SUPPLEMENTARY FILES

Supplemental material

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Trauma Surg Acute Care Open

SUPPLEMENTARY MATERIAL 1:

LINKS TO SURVEY QUESTIONAIRES:

2019 SURVEY

2022 SURVEY

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Supplementary Material File 2 – Additional Demographic Data and Responses

Table S1: How are/were you mostly employed? (Choose all that apply.)

	2019 (n=213)		2022 (n=189)		Chi Square
	#	%	#	%	P
Acute Care Surgeon (i.e., Trauma Surgery, Emergency General Surgery, Surgical Critical Care)	168	78.8%	155	82.0%	0.42
Burn Surgeon	14	6.6%	12	6.3%	0.93
General Surgeon	26	12.2%	20	10.5%	0.61
I'm retired	6	2.8%	7	3.7%	0.62
Other surgeon/surgical resident	22	10.3%	22	11.6%	0.64

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Table S2: Please indicate if you have served in any of the following roles
Choose all that apply):

	2019 (n=215)		2022 (n=180)		Chi Square
	YES	%	YES	%	P
Trauma Medical Director	118	58.7%	88	48.9%	0.077
Member of the Trauma Surgery Call panel	150	74.6%	124	68.9%	0.301
Member of the Hospital / Organization Emergency Management or Disaster Committee	114	56.7%	80	44.4%	0.025*
Member of the Hospital / Organization Incident Command System HICS or ICS)	51	25.4%	56	31.1%	0.198
None of the above	13	6.4%	31	17.2%	0.001*

Abbreviations: HICS- Hospital Incident Command System, ICS- Incident Command System.
*: P<0.05

Table S3: What state do you reside in?

State	Survey Year		Total
	2019	2022	
Alabama	6	5	11
Alaska	1	0	1
Arizona	3	5	8
Arkansas	0	3	3
California	21	24	45
Colorado	5	3	8
Connecticut	7	9	16
Delaware	1	0	1
District of Columbia (DC)	3	1	4
Florida	10	5	15
Georgia	1	3	4
Illinois	9	5	14
Indiana	5	4	9
Iowa	2	1	3
Kansas	1	0	1
Kentucky	3	1	4
Louisiana	2	2	4
Maine	1	0	1
Maryland	10	3	13
Massachusetts	2	3	5
Michigan	7	6	13
Minnesota	5	0	5
Mississippi	1	2	3
Missouri	6	8	14
Nebraska	1	2	3
Nevada	2	1	3
New Hampshire	2	1	3
New Jersey	3	4	7
New Mexico	0	2	2
New York	8	7	15
North Carolina	2	8	10
North Dakota	4	0	4
Ohio	4	5	9
Oklahoma	2	0	2

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Oregon	3	0	3
Pennsylvania	10	8	18
Rhode Island	5	4	9
South Carolina	1	1	2
Tennessee	4	5	9
Texas	15	17	32
Utah	1	1	2
Vermont	1	1	2
Virginia	8	5	13
Washington	7	3	10
West Virginia	2	1	3
Wisconsin	3	5	8
Total	200	174	374

Table S4: What Level of Verification (State, COT or other) is your trauma center?

What Level of Verification (State, COT or other) is your trauma center?				
				Total
		2019	2022	
What Level of Verification (State, COT or other) is your trauma center?	Level I	167	148	315
	Level II	27	21	48
	Level III	4	2	6
	I do not work in a Trauma Center	3	4	7
Total		201	175	376

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Table S5: True/False: In the past year, my family and I have taken action to become better prepared for likely disasters in our community. (Examples: we have made a disaster kit, taken active shooter training, obtained stop the bleed training, created a disaster plan, discussed communications plans and/or rendezvous plans).

	2019 (n=195)	2022* (n=163)
True	111 (56.9%)	91 (55.8%)
False	75 (38.5%)	69 (42.3%)

Chi Square Test: P=0.446

Table S6: Which actions below by AAST and ACS COT do you think are most important to improve disaster preparedness? (Choose all that apply.)

	2019		2022		Chi-Square P
	YES (n=213)	%	YES (n=189)	%	
Advocacy for hospital / trauma center preparedness funding	146	68.5	110	58.2	0.031*
Create National Standards for trauma center disaster preparedness	134	62.3	105	55.6	0.134
Create more online disaster-related education	125	58.1	101	53.4	0.290
Create more disaster-related Trauma Center/System Verification Standards	106	49.3	97	51.3%	0.755
Propose mandatory disaster-related training in Medical School, Residency and/or Fellowships	110	51.2	93	49.2	0.620
Increase Military-Civilian cooperation for disaster response	105	48.8	93	49.3	0.986
Add more disaster and mass casualty sessions to annual ACS Clinical Congress / AAST Annual Meeting	98	46.0	82	43.4	0.598
Offer more live disaster courses	87	40.5	73	38.6	0.650
Create Hospital Disaster Annual Update training	80	37.6	62	32.8	0.320
The AAST / ACS COT should take no actions to improve disaster preparedness	5	2.3	5	2.6	0.848

Abbreviations: AAST-American Association for the Surgery of Trauma, ACS – American College of Surgeons, COT – Committee on Trauma.

*: P<0.05

Supplementary Material File 4: Checklist for Reporting of Survey Studies (CROSS)

Section/topic	Item	Item description	Reported on page #
Title and abstract			
Title and abstract	1a	State the word "survey" along with a commonly used term in title or abstract to introduce the study's design.	1
	1b	Provide an informative summary in the abstract, covering background, objectives, methods, findings/results, interpretation/discussion, and conclusions.	1
Introduction			
Background	2	Provide a background about the rationale of study, what has been previously done, and why this survey is needed.	4
Purpose/aim	3	Identify specific purposes, aims, goals, or objectives of the study.	5
Methods			
Study design	4	Specify the study design in the methods section with a commonly used term (e.g., cross-sectional or longitudinal).	6
Data collection methods	5a	Describe the questionnaire (e.g., number of sections, number of questions, number and names of instruments used).	SDC 1
	5b	Describe all questionnaire instruments that were used in the survey to measure particular concepts. Report target population, reported validity and reliability information, scoring/classification procedure, and reference links (if any).	6, 7 SDC 1
	5c	Provide information on pretesting of the questionnaire, if performed (in the article or in an online supplement). Report the method of pretesting, number of times questionnaire was pre-tested, number and demographics of participants used for pretesting, and the level of similarity of demographics between pre-testing participants and sample population.	6
	5d	Questionnaire if possible, should be fully provided (in the article, or as appendices or as an online supplement).	SDC1
Sample characteristics	6a	Describe the study population (i.e., background, locations, eligibility criteria for participant inclusion in survey, exclusion criteria).	6
	6b	Describe the sampling techniques used (e.g., single stage or multistage sampling, simple random sampling, stratified sampling, cluster sampling, convenience sampling). Specify the locations of sample participants whenever clustered sampling was applied.	6
	6c	Provide information on sample size, along with details of sample size calculation.	6
	6d	Describe how representative the sample is of the study population (or target population if possible), particularly for population-based surveys.	8
Survey administration	7a	Provide information on modes of questionnaire administration, including the type and number of contacts, the location where the survey was conducted (e.g., outpatient room or by use of online tools, such as SurveyMonkey).	6
	7b	Provide information of survey's time frame, such as periods of recruitment, exposure, and follow-up days.	6
	7c	Provide information on the entry process: –>For non-web-based surveys, provide approaches to minimize human error in data entry. –>For web-based surveys, provide approaches to prevent "multiple participation" of participants.	6
Study preparation	8	Describe any preparation process before conducting the survey (e.g., interviewers' training process, advertising the survey).	6

Ethical considerations	9a	Provide information on ethical approval for the survey if obtained, including informed consent, institutional review board [IRB] approval, Helsinki declaration, and good clinical practice [GCP] declaration (as appropriate).	6
	9b	Provide information about survey anonymity and confidentiality and describe what mechanisms were used to protect unauthorized access.	6
Statistical analysis	10a	Describe statistical methods and analytical approach. Report the statistical software that was used for data analysis.	8
	10b	Report any modification of variables used in the analysis, along with reference (if available).	8
	10c	Report details about how missing data was handled. Include rate of missing items, missing data mechanism (i.e., missing completely at random [MCAR], missing at random [MAR] or missing not at random [MNAR]) and methods used to deal with missing data (e.g., multiple imputation).	8
	10d	State how non-response error was addressed.	8
	10e	For longitudinal surveys, state how loss to follow-up was addressed.	NA
	10f	Indicate whether any methods such as weighting of items or propensity scores have been used to adjust for non-representativeness of the sample.	8
	10g	Describe any sensitivity analysis conducted.	NA

Results

Respondent characteristics	11a	Report numbers of individuals at each stage of the study. Consider using a flow diagram, if possible.	9
	11b	Provide reasons for non-participation at each stage, if possible.	NA
	11c	Report response rate, present the definition of response rate or the formula used to calculate response rate.	9
	11d	Provide information to define how unique visitors are determined. Report number of unique visitors along with relevant proportions (e.g., view proportion, participation proportion, completion proportion).	8
Descriptive results	12	Provide characteristics of study participants, as well as information on potential confounders and assessed outcomes.	9
Main findings	13a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates along with 95% confidence intervals and p-values.	Tables
	13b	For multivariable analysis, provide information on the model building process, model fit statistics, and model assumptions (as appropriate).	NA
	13c	Provide details about any sensitivity analysis performed. If there are considerable amount of missing data, report sensitivity analyses comparing the results of complete cases with that of the imputed dataset (if possible).	NA

Discussion

Limitations	14	Discuss the limitations of the study, considering sources of potential biases and imprecisions, such as non-representativeness of sample, study design, important uncontrolled confounders.	19
Interpretations	15	Give a cautious overall interpretation of results, based on potential biases and imprecisions and suggest areas for future research.	16-20

Generalizability	16	Discuss the external validity of the results.	18
Other sections			
Role of funding source	17	State whether any funding organization has had any roles in the survey's design, implementation, and analysis.	1
Conflict of interest	18	Declare any potential conflict of interest.	1
Acknowledgements	19	Provide names of organizations/persons that are acknowledged along with their contribution to the research.	1

Supplementary File Material 5: Survey takers' free text comments

2022 Free-text Responses

Other/Comments"

1. The pandemic made it easier to care for trauma and burn patients because no one else was using the OR!
2. some showed stress, perhaps less than i thought
3. Semi-retired no longer operating but still say patients non-OP in the office throughout Covid-19
4. Our SCC intensivists were not required to care for C19 patients, we volunteered to do so
5. Consider changing careers more to general burnout than specifically to pandemic, though it contributed to being overworked
6. I retired from clinical practice during COVID, in part because of what I believed to be excessive risk

Final: If you have any questions, comments or complaints for the AAST Disaster Committees or leadership about disaster preparedness, please feel free to add them below.

Open-Ended Response

1. I visited a hospital in Israel several years ago and was impressed by the disaster training: all staff are engaged, even the administrators knew where the hazmat and disaster supplies were stored.
2. Please add courses and content for disaster preparedness. The VRC should increase their standards for trauma center verification in this area.
3. none
4. AAST, COT, EAST and WEST should consider supporting one disaster/mass casualty educational program rather than each have their own.
5. We are the only trauma center for 2 million person catchment area. During the early stages of the pandemic our hospital administration was so focused on on COVID 19 that the essentially ignored this fact. We pushed back hard and maintained the capability to care for trauma and emergency general surgery. As the TMD, I had to advocate frequently to maintain trauma care capability. I was most definitely persona non grata.
6. Some hospital centers (Las Vegas, Orlando, Eastern VA, San Fran General) have responded extraordinarily well to rapid influx of mass casualties and have shared their 'secrets'. Alot seems to be dependent on adequate staffing, funding, and some luck (like occurring at shift change). But also their success has been due to things like surge capacity plans, phone trees for call-backs, and hand held radios to use when cell towers go down. The vast majority of Level 1 centers in my experience do NOT have these aspects worked out, and so I (still) think the number 1 thing to do is to standardize what has worked in the aforementioned centers and include it in Level 1 designation as required. Executive leadership of many academic Level 1's will only respond to such national standards. Thanks for the surgery. At my shop, we have such a long way to go.
7. No
8. Thank you
9. Need more courses and education. Should be standards that must be followed for ACSCOT verification as a Trauma Center. Creating verification standards would force hospitals to take this seriously.
10. My hospital does NOT prioritize disaster preparedness, and I have not been able to have impact on importance of it.
11. The current standard for Trauma Center disaster preparedness is inadequate.
12. Current dependence on technology has made cybersecurity perhaps the greatest threat. Having been through this, I think most or all centers are inadequately prepared for a prolonged IT or internet downtime.
13. I think the pandemic showed us that many centers are not well prepared to manage disasters. Despite NY having made guidelines and triage criteria for vents in preparation for a large flu pandemic, it is unclear to me that the written guideline was ever used. Other states had similar guidelines that were creating unease among the civilian population due to fear of not having access to care or ventilators. And ventilator shortages ultimately was not the problem. It is the lack of staff and personnel. The loss of people makes managing disasters even more complex.
14. cool - keep it going Jay and Mark.

15. Requiring standards for site certification will motivate organizations to bring resources to be in compliance

16. Disaster preparedness costs the hospital a lot of money if it is done well. Margins are already thin for hospitals. The probability a a disaster is small. This makes disaster preparedness impossible. It is given lip service only.

17. No but in the future I would love to get involved in this field, as sadly it will be the future

18. I strongly support an immediate and effective process to set standards and provide education and trauma system direction for disaster preparedness.

19. While military-civilian partnerships sound appealing, the burden of public health emergencies and disasters should remain the responsibility of civilians. We can learn from our military partners, but need to own our own processes in civilian environment as it is NOT the same.

20. Thank you!

21. Agree we need to do better with this topic

22. Trauma is only a small proportion of disaster preparation. Surgical training was negatively impacted by COVID by ways that will impact these surgeons for their entire careers, with very little meaningful guidance from the ACGME, government payers, or ABMS. Trainees should have had the option to extend their training with no penalty, or the nation should have moved the graduation date back by 6 months so that chief's got their chief year, and fellows learned their specialties.

23. I definitely interested in becoming more involved with this kind of work and would like to participate. I am working on increasing the presence of the trauma surgeons in local disaster planning, working on coordinating regional response to such events and would love to be involved more at the national level with aast

2019 Free Text Responses

Other (please specify)

1. Create a simulation center for disaster training

2. promulgate MRMI course worldwide

3. Wsupport more research to inform all the activities above which may not be worthwhile if utility iof disaster preparedness (cost of preparing) cannot be justified

4. Coordinate with the ABA and other organizations that have disaster planning capacity for multispecialty coordinated planning, drills, and standards

5. Please note, the Posse Comitatus Sct does NOT prevent local militay medical support for disasters in the local civilian. This ismisunderstood by civilia & military authorities.

6. Advise state governmental agencies how to prepare properly

7. Training/information on developing/participating in hospital and regional disaster preparedness

8. create a list of what we as trauma surgeons should have in our disaster preparedness kit

9. webinars, direct mailings (electronic or physical) to members about their own preparedness

10. I think it isa waste of time. Disaster management works best from the bottom up, so identify your leaders locally, then allow them to work together to troubleshoot. Formal training sessions at national conferences are a waste of time - having been to a few/

11. Help with development of educational materials for the non-trauma centers

Final: If you have any questions, comments or complaints for the AAST or ACS COT Disaster Committees or leadership about disaster preparedness, please feel free to add them below.

Open-Ended Response

1. Important topic - but difficult to get buy in from institution until too late...

2. I would advise to improve international colabortion in field of Disaster preparedness. Not just military, but civilian experience.

3. ANY AND ALL VRC TRAUMA CENTER VERIFICATION CRITERIA SHOULD BE BASED ON THE BEST EVIDENCE/BEST PRATICE DATA THAT HAS MEANINGFUL CLINICAL OUTCOMES AND CAN BE REASONABLY APPLIED. ARTIFICIAL STANDARDS/ (E,G IR RESPONSE TIMES,OTHERS) THAT DO NOT HAVE STRONG CLINICAL

ADVANTAGES FOR PATIENTS SHOULD BE ASPIRATIONAL AND NOT VIEWED AS CRITRIA DEFICIENCIES, UNTIL CLINICAL EVIDENCE PROVES OTHERWISE.

4. ACS COT should be on the forefront of preparing and educating the public and other health care providers and organizations.

5. Having handles three mass casualty events in the last five years, there is a sense of ennui from administration regarding disaster response (i.e. if we handled thirteen 80 year olds in a bus crash, or 25 victims of a tornado, we can handle anything). Bringing a regulatory burden thru ACS Verification would at least commit them to focusing on such issues.

6. Topic of growing importance

7. Use experiences of centers already involved in such events (Charity Hospital, New Orleans, for Katrina; Grady Hospital, Atlanta, for Olympic Bombing; Las Vegas hospitals for mass shooting; Orlando Health for mass shooting, etc.) Have these centers emphasize what part of their response didn't work and what changes they made in their annual disaster training and planning after the event. You both know how woefully unprepared most centers are at this time.....

8. As disaster preparedness is a worldwide issue, AAST and ACS COT could involve ESTES disaster/military section in order to elaborate global solutions

9. need more emphasis on the infrequent but high consequence nature of such events and that the trauma center will be looked to as the local resource to deal with the issue

10. just great that you're doing an assessment

11. COT, ACS, AAST must stay closely involved with all other local state and federal agencies with these programs.

12. In my institution I see little coordination between Admin/Emergency Medicine and the surgical services.

13. Mandate level 1 centers play active role in disaster planning

14. I believe that the need for disaster training is paramount to surgical training. The medical community at large does not have the exposure to disaster medicine that is required to same the maximal amount of lives. I don't believe the community at large is receiving enough education on the impact that a major disaster has on hospital. We need to do better.

15. I greatly appreciate that you're conducting this survey. Consider alliance between all disaster entities

16. More disaster courses!!!

17. The scenarios at the DMEP course somehow need to be more realistic. Maybe for a certain action of the incident command have feedback on what happens.

18. Need to put DMEP into trauma center verification standards.

19. Thank you for focusing on this topic.

20. Scenarios at the end of DMEP need to be more realistic. Right now they are clumsy and awkward. I dont really know how to do it. DMEP is a great course. Also expand the disaster part of ATLS

21. Thank you for spearheading this effort.

22. this is more for the survey structure, I'd encourage you to change question of in which state do you reside to in which state do you work. I live in VA but work in DC.

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Supplementary Material 6: Survey methodology

Questions were grouped to collect respondent's demographics related to regional location and
type of practice as well as role in trauma care. Types of disaster training were collected.
"Formal" disaster training was considered to be Active Shooter Response courses (i.e. FBI,
DHS, "Run, Hide, Fight"), the Disaster Management and Emergency Preparedness Course
(DMEP), occupational training (military, law enforcement, EMT training), decontamination
training, Chemical, Biological, Radiological, Nuclear or Explosives (CBRNE) training,
Residency or Fellowship rotation or experience, Fundamentals of Disaster Management, PTSD
response courses, Acute Stress reaction response courses, Critical Incident Stress Debriefing
courses or a live course (i.e. Center for Domestic Preparedness, Anniston AL, ICS 300, 400
courses, BDLS, ADLS). Informal disaster training was the "Stop the Bleed" course, hospital, or
organization exercises (i.e., annual exercises), Continuing Education (CE) Conference
presentations (i.e., AAST session, ACS Clinical Congress, Las Vegas Medical Disaster
Response), departmental, medical school, residency lecture(s), or online courses (i.e., FEMA ICS
ISP Courses, TIIDE Clinical Primer). The first survey closed on September 1, 2019.
Surgeon's perception of future threats was determined using a 5-point Likert Scale on the
likelihood of MCI scenarios, perceptions of personal and hospital preparedness, including
preparedness characteristics of their facility, self, and family. The Likert values were: 1-Strongly
Disagree, 2-Somewhat Disagree, 3- Neither Agree or Disagree, 4-Somewhat Agree, and 5-
Strongly Agree. Respondents were asked to select desired actions from a list of activities
proposed by either the ACS-COT or the AAST. Open text responses supporting further comment

were collected. Questionnaire responses were tabulated using the 5-point Likert Scale and

reported as frequencies (%). Categorical data were interrogated using chi square analysis.