COVID-19-Associated Deaths in San Francisco: the Important Role of Dementia and Atypical Presentations in Long-term Care Facilities

BACKGROUND

COVID-19 has caused significant mortality worldwide.[1] Within the USA, marked geographic differences in incidence, hospitalization, and death have been reported.[2] Better characterization of populations at increased risk for death from COVID-19 is needed, including from long-term care facilities (LTCF). We describe the demographic and clinical characteristics of the first 50 fatalities with COVID-19 in San Francisco.

METHODS

All San Francisco residents who die with laboratory-confirmed COVID-19 infection are reported to the San Francisco Department of Public Health (SFDPH). We reviewed case report forms, medical records, and death certificate data for demographics, clinical presentation, and hospital course when applicable. Cause of death was not considered to be due to COVID-19 if not listed as the underlying cause of death on both the death certificate and medical record. These activities were public health surveillance, and not research; therefore, institutional review board review was not obtained.

RESULTS

From March 5 to July 14, 2020, 50 decedents with confirmed COVID-19 were reported. Of these, 46 had COVID-19 listed as the underlying cause of death and four were assessed as being unrelated to COVID-19; the non-COVID-19 causes of deaths were abdominal perforation, liver laceration, splenic laceration, and urosepsis.

The remaining 46 fatalities are described in Table 1. The average age was 81 years (range 30–100), and the most common race-ethnicity was Asian (49%). The most common co-morbidities included dementia (46%), diabetes mellitus (43%), cardiac disease (41%), and chronic lung disease

(28%). Common presenting symptoms included dyspnea (48%), fever ≥ 100.0 °F (46%), cough (30%), and altered mental status (25%). Thirty-nine (89%) were hospitalized, 24 (59%) required intensive care, and 19 (44%) were intubated. The mean time from symptom onset to death was 14.1 days (range 4 h–42 days).

Twenty-one (46%) decedents resided in a LTCF; most (84%) were designated as DNR/DNI (do not resuscitate or intubate), comfort care, or hospice either preceding or at presentation. Ten (48%) LTCF decedents presented without any fever, cough, and/or dyspnea; in six, altered mental status (e.g., confusion or lethargy) was the sole presenting symptom. When compared to community decedents, LTCF decedents were more likely to have a dementia diagnosis and to present with altered mental status and were less likely to present with cough, be hospitalized, receive intensive care or intubation, or be diagnosed with sepsis or acute renal failure.

DISCUSSION

Consistent with other reports, older adults in San Francisco remain the most likely to die due to COVID-19.[1,2] In San Francisco, as of July 30, 2020, persons $\geq$ 60 years comprise 14% of COVID-19 infections, yet 90% of deaths.[3] Asians accounted for nearly half of deaths, though they comprise only 10.2% of COVID-19 infections in San Francisco.[3] In contrast, statewide and nationally, higher proportions of Latinos, Whites, and Blacks have died due to COVID-19.[1,2,4] This finding may be due to demographics specific to San Francisco; in 2019, of persons ≥ 60 years, 43% were Asian.[5]

Most decedents had multiple co-morbidities reported by others, including diabetes and chronic cardiac and lung disease.[1] However, we found dementia was the most frequent co-morbidity, driven predominantly by LTCF residents who comprised nearly half of our decedents. Additionally, LTCF decedents were more likely to present with altered mental status; nearly half did not present with any typical COVID-19 symptoms of fever, cough, or dyspnea. Presentation with altered mental status has also been reported in older COVID-19 patients presenting to emergency medical services.[6] Although we found that LTCF cases were less likely to be hospitalized, receive aggressive medical interventions, or

Table 1 COVID-19 Fatalities in San Francisco, March 5–July 14, 2020

	Total	LTCF	Non-LTCF	P value[a]
Number of fatalities, no. (%)	46	21 (46)	25 (54)	
Male, no. (%)	31/46 (67)	14/21 (67)	17/25 (68)	NS
Age, mean (range), years	80.5 (30–100)	86.8 (66–100)	75.3 (30–99)	0.007
Race-ethnicity[b], no. (%)				0.012
Asian	22/45 (49)	14/21 (67)	8/24 (34)	-
White	10/45 (22)	6/21 (29)	4/24 (17)	-
Hispanic	9/45 (20)	0/21 (0)	9/24 (38)	-
Black	4/45 (9)	1/21 (5)	3/24 (13)	-
Co-morbid conditions, no. (%)				
Dementia	21/46 (46)	15/21 (71)	6/25 (24)	0.001
Diabetes mellitus	20/46 (43)	11/21 (52)	9/25 (36)	NS
Chronic cardiac disease	19/46 (41)	8/21 (38)	11/25 (44)	NS
Chronic lung disease	13/46 (28)	7/21 (34)	6/25 (24)	NS
Immunocompromised	6/46 (13)	3/21 (14)	3/25 (12)	NS
ESRD on HD	5/46 (11)	3/21 (14)	2/25 (8)	NS
Obesity	3/46 (7)	0/21 (0)	3/25 (12)	NS
Developmental delay	3/46 (7)	0/21 (0)	3/25 (12)	NS
Average no. co-morbidities (range)	4.4 (1–11)	5 (1–11)	3.7 (1–10)	NS
Symptoms [b], no. (%)				
Dyspnea	21/44 (48)	7/20 (35)	14/24 (58)	NS
Fever > 100.0 °F	20/44 (46)	6/20 (30)	14/24 (58)	NS
Cough	13/44 (30)	2/20 (10)	11/24 (46)	0.010
Altered mental status	11/44 (25)	9/20 (45)	2/24 (8)	0.006
Weakness	9/44 (21)	3/20 (15)	6/24 (25)	NS
Anorexia	7/44 (16)	2/20 (10)	5/24 (21)	NS
Gastrointestinal	5/44 (11)	2/20 (10)	3/24 (13)	NS
Asymptomatic	2/44 (5)	2/20 (10)	0/24 (0)	NS
Other	2/44 (5)	0/20 (0)	2/24 (8)	NS
Hospitalized [b], no. (%)	39/44 (89)	14/19 (74)	25/25 (100)	0.011
Intensive care [b], no. (%)	24/41 (59)	4/16 (25)	20/25 (80)	0.040
Intubated [b], no. (%)	19/43 (44)	2/18 (11)	17/25 (68)	< 0.001
DNR/DNI/comfort care/hospice status [b], no. (%)	27/43 (63)	16/19 (84)	7/25 (28)	< 0.001
Complications, no. (%)				
Pneumonia/ARDS	44/46(96)	19/21 (90)	25/25 (100)	NS
Sepsis	21/46 (46)	5 /21(24)	16 /25 (64)	0.006
Acute renal failure	11/46 (24)	2/21 (10)	9/25 (36)	0.036
Secondary bacterial infection	6/46(13)	3/21 (14)	3/25 (12)	NS
Pulmonary emboli	5/46 (11)	0 /21(0)	5/25 (20)	NS
Symptom onset to death[b], mean (range), days	14.1 (0–42)	9.3 (1–30)	17.5 (1–42)	0.013

LTCF, long-term care facility, NS, not significant; ESRD on HD, end-stage renal disease on hemodialysis; DNR/DNI, do not resuscitate/do not intubate, ARDS, acute respiratory distress syndrome
[a]*The χ^2 test was used for comparisons of categorical variables that had large values, and the Fisher exact test was used for comparisons of categorical variables with values < 5. The T test was used for comparison of two independent means*
[b]*Includes patients with known information only*

develop complications of sepsis or acute renal failure, they progressed more rapidly to death after symptom onset, likely reflecting the frail, debilitated state of many LTCF residents who are near end-of-life and have a DNR/DNI or comfort care status.

Our findings are a reminder that clinicians should remain vigilant for COVID-19 in older adults with dementia, who may present with atypical signs and symptoms and deteriorate quickly. Populations at risk for dying can vary greatly from region to region, and therefore public health policymakers should utilize local surveillance data to inform and target educational messages and prevention strategies.

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Compliance with Ethical Standards:

Conflict of Interest: *The authors declare that they do not have a conflict of interest.*

REFERENCES

1. **Wortham JM**, **Lee JT**, **Althomsons S**, et al. Characteristics of Persons Who Died with COVID-19 — United States, February 12–May 18, 2020. MMWR Morb Mortal Wkly Rep 2020;69:923-929.
2. **Hooper MW**, **Napoles AM**, **Perez-Stable EJ**. COVID-19 and Racial/Ethnic Disparities. JAMA. 2020;323(24):2466-2467.
3. San Francisco Department of Public Health. COVID-19 Data and Reports. Available at URL: https://data.sfgov.org/stories/s/w6za-6st8. Last accessed August 2, 2020.
4. California Department of Public Health. COVID-19 Race and Ethnicity Data. Available at URL: https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/COVID-19/Race-Ethnicity.aspx. Last accessed August 2, 2020.
5. State of California Department of Finance Population Projections – Baseline 2019. Available at URL: http://www.dof.ca.gov/forecasting/demographics/projections/. Last accessed August 2, 2020.
6. **Yang BY**, **Barnard LM**, **Emert JM**, et al. Clinical Characteristics of Patients With Coronavirus Disease 2019 (COVID-19) Receiving Emergency Medical Services in King County, Washington JAMA Netw Open. 2020;3(7):e2014549

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