONCLUSIONS

In response to research challenges during the pandemic, many academic and funding organizations have introduced flexibility, including extending research deadlines and relaxing grant-sponsoring requirements.<sup>5</sup> The ACS has delayed site visits and altered review periods during this time, but many centers still face an inability to meet ACS requirements because of volume shortfalls or diversion of research resources. Potential solutions include reduced trauma admission volume and publication requirements for ACS verification during the months or years that the COVID-19 pandemic has dramatically affected the facilities' ability to conduct research, as well as a longer review period or considering COVID-19-related articles for the fulfillment of publication requirements.

**Contributors** RMM conceived the study, assisted in study and survey design, participated in data interpretation, provided critical article revisions, and approved the final article. ES assisted in study and survey design, conducted literature searches, data collection, data analyses, and data interpretation, wrote the first draft of the article, provided critical article revisions, and approved the final article. GMB, KLB, MC, ML, and AT participated in survey design and data interpretation, provided critical article revisions, and approved the final article. DB-O supervised the

study, participated in survey design and data interpretation, provided critical article revisions, and approved the final article.

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**Competing interests** None declared.

**Patient consent for publication** Not required.

**Ethics approval** This study was reviewed by the Catholic Health Initiatives Institute for Research and Innovation Institutional Review Board (CHIRB) (study number 1653782-1), and was determined to not require further IRB review or approval, as it did not meet the criteria for human subject research under the purview of the IRB according to federal regulations.

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**Fulfilling the research criteria for American College of Surgeons level I trauma center verification and the effects of COVID-19 on ACS verification: A nationwide survey**

Section I: Description of your level I trauma center

1. What type of facility is your hospital?
  - a. Academic or teaching hospital affiliated with a university
  - b. Non-academic hospital (e.g., community hospital)
2. What is the tax status of your hospital?
  - a. Non-profit
  - b. For-profit
  - c. Government
  - d. Other (please specify): \_\_\_\_\_
3. Is your facility part of a hospital system?
  - a. Yes
  - b. No
4. Approximately how many total licensed beds are in your hospital?  
\_\_\_\_\_
5. In the past year, approximately how many adult (age 18+) trauma patients were admitted to your hospital?  
\_\_\_\_\_
6. How many years have you been an ACS-verified level I trauma center?  
\_\_\_\_\_ years

Section IV: Effect of COVID-19 on ACS verification and research activities

1. Have your trauma service admission numbers been reduced during the COVID-19 pandemic period?
  - a. Yes
  - b. No
2. If yes, have your trauma admission numbers been reduced to levels that may no longer surpass the ACS-required volume for level I verification (1,200/year total or 240/year with Injury Severity Score >15)?
  - a. Yes
  - b. No
3. Was your center scheduled for an ACS review during the period March-December 2020?
  - a. Yes
  - b. No
4. Has your center diverted resources from research to patient care during the COVID-19 pandemic period?
  - a. Yes
  - b. No
5. Do you have ongoing consenting studies that have been halted or postponed because of the COVID-19 pandemic?
  - a. Yes

- b. No
6. Consenting studies comprised approximately what percentage of your total research studies in your most recent ACS review?
- a. 0-25%
  - b. 26-50%
  - c. 51-75%
  - d. >75%
7. Have diversion of resources, halting of consenting studies, or other activities related to the COVID-19 pandemic made it difficult to fulfill the research requirements of the ACS during the current review period?
- a. Yes
  - b. No