**Sclafani et al**

**Supplementary Appendix:**

Box 1. List of all 50 acute clinical events with sources

Table 2. Hospital Acute Clinical Events and Resident Exposure by PGY Year

Table 3. Confident Residents by PGY Year for Individual Acute Clinical Events

Survey instrument (separate attachment)

**Box 1. 50 Hospital Acute Clinical Events**

|  |  |  |
| --- | --- | --- |
| **ABIM Certification Requirements** | **IM Residency Curriculum** | **Inpatient Rapid Response Events** |
| ACLS - VT or VF\* | ACLS - VT or VF\* | ACLS - VT or VF\* |
| ACLS - PEA or asystole\* | ACLS - PEA or asystole\* | ACLS - PEA or asystole\* |
| Unstable bradycardia\* | Unstable bradycardia\* | Unstable bradycardia\* |
| Unstable tachycardia (not afib)\* | Unstable tachycardia (not afib)\* | Unstable tachycardia (not afib)\* |
| Stable narrow complex tachycardia (including SVT)\* | Stable narrow complex tachycardia (including SVT)\* | Stable narrow complex tachycardia (including SVT)\* |
| Stable wide complex tachycardia (including VT)\* | Stable wide complex tachycardia (including VT)\* | Stable wide complex tachycardia (including VT)\* |
|  | Torsades de pointes\* | Torsades de pointes\* |
| Use of emergency cardioversion\* | Use of emergency cardioversion\* | Use of emergency cardioversion\* |
| Use of emergency transcutaneous pacing\* | Use of emergency transcutaneous pacing\* | Use of emergency transcutaneous pacing\* |
| ACS – STEMI\* | ACS – STEMI\* | ACS – STEMI\* |
| ACS - NSTEMI\* | ACS - NSTEMI\* | ACS - NSTEMI\* |
|  | Advanced CHF (decompensated heart failure requiring inodilators, vasopressors, or mechanical support)\* | Advanced CHF (decompensated heart failure requiring inodilators, vasopressors, or mechanical support)\* |
|  | Cardiogenic shock\* | Cardiogenic shock\* |
|  | Acute mechanical valve failure |  |
|  | Hypertensive urgency |  |
|  | Hypertensive emergency\* | Hypertensive emergency\* |
|  | Aortic dissection |  |
|  | Afib with RVR\* |  |
|  | Hemodynamically unstable afib with RVR | Hemodynamically unstable afib with RVR |
|  | Tamponade\* | Tamponade\* |
|  | Respiratory failure requiring intubation\* | Respiratory failure requiring intubation\* |
|  | Respiratory failure requiring NIPPV\* | Respiratory failure requiring NIPPV\* |
|  | COPD exacerbation\* | COPD exacerbation\* |
|  | Flash pulmonary edema\* | Flash pulmonary edema\* |
|  | Massive pulmonary embolism\* | Massive pulmonary embolism\* |
|  | Submassive pulmonary embolism\* |  |
|  | Tension pneumothorax | Tension pneumothorax |
|  | Hemoptysis | Hemoptysis |
|  | ARDS\* | ARDS\* |
|  | Septic shock\* | Septic shock\* |
|  | Severe pancreatitis |  |
|  | Acute GI bleed\* | Acute GI bleed\* |
|  | Acute liver failure | Acute liver failure |
|  | Decompensated end stage liver disease\* | Decompensated end stage liver disease\* |
|  | Hyperkalemia | Hyperkalemia |
|  | Symptomatic hyponatremia |  |
|  | Tumor lysis syndrome |  |
|  | TTP/HUS | TTP/HUS |
|  | Massive transfusion protocol | Massive transfusion protocol |
| Acute stroke | Acute stroke | Acute stroke |
| Intracranial hemorrhage | Intracranial hemorrhage | Intracranial hemorrhage |
|  | Elevated ICP/herniation |  |
|  | Seizure/status epilepticus | Seizure/status epilepticus |
|  | Cord compression |  |
|  | PRES |  |
|  | Alcohol withdrawal\* | Alcohol withdrawal\* |
|  | Agitated delirium\* | Agitated delirium\* |
|  | Anaphylaxis\* | Anaphylaxis\* |
|  | Opiate toxicity requiring naloxone\* | Opiate toxicity requiring naloxone\* |
|  | Post-procedure bleed\* | Post-procedure bleed\* |

\*Indicates also part of MGH IM residency simulation curriculum

Abbreviations: VT, ventricular tachycardia; VF, ventricular fibrillation; PEA, pulseless electrical activity; SVT, supraventricular tachycardia; ACS, acute coronary syndrome; STEMI, ST elevation myocardial infarction; NSTEMI, non ST elevation myocardial infarction; CHF, congestive heart failure; NIPPV, noninvasive positive pressure ventilation; ARDS, acute respiratory distress syndrome.

**Table 1. Hospital Acute Clinical Events and Resident Exposure by PGY Year**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Acute Clinical Event** | **PGY-1** | | | | **PGY-2** | | | | **PGY-3/4** | | | |
| **Never seen/ Sim alone** | | **Independently/ Ind. plus Sim** | | **Never seen/ Sim alone** | | **Independently/ Ind. plus Sim** | | **Never seen/ Sim alone** | | **Independently/ Ind. plus Sim** | |
| **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** |
| ACLS - VT or VF | 24 | 58.5% | 0 | 0% | 10 | 20% | 10 | 20% | 1 | 2% | 33 | 67.3% |
| ACLS - PEA or asystole | 18 | 43.9% | 1 | 2.4% | 11 | 22% | 12 | 24% | 1 | 2% | 28 | 57.1% |
| Unstable bradycardia | 26 | 63.4% | 3 | 7.3% | 12 | 24% | 18 | 36% | 4 | 8.2% | 29 | 59.2% |
| Unstable tachycardia | 25 | 61% | 0 | 0% | 7 | 14% | 18 | 36% | 4 | 8.2% | 31 | 63.3% |
| Stable narrow complex tachycardia | 6 | 14.6% | 15 | 36.6% | 2 | 4% | 29 | 58% | 0 | 0% | 42 | 85.7% |
| Stable wide complex tachycardia | 21 | 51.2% | 1 | 2.4% | 6 | 12% | 26 | 52% | 2 | 4.1% | 34 | 69.4% |
| Torsades de pointes | 34 | 82.9% | 0 | 0% | 30 | 60% | 6 | 12% | 25 | 51% | 14 | 28.6% |
| Use of emergency cardioversion | 30 | 73.2% | 0 | 0% | 24 | 48% | 7 | 14% | 8 | 16.3% | 22 | 44.9% |
| Use of emergency transcutaneous pacing | 38 | 92.7% | 0 | 0% | 33 | 66% | 2 | 4% | 19 | 38.8% | 15 | 30.6% |
| ACS - STEMI | 20 | 48.8% | 3 | 7.3% | 7 | 14% | 25 | 50% | 1 | 2% | 32 | 65.3% |
| ACS - NSTEMI | 4 | 9.8% | 11 | 26.8% | 0 | 0% | 43 | 86% | 0 | 0% | 44 | 89.8% |
| Advanced CHF | 23 | 56.1% | 1 | 2.4% | 4 | 8% | 30 | 60% | 0 | 0% | 43 | 87.8% |
| Cardiogenic shock | 15 | 36.6% | 0 | 0% | 1 | 2% | 31 | 62% | 0 | 0% | 38 | 77.6% |
| Acute mechanical valve failure | 35 | 85.4% | 0 | 0% | 28 | 56% | 3 | 6% | 24 | 49% | 10 | 20.4% |
| Hypertensive urgency | 0 | 0% | 35 | 85.4% | 0 | 0% | 50 | 100% | 0 | 0% | 48 | 98% |
| Hypertensive emergency | 2 | 4.9% | 27 | 65.9% | 0 | 0% | 47 | 94% | 0 | 0% | 48 | 98% |
| Aortic dissection | 34 | 82.9% | 2 | 4.9% | 22 | 44% | 10 | 20% | 11 | 22.4% | 18 | 36.7% |
| Afib with RVR | 0 | 0% | 37 | 90.2% | 1 | 2% | 49 | 98% | 0 | 0% | 49 | 100% |
| Hemodynamically unstable afib with RVR | 10 | 24.4% | 11 | 26.8% | 3 | 6% | 36 | 72% | 2 | 4.1% | 42 | 85.7% |
| Tamponade | 23 | 56.1% | 2 | 4.9% | 10 | 20% | 16 | 32% | 4 | 8.2% | 19 | 38.8% |
| Respiratory failure requiring intubation | 2 | 4.9% | 11 | 26.8% | 0 | 0% | 33 | 66% | 0 | 0% | 42 | 85.7% |
| Respiratory failure requiring NIPPV | 1 | 2.4% | 26 | 63.4% | 0 | 0% | 43 | 86% | 0 | 0% | 47 | 95.9% |
| COPD exacerbation | 0 | 0% | 38 | 92.7% | 0 | 0% | 50 | 100% | 0 | 0% | 49 | 100% |
| Flash pulmonary edema | 1 | 2.4% | 34 | 82.9% | 0 | 0% | 50 | 100% | 0 | 0% | 48 | 98% |
| Massive pulmonary embolism | 19 | 46.3% | 3 | 7.3% | 6 | 12% | 23 | 46% | 6 | 12.2% | 27 | 55.1% |
| Submassive pulmonary embolism | 4 | 9.8% | 21 | 51.2% | 2 | 4% | 39 | 78% | 0 | 0% | 46 | 93.9% |
| Tension pneumothorax | 32 | 78% | 2 | 4.9% | 31 | 62% | 5 | 10% | 19 | 38.8% | 12 | 24.5% |
| Hemoptysis | 6 | 14.6% | 18 | 43.9% | 2 | 4% | 36 | 72% | 0 | 0% | 39 | 79.6% |
| ARDS | 1 | 2.4% | 10 | 24.4% | 0 | 0% | 33 | 66% | 0 | 0% | 45 | 91.8% |
| Septic shock | 0 | 0% | 24 | 58.5% | 0 | 0% | 49 | 98% | 0 | 0% | 48 | 98% |
| Severe pancreatitis | 2 | 4.9% | 18 | 43.9% | 2 | 4% | 34 | 68% | 0 | 0% | 40 | 81.6% |
| Acute GI bleed | 0 | 0% | 32 | 78% | 0 | 0% | 50 | 100% | 0 | 0% | 49 | 100% |
| Acute liver failure | 4 | 9.8% | 20 | 48.8% | 1 | 2% | 38 | 76% | 0 | 0% | 43 | 87.8% |
| Decompensated end stage liver disease | 0 | 0% | 26 | 63.4% | 0 | 0% | 47 | 94% | 0 | 0% | 47 | 95.9% |
| Hyperkalemia | 0 | 0% | 35 | 85.4% | 0 | 0% | 48 | 96% | 0 | 0% | 48 | 98% |
| Symptomatic hyponatremia | 4 | 9.8% | 17 | 41.5% | 2 | 4% | 38 | 76% | 0 | 0% | 43 | 87.8% |
| Tumor lysis syndrome | 10 | 24.4% | 12 | 29.3% | 5 | 10% | 27 | 54% | 2 | 4.1% | 37 | 75.5% |
| TTP/HUS | 17 | 41.5% | 5 | 12.2% | 13 | 26% | 12 | 24% | 7 | 14.3% | 21 | 42.9% |
| Massive transfusion protocol | 21 | 51.2% | 3 | 7.3% | 13 | 26% | 17 | 34% | 5 | 10.2% | 23 | 46.9% |
| Acute stroke | 16 | 39% | 5 | 12.2% | 3 | 6% | 22 | 44% | 2 | 4.1% | 29 | 59.2% |
| Intracranial hemorrhage | 21 | 51.2% | 2 | 4.9% | 7 | 14% | 17 | 34% | 5 | 10.2% | 22 | 44.9% |
| Elevated ICP/herniation | 30 | 73.2% | 0 | 0% | 14 | 28% | 13 | 26% | 12 | 24.5% | 17 | 34.7% |
| Seizure/status epilepticus | 10 | 24.4% | 9 | 22% | 4 | 8% | 27 | 54% | 0 | 0% | 35 | 71.4% |
| Cord compression | 26 | 63.4% | 2 | 4.9% | 9 | 18% | 13 | 26% | 8 | 16.3% | 27 | 55.1% |
| PRES | 24 | 58.5% | 3 | 7.3% | 19 | 38% | 11 | 22% | 7 | 14.3% | 26 | 53.1% |
| Alcohol withdrawal | 0 | 0% | 38 | 92.7% | 0 | 0% | 50 | 100% | 0 | 0% | 49 | 100% |
| Agitated delirium | 0 | 0% | 37 | 90.2% | 0 | 0% | 49 | 98% | 0 | 0% | 48 | 98% |
| Anaphylaxis | 16 | 39% | 10 | 24.4% | 15 | 30% | 20 | 40% | 3 | 6.1% | 30 | 61.2% |
| Opiate toxicity requiring naloxone | 7 | 17.1% | 18 | 43.9% | 2 | 4% | 38 | 76% | 1 | 2% | 41 | 83.7% |
| Post-procedure bleed | 9 | 22% | 15 | 36.6% | 3 | 6% | 35 | 70% | 1 | 2% | 41 | 83.7% |

**Table 2. Confident Residents by PGY Year for Individual Acute Clinical Events**

(Includes events with >50% increase in average confidence between PGY-1 and PGY-3/4)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Acute Clinical Event** | **PGY-1** | | **PGY-2** | | **PGY-3/4** | |
| **n** | **%** | **n** | **%** | **n** | **%** |
| ACS - STEMI | 5 | 12.2% | 30 | 60.0% | 43 | 87.8% |
| Advanced CHF | 0 | 0.0% | 24 | 48.0% | 37 | 75.5% |
| ACS - NSTEMI | 10 | 24.4% | 37 | 74.0% | 47 | 95.9% |
| Cardiogenic shock | 0 | 0.0% | 23 | 46.0% | 35 | 71.4% |
| Hemodynamically unstable afib with RVR | 7 | 17.1% | 30 | 60.0% | 43 | 87.8% |
| Unstable tachycardia | 0 | 0.0% | 15 | 30.0% | 34 | 69.4% |
| Respiratory failure requiring intubation | 8 | 19.5% | 27 | 54.0% | 43 | 87.8% |
| ACLS - PEA or asystole | 2 | 4.9% | 12 | 24.0% | 34 | 69.4% |
| ARDS | 8 | 19.5% | 25 | 50.0% | 41 | 83.7% |
| Stable wide complex tachycardia | 1 | 2.4% | 19 | 38.0% | 32 | 65.3% |
| ACLS - VT or VF | 1 | 2.4% | 11 | 22.0% | 30 | 61.2% |
| Unstable bradycardia | 1 | 2.4% | 12 | 24.0% | 30 | 61.2% |
| Symptomatic hyponatremia | 12 | 29.3% | 33 | 66.0% | 43 | 87.8% |
| Stable narrow complex tachycardia | 8 | 19.5% | 20 | 40.0% | 38 | 77.6% |
| Submassive pulmonary embolism | 14 | 34.1% | 32 | 64.0% | 45 | 91.8% |
| Massive pulmonary embolism | 3 | 7.3% | 15 | 30.0% | 31 | 63.3% |
| Acute stroke | 3 | 7.3% | 17 | 34.0% | 31 | 63.3% |
| Opiate toxicity requiring naloxone | 15 | 36.6% | 38 | 76.0% | 45 | 91.8% |
| Post-procedure bleed | 11 | 26.8% | 33 | 66.0% | 40 | 81.6% |
| Septic shock | 18 | 43.9% | 39 | 78.0% | 48 | 98.0% |
| Seizure/status epilepticus | 3 | 7.3% | 17 | 34.0% | 30 | 61.2% |
| Hemoptysis | 10 | 24.4% | 22 | 44.0% | 38 | 77.6% |
| Anaphylaxis | 11 | 26.8% | 28 | 56.0% | 39 | 79.6% |
| Respiratory failure requiring NIPPV | 18 | 43.9% | 34 | 68.0% | 47 | 95.9% |

Abbreviations: VT, ventricular tachycardia; VF, ventricular fibrillation; PEA, pulseless electrical activity; SVT, supraventricular tachycardia; ACS, acute coronary syndrome; STEMI, ST elevation myocardial infarction; NSTEMI, non ST elevation myocardial infarction; CHF, congestive heart failure; NIPPV, noninvasive positive pressure ventilation; ARDS, acute respiratory distress syndrome.