The MISSION of the Harris County Institute of Forensic Sciences is to provide medical examiner and crime laboratory services of the highest quality in an unbiased manner with uncompromised integrity.
Our Accreditations

- Accreditation Council for Graduate Medical Education
- American Board of Forensic Toxicology
- ANSI National Accreditation Board ISO/IEC 17025 Program (Crime Laboratory)
- ANSI National Accreditation Board ISO/IEC 17020 Program (Forensic Anthropology)
- Lloyd’s Register Quality Assurance ISO 9001 Program (Quality Management System)
- National Association of Medical Examiners
- Texas Forensic Science Commission
- Texas Medical Association for Continuing Medical Education
Has the statutory duty to determine cause and manner of death in accordance with Article 49.25 of the Texas Code of Criminal Procedure
Texas Medical Examiner Jurisdiction

1. When a person dies within \textit{twenty-four hours} after admission to a hospital

2. When any person is \textit{killed}

3. When the body or a body part of a person is \textit{found}

4. When the circumstances of the death are such as to lead to suspicion that the death was by \textit{unlawful means}

5. When any person commits \textit{suicide}

6. When a person dies \textit{without} having been attended by a duly licensed and \textit{practicing physician}

7. When the person is a child who is younger than \textit{six years} of age

8. When a person dies who has been attended immediately preceding their death by a duly licensed and practicing physician, and such physician is not certain as to the cause of death and is \textit{unable to certify} with certainty the cause of death
Harris County (HC) remains the **third most populous county** in the nation, exceeded only by Los Angeles and Cook counties

- **4.72+ million** estimated HC population in 2021*
- **40,216** HC death certificates filed in 2021**
- **34%** (13,868) of HC deaths reported to HCIFS in 2021

**7,077 deaths** were certified in 2021, including:

- **5,952** Harris County ML cases (all brought to HCIFS for examination)
- **53** out-of-county cases examined
- **1,072** certification only

**6,844 inquest only cases** reported***

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* Population estimate for 2021 obtained from the US Census Bureau  
** Provisional death certificate data from the Texas Department of State Health Services  
***Inquest only cases are reported deaths that are released from medical examiner jurisdiction
Statistical Summary

- 84% of ML cases (5,001) received an autopsy examination*
  - 16% of ML cases (951) received an external examination

- 4,143 scenes attended by Forensic Investigators

- 336 referrals to Harris County Bereavement Services

- 13 decedents remain unidentified after six months or longer

* Includes partial autopsy examinations (13)
# Total County Caseload (2018 - 2021)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Cases Reported</th>
<th>Autopsies</th>
<th>External Exams</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>10,577</td>
<td>3,915</td>
<td>639</td>
</tr>
<tr>
<td>2019</td>
<td>10,677</td>
<td>4,027</td>
<td>556</td>
</tr>
<tr>
<td>2020</td>
<td>13,177</td>
<td>4,588</td>
<td>1,007</td>
</tr>
<tr>
<td>2021*</td>
<td>13,868</td>
<td>5,001</td>
<td>951</td>
</tr>
</tbody>
</table>

*2021 total cases reported show a 5% increase from 2020. The autopsy case number increase occurred despite modified criteria that increased external examinations and certification only.
Monthly Medicolegal Caseload 2021

Cases Received per Month

- January: 508 cases
- February: 501 cases
- March: 464 cases
- April: 496 cases
- May: 460 cases
- June: 522 cases
- July: 498 cases
- August: 571 cases
- September: 569 cases
- October: 493 cases
- November: 431 cases
- December: 439 cases
**Average Daily Medicolegal Caseload**

*Months with HIGHEST Average Daily Caseload*

- 2021 August: 19 cases
- 2020 July: 19 cases
- 2019 December: 14 cases

*Top 5 Days with HIGHEST Cases Received*

<table>
<thead>
<tr>
<th>Year</th>
<th>Day</th>
<th># of Cases</th>
<th>Year</th>
<th>Day</th>
<th># of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>July 15</td>
<td>31</td>
<td>2021</td>
<td>January 1</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>May 6</td>
<td>30</td>
<td></td>
<td>January 13</td>
<td>30</td>
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<tr>
<td></td>
<td>August 28</td>
<td>30</td>
<td></td>
<td>December 4</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>November 9</td>
<td>29</td>
<td></td>
<td>April 24</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>February 3</td>
<td>28</td>
<td></td>
<td>August 1</td>
<td>28</td>
</tr>
</tbody>
</table>

- 2021: 16.3 cases
- 2020: 15.3 cases
- 2019: 12.5 cases
“Certification only” is a death investigation in which the medical examiner accepts jurisdiction and completes the death certificate, but the body of the deceased is not brought to HCIFS. There is sufficient medical/clinical information and investigative findings to properly classify the cause and manner of death. Hip fractures and head injuries after a fall are common examples.

*2021 had a 52% increase from 2020; a record high for certification only cases.
Manner of Death - Autopsy and External Examinations Combined

N = 5,952

- Natural: 2,409
- Accident: 2,029
- Suicide: 581
- Homicide: 720
- Undetermined: 207
- Fetal: 6
Manner of Death by Autopsy and External Examinations

Autopsy Examinations

- Natural: 1,946
- Accident: 1,855
- Suicide: 281
- Undetermined: 195
- Fetal: 5
- Homicide: 719

N=5,001

External Examinations

- Natural: 463
- Accident: 174
- Suicide: 300
- Undetermined: 12
- Fetal: 1
- Homicide: 1

N=951
Manner of Death by Sex

<table>
<thead>
<tr>
<th>Manner of Death</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural</td>
<td>1,705</td>
<td>704</td>
</tr>
<tr>
<td>Accident</td>
<td>1,450</td>
<td>579</td>
</tr>
<tr>
<td>Homicide</td>
<td>597</td>
<td>123</td>
</tr>
<tr>
<td>Suicide</td>
<td>465</td>
<td>116</td>
</tr>
<tr>
<td>Undetermined</td>
<td>122</td>
<td>75</td>
</tr>
</tbody>
</table>

N=5,952*

Sex was unknown for 10 skeletal cases.

*Excludes 6 fetal cases
Race/Ethnicity of Medicolegal Cases

- **40%** White: 2,334
- **31%** Black: 1,892
- **26%** Hispanic: 1,527
- **3%** Asian: 180
- **3%** Native American: 6

Race/Ethnicity was unknown for 13 cases.

N=5,952
Race/Ethnicity Demographics Compared to Population

**HCIFS Decedent Population***
- White: 40%
- Hispanic: 31%
- Black: 26%
- Other: 3%

* HCIFS decedent population for 2021, N=5,939, excludes unknown race/ethnicity

** Houston City Population**
- White: 46%
- Hispanic: 24%
- Black: 23%
- Other: 7%

*** Harris County Population
- White: 44%
- Hispanic: 28%
- Black: 20%
- Other: 8%

** City of Houston population for 2021, N=2,288,250, estimated by U.S. Census Bureau
*** Harris County population for 2021, N=4,728,030, estimated by Texas DSHS Center for Health Statistics
Medicolegal Cases by Manner and Race/Ethnicity

<table>
<thead>
<tr>
<th>Manner</th>
<th>White: 2,334</th>
<th>Black: 1,892</th>
<th>Hispanic: 1,522</th>
<th>Other: 185</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accident</td>
<td>853</td>
<td>588</td>
<td>539</td>
<td>49</td>
</tr>
<tr>
<td>Natural</td>
<td>1,012</td>
<td>740</td>
<td>574</td>
<td>83</td>
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<tr>
<td>Suicide</td>
<td>93</td>
<td>314</td>
<td>141</td>
<td>33</td>
</tr>
<tr>
<td>Homicide</td>
<td>96</td>
<td>387</td>
<td>227</td>
<td>10</td>
</tr>
<tr>
<td>Undetermined</td>
<td>59</td>
<td>84</td>
<td>41</td>
<td>10</td>
</tr>
</tbody>
</table>

N=5,952*

13 cases were individuals of unknown race/ethnicity.

*Excludes 6 fetal cases
Medicolegal Cases by Age

N=5,952*

- <1 Year: 86
- 1-17 Years: 189
- 18-39 Years: 1,786
- 40-64 Years: 2,643
- 65+ Years: 1,234

*14 cases with unknown age
Homicide Cases

*This is a 9% increase from 2020 and a 103% increase from 2011.
41 cases were linked to at least one other ML case (e.g., double homicide, homicide suicide)

At least 60 homicide cases were associated with domestic violence

4 homicide deaths occurred “while at work”

Cases with mixed causes of death include gunshot/sharp/blunt-force trauma (15), not included in graph.

*Other causes include the use of drugs, thermal injuries, homicidal violence, and drowning.
Homicide Deaths by Firearms

<table>
<thead>
<tr>
<th>Year</th>
<th>Single Wound</th>
<th>Multiple Wounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>179 (45%)</td>
<td>218 (55%)</td>
</tr>
<tr>
<td>2020</td>
<td>223 (41%)</td>
<td>314 (59%)</td>
</tr>
<tr>
<td>2021</td>
<td>268 (44%)</td>
<td>340 (56%)</td>
</tr>
</tbody>
</table>
Homicide Cases by Demographics

Sex
- Male: 597 (83%)
- Female: 123 (17%)

Race/Ethnicity
- Black: 387 (54%)
- Hispanic: 227 (32%)
- White: 96 (13%)
- Asian: 10 (1%)
Homicide Cases by Race/Ethnicity and Location

City of Houston

- Black: 56%
- Hispanic: 32%
- White: 11%
- Asian: 1%

N=625*

Harris County

- Excluding the City of Houston

- Black: 42%
- Hispanic: 27%
- White: 29%
- Asian: 2%

N=95

*625 homicide cases were attributed to injury locations within the City of Houston based on the address of the place of injury and law enforcement jurisdiction.
Homicide Cases by Age

- < 18 years: 60
- 18-39 years: 443
- 40-64 years: 192
- 65+ years: 25

N = 720
Homicide Deaths of Infants and Toddlers (Age 0 - 4)

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>29</td>
<td>26</td>
<td>27</td>
<td>24</td>
<td>18</td>
<td>16</td>
<td>14</td>
<td>11</td>
<td>18</td>
<td>19</td>
<td>22</td>
<td>17</td>
</tr>
</tbody>
</table>
Homicide Case Comparison Between Years by Cause

*Other causes include the use of drugs, thermal injuries, homicidal violence, and drowning. Excludes (15) cases with a combination of causes of death.
Homicide Case Comparison Between Years by Age

- **Less than 18 yrs**
  - 2015-2019 avg: 44
  - 2020: 60
  - 2021: 52

- **18-39 yrs**
  - 2020: 428
  - 2021: 443
  - Increase: 3%

- **40-64 yrs**
  - 2015-2019 avg: 120
  - 2020: 150
  - 2021: 192
  - Increase: 28%

- **Greater than 64 yrs**
  - 2015-2019 avg: 19
  - 2020: 28
  - 2021: 25

- **2015-2019 avg**
- **2020**
- **2021**
Homicide Case Comparison Between Years by Race

- **Black**: 236 (2015-2019), 356 (2020), 387 (2021), 9% increase
- **Hispanic**: 147 (2015-2019), 203 (2020), 227 (2021), 12% increase

2021 shows a 9% increase compared to the 2015-2019 average.
Accidental Deaths

*12% increase from 2020 for medicolegal cases and a 18% increase for both medicolegal and certification only cases combined.
Most Common Causes of ML Accidental Deaths

N=2,029*

- Drug Toxicity: 1129
- Motor Vehicle: 558
- Non-MVC Blunt Trauma: 141
- Drowning: 54
- Asphyxia: 46
- Fire/Thermal: 36
- Other: 74**

*These data do not reflect discrete cases because causes may be combined within a case.

**Other includes firearm injuries, sharp force injuries, hyperthermia, hypothermia, carbon monoxide intoxication and therapeutic complications.
Drug Toxicity in ML Accidental Deaths

Sex
- Male: 824 (27%)
- Female: 305 (73%)

N=1,129

Age
- Under 18 years: 7 (1%)
- 18 - 39 years: 444 (39%)
- 40 - 64 years: 590 (52%)
- 65+ years: 88 (8%)

N=1,129

Race
- Hispanic: 237 (21%)
- Black: 341 (30%)
- White: 525 (47%)
- Asian: 26 (2%)

N=1,129
Motor Vehicle Crash (MVC) Cases in ML Accidental Deaths

- MVC fatalities include **34** children ages 6 months to 17 years old
- **2** children were pedestrians, 2 years to 6 years old
- **23%** of driver fatalities (**51**) were under 25 years old
- **33** stranded motorists were hit and killed
MVC in ML Accidental Deaths

**Driver’s Sex**
- Male: 157 (29%)
- Female: 65 (71%)
- Total: N=222

**Driver’s Race**
- Hispanic: 83 (37%)
- Black: 73 (33%)
- White: 61 (28%)
- Asian: 5 (2%)
- Total: N=222
Medicolegal Accidental Drownings

Race/Ethnicity

- White: 28
- Hispanic: 13
- Black: 10
- Asian: 3

N=54*

Type of Water

- Bath Tub: 20
- Residential Pool: 16
- Community Pool: 8
- Bayou/River: 6
- Lake/Pond: 2
- Other**: 2

N=54*

*Includes 15 children, ages 2 to 10 years and male to female ratio 30:24.
**Other category includes near a roadway, parking lot, open areas, and ditches.
ML Accidental Case Comparison Between Years by Cause

*Other includes asphyxia, thermal injuries, firearm injuries, sharp force injuries, hyperthermia, hypothermia, and therapeutic complications.
Medicolegal Suicide Cases

*This is a 4% increase from 2020 and a 32% increase from 2011.
Male to female ratio is 4 to 1.

Age range is 11 to 100 years.

Suicide among races are 54% White; 24% Hispanic; 16% Black; 6% Asian/American Indian, with the lowest White suicide rate in the past 5 years.

Number of companion suicide/homicide cases:
- 2018: 14
- 2019: 10
- 2020: 13
- 2021: 13
Causes of Death in Suicides

- Firearm: 347
- Hanging: 127
- Drug Toxicity: 57
- Other: 50*

N=581

*Other category includes blunt force trauma (29), asphyxiation-not due to hanging (5), sharp force (12), thermal (3) and drowning (1).
Suicide Cases by Sex and Race/Ethnicity

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>247</td>
<td>67</td>
</tr>
<tr>
<td>Hispanic</td>
<td>118</td>
<td>23</td>
</tr>
<tr>
<td>Black</td>
<td>74</td>
<td>19</td>
</tr>
<tr>
<td>Asian</td>
<td>25</td>
<td>7</td>
</tr>
</tbody>
</table>

N=581*

*Sex was unknown for 1 suicide case.
Suicide Case Comparison Between Years by Cause

*Other includes asphyxia due to non-hanging, thermal injuries, and drowning.
Suicide Case Comparison Between Years by Age

2015-2019 avg
2020
2021

Less than 18 yrs: 26, 28, 33
18-39 yrs: 204, 264, 231
40-64 yrs: 213, 205, 228
Greater than 64 yrs: 70, 64, 89

Change:
- Less than 18 yrs: 0%
- 18-39 yrs: 11%
- 40-64 yrs: 39%

Annual Report 2021
Suicide Case Comparison Between Years by Race

<table>
<thead>
<tr>
<th>Race</th>
<th>2015-2019 avg</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian/American Indian</td>
<td>33</td>
<td>45</td>
<td>33</td>
</tr>
<tr>
<td>Black</td>
<td>61</td>
<td>73</td>
<td>93</td>
</tr>
<tr>
<td>Hispanic</td>
<td>114</td>
<td>152</td>
<td>141</td>
</tr>
<tr>
<td>White</td>
<td>305</td>
<td>291</td>
<td>314</td>
</tr>
</tbody>
</table>

27% increase in Hispanic cases from 2020 to 2021.
**Medicolegal Natural Cases**

![Bar chart showing annual cases from 2011 to 2021.](image)

- **2011**: 1,465
- **2012**: 1,518
- **2013**: 1,706
- **2014**: 1,836
- **2015**: 2,026
- **2016**: 1,962
- **2017**: 1,915
- **2018**: 1,894
- **2019**: 1,843
- **2020**: 2,343
- **2021**: 2,409

*This is a 3% increase from 2020 and a 64% increase from 2011.*
Most Frequent Causes of Medicolegal Natural Death

2,409 Natural Deaths in 2021

- **Hypertensive Cardiovascular (HCD)**
- **Atherosclerotic Cardiovascular (ACD)**
- **Obesity**
- **Diabetes Mellitus**
- **Chronic Ethanolism**
- **COVID-19**
- **Chronic Obstructive Pulmonary Disease**
- **Pulmonary Thromboemboli/Embolus**
- **Other forms of cardiac death**

These data do not reflect discrete cases because diseases may be combined within a case.
Natural Case Comparison Between Years by Cause

These data do not reflect discrete cases because diseases may be combined within a case.
For 573 decedents, diabetes mellitus was listed as the primary cause (116) or the contributing cause (457) of death

- 68% (391) were either overweight or obese
  
  \[\text{Body Mass Index, BMI} = 25^+\]

BMI was calculated for 5,675 decedents age 13 years or older, at least 60” tall and weighing at least 100 pounds:

- 1,544 (27%) were obese with a BMI of 30 or greater
- 1,878 (33%) were overweight with a BMI between 25 and 29
- 2,253 (40%) decedents were of normal weight or underweight
- 29 decedents weighed more than 400 lbs.
Natural Case Comparison Between Years by Age

- **Less than 18 yrs**
  - 2015-2019 avg: 60
  - 2020: 31
  - 2021: 38
  - **Change:** Decrease of 15%

- **18-39 yrs**
  - 2015-2019 avg: 186
  - 2020: 241
  - 2021: 276
  - **Change:** Increase of 15%

- **40-64 yrs**
  - 2015-2019 avg: 1,077
  - 2020: 1,311
  - 2021: 1,266
  - **Change:** Increase of 9%

- **Greater than 64 yrs**
  - 2015-2019 avg: 606
  - 2020: 760
  - 2021: 829
  - **Change:** Increase of 9%
Natural Case Comparison Between Years by Race

- **Asian/American Indian**
  - 2015-2019 avg: 72
  - 2020: 98
  - 2021: 83
  - 6% increase

- **Black**
  - 2015-2019 avg: 594
  - 2020: 700
  - 2021: 740
  - 3% increase

- **Hispanic**
  - 2015-2019 avg: 363
  - 2020: 557
  - 2021: 574
  - 3% increase

- **White**
  - 2015-2019 avg: 900
  - 2020: 987
  - 2021: 1012
  - 3% increase
Most Frequent Substances Listed in Cause of Death for ML Cases

These data do not reflect discrete cases because drugs may be combined within a case.
Opiates/Opioids Listed in Cause of Death for ML Cases

These data do not reflect discrete cases because drugs may be combined within a case.
Trends in Death from Selected Drugs

![Graph showing trends in death from selected drugs between 2011 and 2021. The graph compares the trends of Cocaine, Heroin, Fentanyl and Analogs, Amphetamine/Meth, and Hydrocodone. The data indicates a significant increase in deaths from Fentanyl and Analogs, with a notable rise in 2019-2021. Cocaine and Heroin show a steady increase, while Hydrocodone remains relatively stable. Amphetamine/Meth has seen a sharp increase in recent years.]
Cause of Death Due to Ethanol

- Natural: 433*
- Accidental: 259**
- Suicide: 17
- Undetermined: 2

N=711

*For 96 deaths, the primary cause of death was attributed solely to chronic alcoholism.
**Ethanol is the sole intoxicant in 29 accidental cases (including 19 cases of acute alcohol toxicity).
Unexplained Sudden Death in Infants

The historical cause of the death designation Sudden Infant Death Syndrome, or SIDS, is an outdated term and was completely phased out in 2020. The accepted practice at this time is to acknowledge these deaths as unexplained, wherein no specific cause of death can be determined. The deaths are still acknowledged as “sudden” in that they are unexpected.

Although no mechanism of death can be identified for these infants, some risk factors may be identified. These associated findings may or may not contribute to the death, but their existence are acknowledged in the revised cause of death classification scheme. These associated findings may be intrinsic to the decedent (some natural disease) or extrinsic (such as an unsafe sleep environment). Some infant deaths are unexplained, but other factors relating to the investigation are found that do not really fit into the above categories. The term “undetermined (not further specified)” is used in these instances. Finally, when such a death occurs and investigative information is incomplete after all avenues to obtain that information have been exhausted, the classification “undetermined (insufficient data)” is used.

The revised classification scheme includes the following causes of death (The manner of death in each of these categories is undetermined):

1. Unexplained Sudden Death (No Identified Intrinsic or Extrinsic Factors)
2. Unexplained Sudden Death (Intrinsic Factors Identified)
3. Unexplained Sudden Death (Extrinsic Factors Identified)
4. Unexplained Sudden Death (Intrinsic and Extrinsic Factors Identified)
5. Undetermined (Not Further Specified)
6. Undetermined (Insufficient Data)

Unexplained Sudden Death in Infants

N=60

- Unexplained sudden death (extrinsic factors identified)
- Unexplained sudden death (intrinsic and extrinsic factors identified)
- Undetermined (not further specified)
- Unexplained sudden death (intrinsic factors identified)
- Unexplained sudden death (no intrinsic or extrinsic factors identified)
- Unexplained sudden death (insufficient data)
Infant/Fetal Deaths

- **96** infant/fetal death cases (less than or equal to 1 year old)
- **60** cases of Undetermined Manner

The birth count for Harris County was estimated to be 70,644 for 2021. (Data provided by Texas Department of State Health Services)

N=96

- Accident: 7
- Homicide: 12
- Natural: 12
- Undetermined: 60
- Fetal: 5
Toddler Deaths (Age 1 - 4 Years)

- Non-natural Deaths Include:
  - 9 toddlers died in motor vehicle crashes
  - 11 toddlers died by accidental drowning
  - 5 homicide cases
    - 4 males
    - 1 female

N=36

- Accident: 23
- Homicide: 5
- Natural: 3
- Undetermined: 5
Pediatric Manners of Death (Age 0 – 17 Years)

- Accident: 70 (26%)
- Homicide: 60 (22%)
- Natural: 37 (14%)
- Undetermined: 70 (26%)
- Suicide: 33 (12%)

N=276*

*Excludes fetal deaths (6)
Most Frequent Cause of Pediatric Deaths (Age 0 – 17 Years)

- Unexplained Sudden Death: 60
- Firearm: 56*
- MVC: 35
- Non-MVC Blunt Force: 23
- Drowning: 18
- Hanging: 15
- Drug Toxicity: 7

*Pediatric firearm deaths increased 33% from 2020
"While at Work" Deaths

<table>
<thead>
<tr>
<th>Year</th>
<th>Non-Natural</th>
<th>Natural</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>66</td>
<td>80</td>
<td>135</td>
</tr>
<tr>
<td>2019</td>
<td>84</td>
<td>73</td>
<td>157</td>
</tr>
<tr>
<td>2020</td>
<td>57</td>
<td>74</td>
<td>130</td>
</tr>
<tr>
<td>2021</td>
<td>48</td>
<td>73</td>
<td>122</td>
</tr>
</tbody>
</table>
Deaths During Police Intervention*

*These include deaths in which the circumstances of the death place the decedent in either direct or indirect contact with law enforcement, such as incarceration, apprehension, and pursuit. This category of death is not limited to police shootings, arrest-related deaths, apprehension deaths, or in-custody deaths.
HCIFS Certified COVID-19 Deaths with Comorbidities

N=434*

- Hypertensive cardiovascular disease: 259
- Obesity: 232
- Diabetes mellitus: 152
- Atherosclerotic cardiovascular disease: 108
- Chronic obstructive pulmonary disease: 19
- Asthma: 17
- Pulmonary thromboembolism: 14
- Chronic ethanolism: 11

These data do not reflect discrete cases because diseases may be combined within a case.

*Includes 119 certification only cases and 17 cases where COVID-19 is the sole cause of death
HCIFS Received COVID-19 Cases Demographics in 2021

**Sex**
- Male: 692 (37%)
- Female: 414 (63%)

**Race/Ethnicity**
- 38% Hispanic
- 31% White
- 27% Black
- 4% Asian

N=1,106*

*Includes both certified cases and inquest only cases*
Age Distribution for COVID-19 Cases

N=1,106*

*Age was not reported in 6 inquest cases with COVID-19.
2021 February Winter Storm – Deaths Due to Freezing Weather

Cause

- Hypothermia: 35 (85%)
- Carbon Monoxide Toxicity: 5 (12%)
- *Blunt Trauma: 1 (3%)

N=41

Housing Status

- Homeless: 10 (24%)
- Fixed Residence: 31 (76%)

N=41

Race

- Hispanic: 7 (17%)
- Black: 16 (42%)
- White: 17 (39%)
- Asian: 1 (2%)

N=41

*Slipping on ice was a contributory cause of death.
### ML Cases Received by Manner in 2021 vs Pre-COVID

<table>
<thead>
<tr>
<th>Manner of Death</th>
<th>Pre-COVID 5 yr. Average</th>
<th>2021</th>
<th>Difference</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suicide</td>
<td>511</td>
<td>581</td>
<td>70</td>
<td>14%</td>
</tr>
<tr>
<td>Homicide</td>
<td>465</td>
<td>720</td>
<td>255</td>
<td>55%</td>
</tr>
<tr>
<td>Accidental</td>
<td>1,607</td>
<td>2,029</td>
<td>422</td>
<td>26%</td>
</tr>
<tr>
<td>Natural</td>
<td>1,921</td>
<td>2,409</td>
<td>488</td>
<td>25%</td>
</tr>
<tr>
<td>Undetermined</td>
<td>151</td>
<td>207</td>
<td>56</td>
<td>37%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,655</strong></td>
<td><strong>5,946</strong></td>
<td><strong>1,291</strong></td>
<td><strong>28%</strong></td>
</tr>
<tr>
<td>Manner of Death</td>
<td>Pre-COVID 5 yr. Average</td>
<td>2021</td>
<td>Difference</td>
<td>% Change</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-------------------------</td>
<td>------</td>
<td>------------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Suicide; Firearm</strong></td>
<td>287</td>
<td>347</td>
<td>60</td>
<td>21%</td>
</tr>
<tr>
<td><strong>Suicide; Hanging</strong></td>
<td>124</td>
<td>127</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Homicide; Firearm</strong></td>
<td>370</td>
<td>608</td>
<td>238</td>
<td>64%</td>
</tr>
<tr>
<td><strong>Accidental; Drug Toxicity</strong></td>
<td>582</td>
<td>1,129</td>
<td>547</td>
<td>94%</td>
</tr>
<tr>
<td><strong>Accidental; MVC</strong></td>
<td>524</td>
<td>558</td>
<td>34</td>
<td>6%</td>
</tr>
<tr>
<td><em><em>Natural</em>; Cardiac Diseases</em>*</td>
<td>1,521</td>
<td>1,903</td>
<td>382</td>
<td>25%</td>
</tr>
<tr>
<td><em><em>Natural</em>; Obesity</em>*</td>
<td>326</td>
<td>642</td>
<td>316</td>
<td>97%</td>
</tr>
<tr>
<td><em><em>Natural</em>; Diabetes</em>*</td>
<td>328</td>
<td>540</td>
<td>212</td>
<td>65%</td>
</tr>
<tr>
<td><em><em>Natural</em>; Chronic Ethanolism</em>*</td>
<td>239</td>
<td>421</td>
<td>182</td>
<td>76%</td>
</tr>
<tr>
<td><em><em>Natural</em>; COVID-19</em>*</td>
<td>-</td>
<td>308</td>
<td>80**</td>
<td>35%**</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4,301</td>
<td>6,583</td>
<td>1,974</td>
<td>37%</td>
</tr>
</tbody>
</table>

* Natural death data does not reflect discrete cases because causes may be combined within a case.
** Difference in COVID-19 for 2021 is calculated by subtracting out ML COVID-19 cases in 2020 (228).
Organ and Tissue Donation Summary

- HCIFS maintains agreements with:
  - LifeGift
  - Lions Eye Bank of Texas at Baylor College of Medicine
  - Biograft Transplant Services

- **269** ML cases were released in 2021 for organ and/or tissue donation
Forensic Anthropology

- Staffed by **three** doctoral-level forensic anthropologists, all diplomates of the American Board of Forensic Anthropology

- **2021 casework:**
  - 371 total cases received with written reports provided
  - 260 trauma cases analyzed
  - 11 death scenes with skeletal recovery
  - 31 cases of remains determined to be non-human
Staffed by a board-certified, doctoral-level forensic entomologist
  • Reports are peer-reviewed by external doctoral-level entomologists from three major academic institutions

2021 Casework:
  • 29 cases
  • 6 scene collections
  • 20 autopsy collections
  • 1 scene and autopsy collection
Forensic Entomology Cases by Manner of Death

<table>
<thead>
<tr>
<th>Manner of Death</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural</td>
<td>32</td>
<td>20</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Undetermined</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Homicide</td>
<td>12</td>
<td>11</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Accident</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Suicide</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
Quality Management Division

A separate division of HCIFS
Ensures that services provided by the Institute are reliable and of high quality
Responsibilities

- Maintains a **documented quality management system** that meets all accreditation and county requirements

- Facilitates **quality improvements** within each division of HCIFS

- Monitors the **continued use of best practices** and ensures the reliability of records released for discovery
2021 Accomplishments

- **328** standard operating procedures reviewed
- **220** proficiency tests administered
- **614** court orders processed
- **11** internal audits conducted
- **71** internal training sessions provided
Provides analytical testing on evidence submitted by local agencies in Harris and surrounding counties
Statistical Summary

- **Cases received:** 26,631
  - Up 17% from 2020

- **Cases completed:** 27,946
  - Up 22% from 2020

- **Total number of submitting agencies:** 84

- **69% of laboratory personnel have a professional certification**
  - American Board of Criminalistics: 52 analysts
  - American Board of Forensic Toxicology: 13 analysts
  - Association of Firearm and Tool Mark Examiners: 5 examiners
Crime Laboratory Services

**DRUG CHEMISTRY**

Analyzes suspected drug evidence seized by law enforcement agencies
Drug Chemistry Laboratory

- In accordance with Texas state statutes, identifies **confiscated**, **illegal**, and **dangerous drugs**, including:
  - Plant material
  - Powders, tablets, liquids
  - Drug paraphernalia

- The laboratory also develops and implements methods to **identify new designer drugs** including:
  - Synthetic cannabinoids
  - Opioid derivatives
Drug Cases Received and Completed

*This reflects a 30% increase in cases received compared to 2020.
Trend in Drug Cases | Total Items | Items Analyzed

Number of Items


Number of Cases

Total Items
Items Analyzed
Cases
Positive Drug Test Results

N=16,727* total confirmed results

- Methamphetamine: 5,906
- Non-Controlled Substances**: 2,855
- Prescription Drugs: 1,703
- Opioids: 1,603
- Cocaine: 1,560
- Marihuana: 1,438
- Designer Drugs: 953
- THC: 497
- Other Controlled Substances**: 180

* This reflects a 38% increase from 2020.
** Non-controlled substances include caffeine, acetaminophen, oils, waxes, and edible THC.
*** Other controlled substances include anti-seizure medicines and anti-depressants.
Opioid Test Results

N=1,603 total confirmed opioid results

- Fentanyl: 433
- Heroin: 431
- Hydrocodone: 217
- Oxycodone: 75
- Codeine: 52
- Fentanyl Derivatives: 49
- Carfentanil: 16
- Methadone: 15
- Other *: 315

*Other includes: Morphine (20), Hydromorphone (3), 4-ANPP (267), and other uncommon opioids
Designer Drug Test Results

- Bath Salts: 499
- Synthetic Marihuana: 391
- Other: 63

These data do not reflect discrete cases because multiple drugs may be detected in one case.
Crime Laboratory Services

FORENSIC GENETICS

Analyzes biological fluids and tissues such as blood, semen, muscle, and bone for DNA

Shau Lin Hon/Slyworks Photography
Forensic Genetics Laboratory

Conducts DNA testing primarily for:

- Law enforcement agencies
- HCIFS medical examiners to assist in positively identifying decedents
- Cases submitted for DNA testing include crimes against persons such as sexual assault, homicide, and robbery; as well as property crimes such as burglary and theft
- Crimes against persons are given first priority for testing
DNA Cases Received and Completed

- **2018**: Received 2,584, Completed 2,496
- **2019**: Received 2,298, Completed 1,822
- **2020**: Received 2,337, Completed 2,611
- **2021**: Received 2,564*, Completed 2,900

*This reflects a 10% increase from 2020 in cases received.*
DNA Case Submissions by Type

- Sexual Assault: 1,029
- Assault/Robbery: 620
- Homicide/Death Investigation: 458
- Property: 311
- Other: 146

N=2,564

Annual Report 2021
CODIS Hits (Combined DNA Index System)

<table>
<thead>
<tr>
<th>Year</th>
<th>CODIS Hits</th>
<th>Offender Hits</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>1,071</td>
<td>558</td>
</tr>
<tr>
<td>2013</td>
<td>1,313</td>
<td>612</td>
</tr>
<tr>
<td>2014</td>
<td>1,540</td>
<td>687</td>
</tr>
<tr>
<td>2015</td>
<td>1,133</td>
<td>527</td>
</tr>
<tr>
<td>2016</td>
<td>600</td>
<td>319</td>
</tr>
<tr>
<td>2017</td>
<td>664</td>
<td>336</td>
</tr>
<tr>
<td>2018</td>
<td>913</td>
<td>283</td>
</tr>
<tr>
<td>2019</td>
<td>1,084</td>
<td>458</td>
</tr>
<tr>
<td>2020</td>
<td>821</td>
<td>517</td>
</tr>
<tr>
<td>2021</td>
<td></td>
<td>456</td>
</tr>
</tbody>
</table>
Trace DNA Evidence Collection Team

- Specialized DNA analysts who attend select death scenes to collect DNA and trace evidence from bodies that have been:
  - Dumped
  - Bound
  - Thought to have been in close contact with an unknown perpetrator

- The team had a number of successes obtaining DNA different from that of the victim.

- This information assists investigators in solving crimes.
Trace DNA Collection by Agency

<table>
<thead>
<tr>
<th>Year</th>
<th>HPD</th>
<th>HCSO</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>62</td>
<td>22</td>
<td>8</td>
</tr>
<tr>
<td>2019</td>
<td>63</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>2020</td>
<td>65</td>
<td>26</td>
<td>6</td>
</tr>
<tr>
<td>2021</td>
<td>57</td>
<td>13</td>
<td>8</td>
</tr>
</tbody>
</table>
Crime Laboratory Services

FORENSIC TOXICOLOGY
Provides analytical services in medicolegal death investigations, driving while intoxicated, and drug-facilitated sexual assault investigations
Forensic Toxicology Laboratory

- Analyzes **biological evidence** submitted by the HCIFS Medical Examiner Service and law enforcement agencies in Harris County for:
  - Death investigations
  - Driving while intoxicated (DWI) and driving under the influence (DUI) cases
  - Drug-facilitated sexual assaults

- The only forensic toxicology laboratory in Texas **dually accredited** by the ANSI National Accreditation Board and the American Board of Forensic Toxicology
Toxicology Cases Received and Completed

- **Number of Cases**

<table>
<thead>
<tr>
<th>Year</th>
<th>Received</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>8,343</td>
<td>8,967</td>
</tr>
<tr>
<td>2019</td>
<td>8,692</td>
<td>8,830</td>
</tr>
<tr>
<td>2020</td>
<td>9,911</td>
<td>10,012</td>
</tr>
<tr>
<td>2021</td>
<td>10,628*</td>
<td>10,749</td>
</tr>
</tbody>
</table>

*This reflects an 8% increase from 2020 in total cases received.*
Toxicology Cases Received by Type

*Compared to 2020, this is a 10% increase in cases received for DWI/DUID and a 5% increase in cases received for postmortem cases.
**DWI Case Results**

N=4,434

- **Alcohol Positive Only**: 3,210
- **Drug Positive Only**: 750
- **Alcohol and Drug Positive**: 346
- **Negative**: 128

*Alcohol Positive Only is a case with the presence of ethanol but no drug analysis was performed. For cases that do not involve a fatality, drugs are tested only if the alcohol concentration is <0.10g/100mL.*
DWI Blood Alcohol Concentrations

Blood Alcohol Concentration (g/100 mL)

Number of Cases

- Less than 0.08 g/100 mL: 54%
- 0.08 - 0.15 g/100 mL: 35%
- Greater than 0.15 g/100 mL: 11%
Drug Prevalence in DWI Cases

N=1,415
Number of Drug-Tested Cases

- THC (Marihuana): 48%
- Benzodiazepines: 29%
- Methamphetamine: 17%
- Cocaine: 14%
- Opiates/Opioids: 12%
- PCP: 7%
- Muscle Relaxants: 6%

True prevalence may be underrepresented as one case could have multiple drugs from a single drug class, e.g., opiates and benzodiazepines.
Crime Laboratory Services

PHYSICAL EVIDENCE

Firearms Identification
Evaluates fired cartridge casings and bullets recovered from crime scenes and firearms involved in violent, gun-related incidents

Trace Evidence
Analyzes in the forensic sub-disciplines of gunshot residue and fire debris
Firearms Identification Laboratory

- Conducts examinations of evidence related to investigations of gun-related offenses
- Cases received are comprised of weapons, bullets, and cartridge casings
- Serves as a regional facility for the National Integrated Ballistics Information Network (NIBIN) database
Firearms Identification Casework

*This reflects a 32% increase in cases received compared to 2020.*
Firearms IBIS (Test-Fire Only) Case Submissions

<table>
<thead>
<tr>
<th>Guns/ Cases Received</th>
<th>Jan-21</th>
<th>Feb-21</th>
<th>Mar-21</th>
<th>Apr-21</th>
<th>May-21</th>
<th>Jun-21</th>
<th>Jul-21</th>
<th>Aug-21</th>
<th>Sep-21</th>
<th>Oct-21</th>
<th>Nov-21</th>
<th>Dec-21</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Firearms</td>
<td>440</td>
<td>389</td>
<td>410</td>
<td>452</td>
<td>466</td>
<td>415</td>
<td>405</td>
<td>372</td>
<td>419</td>
<td>374</td>
<td>312</td>
<td>465</td>
</tr>
<tr>
<td># of Cases</td>
<td>499</td>
<td>452</td>
<td>436</td>
<td>446</td>
<td>496</td>
<td>447</td>
<td>503</td>
<td>347</td>
<td>419</td>
<td>374</td>
<td>411</td>
<td>528</td>
</tr>
</tbody>
</table>
Submissions for Uncommon Firearms Types

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Auto</td>
<td>6, 38%</td>
<td>19, 37%</td>
</tr>
<tr>
<td>Ghost Gun*</td>
<td>10, 62%</td>
<td>43, 63%</td>
</tr>
</tbody>
</table>

*Ghost guns are unserialized, untraceable firearms that can be legally built from home. An 80% completed firearm receiver can be purchased online and comes with instructions on how to finish the assembly. All other firearm parts can be purchased legally online and assembled. The finished product will be a fully functioning firearm that has no serial number and cannot be traced by the ATF.

225% increase of uncommon firearm types (ghost gun & full auto) received in 2021 compared to 2020.
Provides analytical support to the HCIFS Medical Examiner Services and law enforcement in two areas:

- **Fire Debris Analysis**
  - Examines evidence from fires to assist investigators in determining the presence of ignitable liquid residues

- **Gunshot Residue (GSR) Analysis**
  - Assists in determining whether a person or object has an association with the discharge of a firearm
Trace Evidence Casework

*Compared to 2020, this is a 7% increase in overall cases received (16% increase in GSR and a 24% decrease in fire debris).
Published Scientific Work

Published articles in peer-reviewed journals
<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenibut, a GABA B Agonist, Detected in a Fatality</td>
<td>Arndt C., Gray T.R.</td>
<td>Journal of Analytical Toxicology, 2021; bkab099</td>
</tr>
</tbody>
</table>

*HCIFS employees and consultants in 2021 – bold, underlined*
<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 Commentary on the spectrum of cardiopulmonary pathology in COVID-19</td>
<td>Buja, L.M., Zhao, B., McDonald, M., Ottaviani, G., Wolf, D.A.</td>
<td>Cardiovascular Pathology (2021) 53,107339</td>
</tr>
</tbody>
</table>

*HCIFS employees and consultants in 2021 – bold, underlined
Internships and Fellowship Programs
Internship Program

- HCIFS prepares students for future careers in forensic science in many different scientific disciplines as well as in technical, professional, and administrative capacities.

- 11 interns from the following disciplines were on site in 2021:
  - Firearms Identification
  - Forensic Investigations
  - Family Assistance
  - Forensic Entomology
  - Forensic Toxicology
  - Drug Chemistry
Medical Examiner Fellowship Program

Forensic Pathology Fellowship:

A 1-year fellowship that is a required training program for all new pathologists seeking Forensic Pathology Board certification.

Fellows focus on the data acquisition and documentation processes from medical and non-medical sources with particular emphasis placed on the correlation of scene observations (forensic investigation) with autopsy and forensic toxicological findings.
Crime Laboratory Fellowship Programs

Forensic Toxicology:

A 2-year fellowship providing training for doctorate-level scientists seeking specialization in forensic toxicology

Upon completion of the program, fellows will be familiar with toxicology laboratory methods and interpretation. Methods include immunoassay screening, sample preparation, liquid and gas chromatography with mass spectrometry, and interpretation of toxicological findings in postmortem, DWI, and drug-facilitated sexual assault cases.