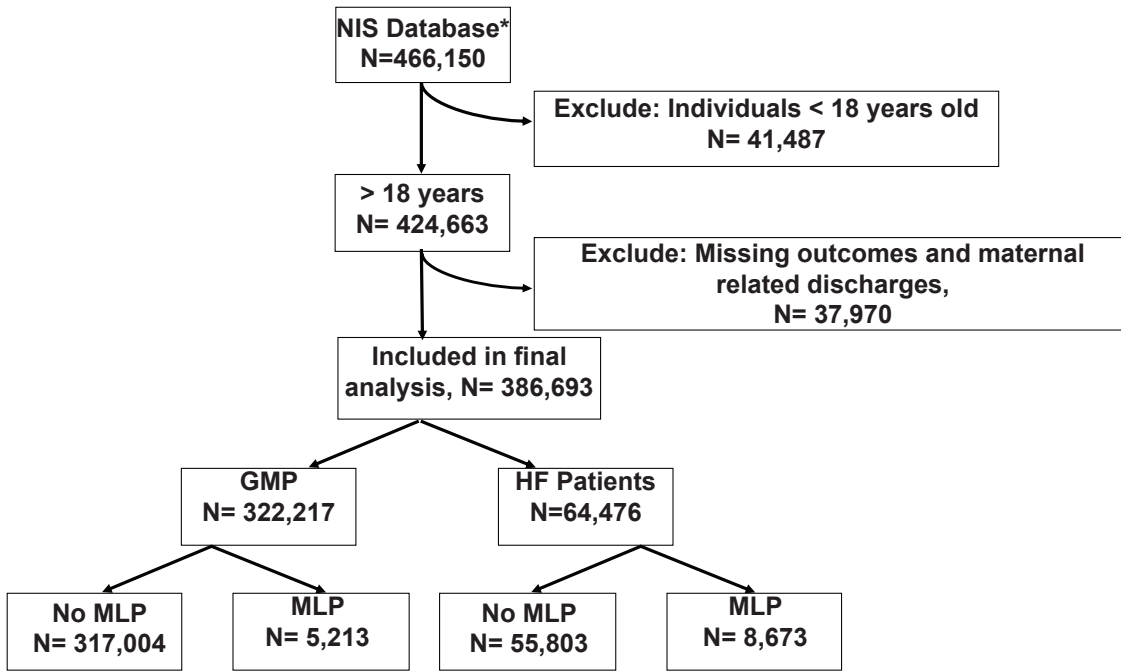
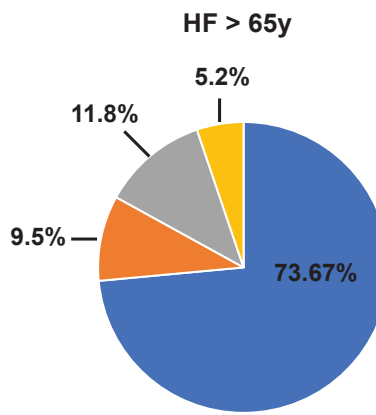
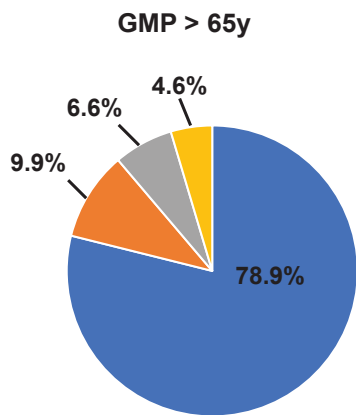
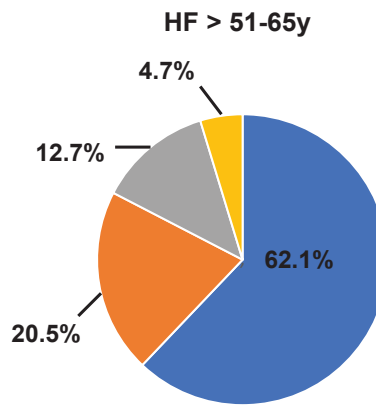
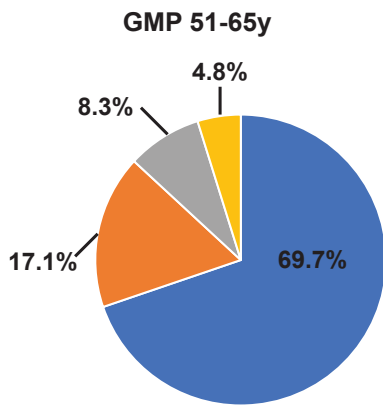
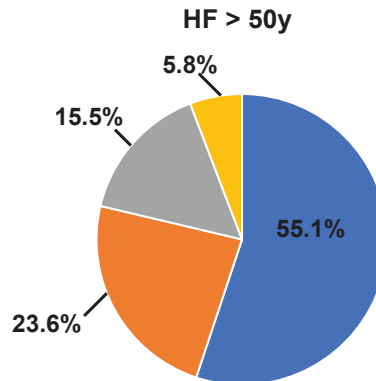
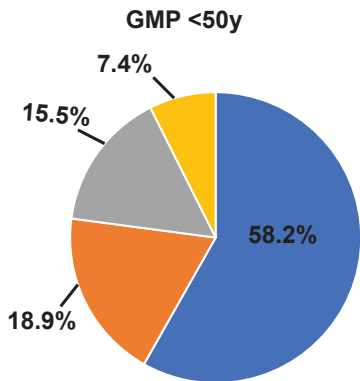


Supplementary Figure 1. CONSORT statement for patient flow chart

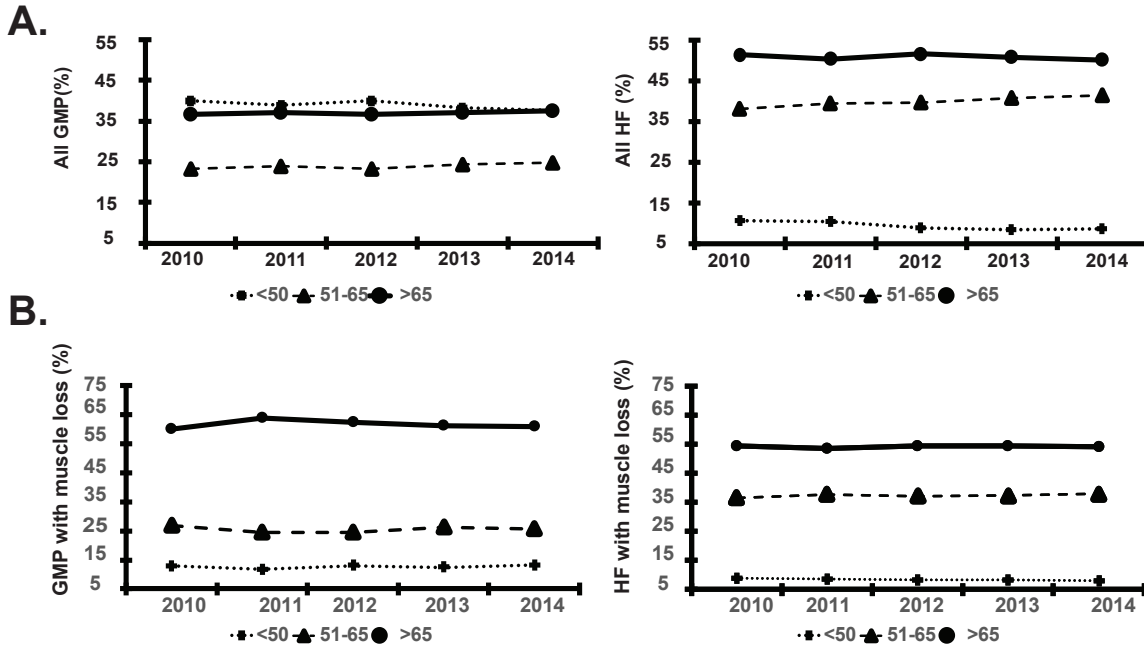


**Supplementary Figure 2. Race/ethnicity proportions among a random 2% inpatient sample of the general medicine population (GMP) and inpatient heart failure patients from the National Inpatient Sample database stratified by age group (50 years(y), 51-64y, and >65y of age quantified cumulatively from data in the years 2010-2014.**

- White
- Black
- Hispanic
- Other



**Supplementary Fig 3A and B. Increasing proportion of older all inpatients with heart failure and older inpatients with heart failure with muscle loss phenotype.** (A) Line graphs depicting percentage of the analyzed random 2% inpatient sample of the general medical population (GMP) and hospitalized patients with heart failure (HF) from the National Inpatient Sample database each year from 2010-2014 who were <50 years(y), 50-64y, and >65y of age. (B) Line graphs depicting percentage of the analyzed inpatient sample of those GMP or HF with muscle loss phenotype each year from 2010-2014 who were <50y, 50-64y, and >65y of age.



**Supplementary Table 1. Demographic characteristics for all hospitalized general medicine population and patients with heart failure, grouped by age regardless of muscle loss status.**

	GMP			HF		
Age categories (years)	≤50	51-65	>65	≤50	51-65	>65
Number of Patients	125,729	77,172	119,316	5935	25,824	32,717
Female (%)	37,783 (30.1)	38,892 (50.4)	51,660 (43.3)	3,572 (60.2) ***	16,137 (62.5) ***	17,010 (52.0) ***
Age (mean (SD))	34.03 (9.35)	58.01 (4.26)	77.73 (7.76)	44.06 (6.21) ***	58.40 (4.15) ***	75.73 (6.92) ***
Race (%)						
White	73,135 (58.2)	53,796 (69.7)	94,192 (78.9)	3,270 (55.1) ***	16,032 (62.1) ***	24,081 (73.6) ***
Black	23782 (18.9)	13212 (17.1)	11828 (9.9)	1,402 (23.6) ***	5,299 (20.5) ***	3,093 (9.5) *
Hispanic	19,452 (15.5)	6,439 (8.3)	7,851 (6.6)	917 (15.5)	3,275 (12.7) ***	3,853 (11.8) ***
Other	9,360 (7.4)	3,725 (4.8)	5,445 (4.6)	346 (5.8) ***	1,218 (4.7)	1,690 (5.2) ***
LoS (mean(SD))	3.77 (5.45) <sup>cf</sup>	4.90 (6.73) <sup>ci</sup>	5.06 (6.03) <sup>fi</sup>	8.75 (12.32) <sup>***cf</sup>	8.13 (9.53) <sup>***ci</sup>	7.69 (8.14) <sup>***fi</sup>
In-hospital mortality (%)	576 (0.5) <sup>cf</sup>	1,407 (1.8) <sup>ci</sup>	3,972 (3.3) <sup>fi</sup>	507 (8.5) <sup>***f</sup>	2,289 (8.9) <sup>***i</sup>	3,556 (10.9) <sup>***fi</sup>
CoH in USD (median (IQR))	4,739.00 [2,967.00, 8,307.00] <sup>cf</sup>	8,115.00 [4,623.00, 14,572.00] <sup>ci</sup>	7,833.00 [4633.75, 13,821.00] <sup>fi</sup>	11,366.90 [6,155.50, 23,860.56] <sup>***cf</sup>	10,831.15 [6,051.80, 21,400.06] <sup>***ci</sup>	10,780.88 [6,222.63, 19,547.25] <sup>***fi</sup>
Muscle loss phenotype (%)	659 (0.5) <sup>cf</sup>	1336 (1.7) <sup>ci</sup>	3218 (2.7) <sup>fi</sup>	730 (12.3) <sup>***f</sup>	3248 (12.6) <sup>***i</sup>	4695 (14.4) <sup>***fi</sup>

Number of diagnoses on discharge (mean (SD))	6.62 (4.40) <sup>cf</sup>	9.98 (5.39) <sup>ci</sup>	11.63 (5.38) <sup>fi</sup>	18.04 (5.68) <sup>***cf</sup>	18.39 (5.53) <sup>ci</sup>	18.78 (5.45) <sup>fi</sup>
Elixhauser score (mean (SD))	0.62 (6.16) <sup>cf</sup>	3.14 (8.40) <sup>ci</sup>	5.33 (8.48) <sup>fi</sup>	21.77 (11.08) <sup>***cf</sup>	22.35 (10.92) <sup>***ci</sup>	24.27 (10.60) <sup>***fi</sup>
Comorbidities (%)						
Acute kidney injury	3,703 (2.9)	7,404 (9.6)	2,0349 (17.1)	1,866 (31.4) <sup>***</sup>	8,910 (34.5) <sup>***</sup>	13,523 (41.3) <sup>***</sup>
Alcohol abuse	6,757 (5.4) <sup>cf</sup>	5,660 (7.3) <sup>ci</sup>	2,290 (1.9) <sup>fi</sup>	2,043 (34.4) <sup>***cf</sup>	8,091 (31.3) <sup>***ci</sup>	4,867 (14.9) <sup>***fi</sup>
Diabetes (uncomplicated)	9,022 (7.2)	17,940 (23.2)	30,142 (25.3)	1,418 (23.9) <sup>***</sup>	8,640 (33.5) <sup>***</sup>	12,434 (38.0) <sup>***</sup>
Diabetes (complicated)	2,211 (1.8)	4,159 (5.4)	5,593 (4.7)	548 (9.2) <sup>***</sup>	3,369 (13.0) <sup>***</sup>	3,601 (11.0) <sup>***</sup>
Hypertension	23,356 (18.6) <sup>cf</sup>	44,420 (57.6) <sup>ci</sup>	83,794 (70.2) <sup>fi</sup>	3,152 (53.1) <sup>***cf</sup>	16,016 (62.0) <sup>***ci</sup>	21,188 (64.8) <sup>***fi</sup>
Home Discharge	111,111 (88.8) <sup>cf</sup>	54,140 (71.5) <sup>ci</sup>	56,543 (49.1) <sup>fi</sup>	3,400 (62.6) <sup>cf***</sup>	12,001 (51.1) <sup>ci***</sup>	9,711 (33.4) <sup>fi***</sup>

Abbreviations: CoH: Cost of hospitalization per admission, GMP: general medical population, HF: heart failure, LoS: Length of stay, SD: Standard deviation, USD: US dollars.

GMP vs. HF between each age group: \* p <0.05, \*\* p <0.01, \*\*\* p <0.001.

Within disease group, ≤50 vs. 51-65: a: p<0.05; b: p<0.01; c: p<0.001

Within disease group, ≤50 vs. >65: d: p<0.05; e: p<0.01; f: p<0.001

Within disease group, 51-65 vs. >65: g: p<0.05; h: p<0.01; i: p<0.001

**Supplementary Table 2. Comorbidities, insurance type and geographic distribution of hospitalized general medical and heart failure patients regardless of muscle loss status stratified by age.**

Age categories (years)	GMP			P value <sup>a</sup>	HF			P value <sup>a</sup>
	≤50	51-65	>65		≤50	51-65	>65	
Number of patients	125,729	77,172	119,316		5935	25,824	32,717	
Comorbidities (%)								
Anemia	5,611 (4.5)	753 (1.0)	1,632 (1.4)	<0.001	2,241 (37.8)	9,361 (36.2)	12,133 (37.1)	<0.001
Coagulopathy	3,710 (3.0)	4,102 (5.3)	6,373 (5.3)	<0.001	1,964 (33.1)	8,386 (32.5)	9,589 (29.3)	<0.001
Depression	10,175 (8.1)	10,264 (13.3)	12,985 (10.9)	<0.001	844 (14.2)	3,651 (14.1)	3,487 (10.7)	<0.001
Drug abuse	9,623 (7.7)	3,448 (4.5)	612 (0.5)	<0.001	872 (14.7)	2,358 (9.1)	421 (1.3)	<0.001
Hypothyroidism	5,410 (4.3)	7,960 (10.3)	20,410 (17.1)	<0.001	649 (10.9)	3,612 (14.0)	7,103 (21.7)	<0.001
Lymphoma	333 (0.3)	569 (0.7)	1,425 (1.2)	<0.001	31 (0.5)	215 (0.8)	466 (1.4)	<0.001
Metastatic cancer	1,014 (0.8)	2,479 (3.2)	3,570 (3.0)	<0.001	53 (0.9)	390 (1.5)	812 (2.5)	<0.001
Peptic ulcer disease	15 (0.0)	24 (0.0)	50 (0.0)	<0.001	6 (0.1)	19 (0.1)	25 (0.1)	<0.001
Solid tumors	641 (0.5)	1,833 (2.4)	3,711 (3.1)	<0.001	72 (1.2)	775 (3.0)	1,366 (4.2)	<0.001
Disposition of patient upon discharge (%) <sup>†</sup>								
Transfer to short-term hospital	1,649 (1.3)	1,920 (2.5)	2,716 (2.4)	<0.001	241 (4.4)	962 (4.1)	991 (3.4)	<0.001
Transfer other: SNF, ICF	4,373 (3.5)	8,253 (10.9)	33,410 (29.0)		794 (14.6)	5,673 (24.1)	11,220 (38.5)	
Home Health Care	5,599 (4.5)	10,350 (13.7)	22,080 (19.2)		798 (14.7)	4,380 (18.6)	7,038 (24.2)	
Against medical advice	2,357 (1.9)	1,058 (1.4)	507 (0.4)		194 (3.6)	491 (2.1)	153 (0.5)	
Urban-rural classification for US county (%)								
Metro areas ≥ 1 million	39,347 (31.3)	22,161 (28.7)	31,295 (26.2)	<0.001	2,168 (36.5)	8,776 (34.0)	9,829 (30.0)	<0.001
Metro areas of 250,000-999,999	23,338 (18.6)	14,237 (18.4)	21,846 (18.3)		1,110 (18.7)	4,833 (18.7)	5,990 (18.3)	
Metro areas of 50,000-249,999	11,460 (9.1)	7,286 (9.4)	11,595 (9.7)		535 (9.0)	2,506 (9.7)	3,111 (9.5)	
Fringe counties of metro ≥ 1 million	32,089 (25.5)	19,444 (25.2)	30,511 (25.6)		1,175 (19.8)	5,512 (21.3)	7,952 (24.3)	
Micropolitan counties	11,763 (9.4)	8,238 (10.7)	13,890 (11.6)		572 (9.6)	2,449 (9.5)	3,322 (10.2)	
Non-metro or micropolitan counties	7,732 (6.1)	5,806 (7.5)	10,179 (8.5)		375 (6.3)	1,748 (6.8)	2,513 (7.7)	
Mean household income by zip code (%)								

0-25th percentile	39,530 (31.4)	24,164 (31.3)	33,053 (27.7)	<0.0 01	2,534 (42.7)	10,400 (40.3)	10,307 (31.5)	<0.0 01
26th to 50th percentile	31,749 (25.3)	19,857 (25.7)	31,243 (26.2)		1,573 (26.5)	6,783 (26.3)	8,482 (25.9)	
51st to 75th percentile	29,468 (23.4)	17,915 (23.2)	28,665 (24.0)		1,176 (19.8)	5,334 (20.7)	7,582 (23.2)	
76th to 100th percentile	24,982 (19.9)	15,236 (19.7)	26,355 (22.1)		652 (11.0)	3,307 (12.8)	6,346 (19.4)	
Primary payer for insurance (%)				<0.0 01				<0.0 01
Medicare	10,920 (8.7)	21,353 (27.7)	106,658 (89.4)		1,960 (33.0)	11,655 (45.1)	29,420 (89.9)	
Medicaid	40,492 (32.2)	11,350 (14.7)	1,759 (1.5)		2,210 (37.2)	6,516 (25.2)	632 (1.9)	
Private insurance	53,857 (42.8)	34,592 (44.8)	9,063 (7.6)		973 (16.4)	5,297 (20.5)	2,143 (6.6)	
Self-pay	13,006 (10.3)	5,421 (7.0)	563 (0.5)		520 (8.8)	1,317 (5.1)	140 (0.4)	
No pay	1297 (1.0)	673 (0.9)	81 (0.1)		54 (0.9)	138 (0.5)	19 (0.1)	
Other	6,157 (4.9)	3,783 (4.9)	1,192 (1.0)		218 (3.7)	901 (3.5)	363 (1.1)	

<sup>†</sup>Routine discharge is included in the total percentage and is shown in the main tables

Abbreviations: GMP: General medical population, ICF: Intermediate care facility, SNF: Skilled nursing facility.

<sup>a</sup> p values that are marked represent ANOVA analyses.

GMP without muscle loss vs. heart failure without muscle loss, between each age group: \* p <0.05, \*\* p <0.01, \*\*\* p <0.001.

**Supplementary Table 3. Comorbidities, insurance type and geographic distribution of hospitalized general medical and heart failure patients with muscle loss stratified by age.**

Age categories (years)	GMP with muscle loss phenotype			P value <sup>a</sup>	HF with muscle loss phenotype			P value <sup>a</sup>
	≤50	51-65	>65		≤50	51-65	>65	
Number of patients	659	1,336	3,218		730	3,248	4,696	
Comorbidities (%)								
Anemia	18 (2.7)	33 (2.5)	80 (2.5)	0.929	318 (43.6)	1367 (42.1)	1,987 (42.3)	0.767
Coagulopathy	149 (22.6)	296 (22.2)	513 (15.9)	<0.001	312 (42.7)	1,278 (39.3)	1,532 (32.6)	<0.001
Depression	125 (19.0)	250 (18.7)	517 (16.1)	0.039	99 (13.6)	406 (12.5)	492 (10.5)	0.004
Drug abuse	88 (13.4)	96 (7.2)	36 (1.1)	<0.001	80 (11.0)	262 (8.1)	73 (1.6)	<0.001
Hypothyroidism	56 (8.5)	159 (11.9)	687 (21.3)	<0.001	84 (11.5)	405 (12.5)	971 (20.7)	<0.001
Lymphoma	10 (1.5)	21 (1.6)	75 (2.3)	0.154	5 (0.7)	27 (0.8)	85 (1.8)	<0.001
Metastatic cancer	42 (6.4)	154 (11.5)	301 (9.4)	0.001	6 (0.8)	102 (3.1)	207 (4.4)	<0.001
Peptic ulcer disease	1 (0.2)	0 (0.0)	3 (0.1)	0.444	1 (0.1)	3 (0.1)	2 (0.0)	0.544
Solid tumors	12 (1.8)	86 (6.4)	217 (6.7)	<0.001	11 (1.5)	102 (3.1)	251 (5.3)	<0.001
Disposition of patient upon discharge (%) <sup>†</sup>								
Transfer to short-term hospital	33 (5.3)	60 (5.1)	77 (2.7)	<0.001	44 (7.0)	136 (4.9)	147 (3.8)	<0.001
Transfer other: SNF, ICF	177 (28.6)	461 (39.2)	1,679 (59.1)		165 (26.3)	1,081 (39.2)	2,116 (54.6)	
Home Health Care	154 (24.9)	286 (24.3)	648 (22.8)		129 (20.5)	567 (20.6)	904 (23.3)	
Against medical advice	10 (1.6)	8 (0.7)	7 (0.2)		16 (2.5)	38 (1.4)	14 (0.4)	
Urban-rural classification for US county (%)								
Metro areas ≥ 1 million	214 (32.5)	434 (32.5)	1,062 (33.0)	0.823 <sup>a</sup>	246 (33.7)	1,045 (32.2)	1,515 (32.3)	0.02
Metro areas of 250,000-999,999	106 (16.1)	214 (16.0)	556 (17.3)		128 (17.5)	656 (20.2)	809 (17.2)	
Metro areas of 50,000-249,999	57 (8.6)	130 (9.7)	278 (8.6)		87 (11.9)	339 (10.4)	473 (10.1)	
Fringe counties of metro ≥ 1 million	162 (24.6)	342 (25.6)	830 (25.8)		150 (20.5)	686 (21.1)	1122 (23.9)	
Micropolitan counties	74 (11.2)	133 (10.0)	301 (9.4)		70 (9.6)	305 (9.4)	435 (9.3)	
Non-metro or micropolitan counties	46 (7.0)	83 (6.2)	191 (5.9)		49 (6.7)	217 (6.7)	341 (7.3)	
Mean household income by zip code (%)								



0-25th percentile	242 (36.7)	453 (33.9)	862 (26.8)	<0.0 01	292 (40.0)	1,250 (38.5)	1,481 (31.5)	<0.0 01
26th to 50th percentile	170 (25.8)	362 (27.1)	797 (24.8)		203 (27.8)	894 (27.5)	1,189 (25.3)	
51st to 75th percentile	149 (22.6)	282 (21.1)	838 (26.0)		145 (19.9)	687 (21.2)	1,120 (23.9)	
76th to 100th percentile	98 (14.9)	239 (17.9)	721 (22.4)		90 (12.3)	417 (12.8)	905 (19.3)	
Primary payer for insurance (%)				<0.0 01				<0.0 01
Medicare	176 (26.7)	490 (36.7)	2,894 (89.9)		221 (30.3)	1,466 (45.1)	4,213 (89.7)	
Medicaid	202 (30.7)	281 (21.0)	51 (1.6)		261 (35.8)	777 (23.9)	91 (1.9)	
Private insurance	198 (30.0)	428 (32.0)	231 (7.2)		141 (19.3)	702 (21.6)	306 (6.5)	
Self-pay	52 (7.9)	79 (5.9)	11 (0.3)		78 (10.7)	177 (5.4)	18 (0.4)	
No pay	6 (0.9)	7 (0.5)	2 (0.1)		4 (0.5)	15 (0.5)	5 (0.1)	
Other	25 (3.8)	51 (3.8)	29 (0.9)		25 (3.4)	111 (3.4)	62 (1.3)	

†Routine discharge is included in the total percentage and is shown in the main tables

GMP: General medical population, ICF: Intermediate care facility, SNF: Skilled nursing facility.

<sup>a</sup>p values that are marked represent ANOVA analyses.

GMP with muscle loss vs heart failure patients with muscle loss, between each age group: \* p <0.05, \*\* p <0.01, \*\*\* p <0.001.

**Supplementary Table 4. Demographic characteristics of hospitalized general medicine patients with/without muscle loss phenotype grouped by age.**

	GMP without muscle loss phenotype			GMP with muscle loss phenotype		
	≤50	51-65	>65	≤50	51-65	>65
Age categories in years						
Number of Patients	125070	75836	116098	659	1336	3218
Female (%)	37448 (29.9)	38171 (50.3)	50160 (43.2)	335 (50.8) ***	721 (54.0) **	1,500 (46.6) **
Age (mean (SD))	34.00 (9.34)	58.00 (4.26)	77.71 (7.76)	39.86 (8.50) ***	58.60 (4.21) ***	78.81 (7.77) ***
Race (%)						
White	72728 (58.1)	52925 (69.8)	91769 (79.0)	407 (61.8)	871 (65.2) ***	2,423 (75.3) ***
Black	23643 (18.9)	12913 (17.0)	11414 (9.8)	139 (21.1)	299 (22.4) ***	414 (12.9) ***
Hispanic	19386 (15.5)	6338 (8.4)	7648 (6.6)	66 (10.0) ***	101 (7.6)	203 (6.3) ***
Other	9313 (7.4)	3660 (4.8)	5267 (4.5)	47 (7.1)	65 (4.9)	178 (5.5)
LoS (mean [SD])	3.70 (5.16) <sup>cf</sup>	4.73 (6.30) <sub>ci</sub>	4.91 (5.80) <sub>fi</sub>	12.00 [6.00, 22.00] <sup>***cf</sup>	9.50 [5.00, 17.00] <sup>***ci</sup>	8.00 [5.00, 13.00] <sup>***fi</sup>
In-hospital mortality (%)	536 (0.4) <sup>cf</sup>	1250 (1.6) <sub>ci</sub>	3600 (3.1) <sub>fi</sub>	40 (6.1) <sup>***cf</sup>	157 (11.8) <sup>***c</sup>	372 (11.6) <sup>***f</sup>
Cost of hospitalization (median (IQR))	4720.00 [2,958.00, 8227.00] <sup>cf</sup>	8014.00 [4,590.00, 14344.00] <sub>ci</sub>	7719.50 [4,587.00, 13,567.00] <sub>fi</sub>	25,329.00 [11,846.00, 56,083.00] <sup>***cf</sup>	18,619.50 [9,905.25, 40,824.00] <sup>***ci</sup>	14,088.00 [7,925.25, 26,901.25] <sup>***fi</sup>
Number of diagnoses on discharge (mean (SD))	6.54 (4.28) <sup>cf</sup>	9.78 (5.20) <sub>ci</sub>	11.37 (5.18) <sub>fi</sub>	21.15 (3.77) ***	21.28 (3.73) ***	21.07 (3.46) ***
Elixhauser score (mean (SD))	0.52 (5.98) <sup>cf</sup>	2.85 (8.05) <sub>ci</sub>	4.93 (8.07) <sub>fi</sub>	18.72 (10.63) <sup>***d</sup>	19.86 (10.89) ***	19.82 (10.25) <sup>***d</sup>
Comorbidities (%)						
Acute kidney injury	3579 (2.9)	7118 (9.4)	19383 (16.7)	124 (18.8) ***	286 (21.4) ***	966 (30.0) ***

Alcohol abuse	6666 (5.3) cf	5456 (7.2) ci	2156 (1.9) fi	91 (13.8) ***f	204 (15.3) ***i	134 (4.2) ***fi
Diabetes (uncomplicated)	8921 (7.1) cf	17659 (23.3) ci	29351 (25.3) fi	101 (15.3) ***af	281 (21.0) ag	791 (24.6) fg
Diabetes (complicated)	2152 (1.7) cf	4016 (5.3) ci	5380 (4.6) fi	59 (9.0) ***	143 (10.7) ***i	213 (6.6) ***i
Hypertension	23114 (18.5) <sup>cf</sup>	43682 (57.6) <sup>ci</sup>	81609 (70.3) <sup>fi</sup>	242 (36.7) *** <sup>cf</sup>	738 (55.2) <sup>ci</sup>	2,185 (67.9) <sup>**fi</sup>
Home Discharge	110866 (89.1) <sup>cf</sup>	53779 (72.1) <sup>ci</sup>	56112 (49.9) <sup>fi</sup>	245 (39.6) <sup>cf***</sup>	361 (30.7) <sup>ci***</sup>	431 (15.2) <sup>fi***</sup>

Abbreviations: CoH: Cost of hospitalization, GMP: General medical population, LoS: Length of stay, SD: Standard deviation, USD: US dollars.

GMP without muscle loss vs GMP with muscle loss phenotype, between each age group: \* p <0.05, \*\* p <0.01, \*\*\* p <0.001.

Within phenotype group, ≤50 vs. 51-65: a: p<0.05; b: p<0.01; c: p<0.001.

Within phenotype group, ≤50 vs. >65: d: p<0.05; e: p<0.01; f: p<0.001.

Within phenotype group, 51-65 vs. >65: g: p<0.05; h: p<0.01; i: p<0.001

**Supplementary table 5. Comorbidities, insurance type and geographic distribution of general medical patients with and without muscle loss phenotype stratified by age.**

Age categories (years)	GMP without muscle loss phenotype			P value <sup>a</sup>	GMP with muscle loss phenotype			P value <sup>a</sup>
	≤50	51-65	>65		≤50	51-65	>65	
Number of patients	125070	75836	116098		659	1336	3218	
Comorbidities (%)								
Anemia	5593 (4.5)	720 (0.9)	1552 (1.3)	<0.001	18 (2.7)	33 (2.5)	80 (2.5)	0.929
Coagulopathy	3561 (2.8)	3806 (5.0)	5860 (5.0)	<0.001	149 (22.6)	296 (22.2)	513 (15.9)	<0.001
Depression	10050 (8.0)	10014 (13.2)	12468 (10.7)	<0.001	125 (19.0)	250 (18.7)	517 (16.1)	0.039
Drug abuse	9535 (7.6)	3352 (4.4)	576 (0.5)	<0.001	88 (13.4)	96 (7.2)	36 (1.1)	<0.001
Hypothyroidism	5354 (4.3)	7801 (10.3)	19723 (17.0)	<0.001	242 (36.7)	738 (55.2)	2,185 (67.9)	<0.001
Lymphoma	323 (0.3)	548 (0.7)	1350 (1.2)	<0.001	56 (8.5)	159 (11.9)	687 (21.3)	0.154
Metastatic cancer	972 (0.8)	2325 (3.1)	3269 (2.8)	<0.001	10 (1.5)	21 (1.6)	75 (2.3)	0.001
Peptic ulcer disease	14 (0.0)	24 (0.0)	47 (0.0)	<0.001	1 (0.2)	0 (0.0)	3 (0.1)	0.444
Solid tumors	629 (0.5)	1747 (2.3)	3494 (3.0)	<0.001	12 (1.8)	86 (6.4)	217 (6.7)	<0.001
Disposition of patient upon discharge (%) <sup>†</sup>								
Transfer to short-term hospital	1616 (1.3)	1860 (2.5)	2639 (2.3)	<0.001	33 (5.3)	60 (5.1)	77 (2.7)	<0.001
Transfer other: SNF, ICF	4196 (3.4)	7792 (10.5)	31731 (28.2)		177 (28.6)	461 (39.2)	1,679 (59.1)	
Home Health Care	5445 (4.4)	10064 (13.5)	21432 (19.1)		154 (24.9)	286 (24.3)	648 (22.8)	
Against medical advice	2347 (1.9)	1050 (1.4)	500 (0.4)		10 (1.6)	8 (0.7)	7 (0.2)	
Urban-rural classification for US county (%)								
Metro areas ≥ 1 million	39133 (31.3)	21727 (28.6)	30233 (26.0)	<0.001	214 (32.5)	434 (32.5)	1,062 (33.0)	0.823
Metro areas of 250,000-999,999	23232 (18.6)	14023 (18.5)	21290 (18.3)		106 (16.1)	214 (16.0)	556 (17.3)	
Metro areas of 50,000-249,999	11403 (9.1)	7156 (9.4)	11317 (9.7)		57 (8.6)	130 (9.7)	278 (8.6)	
Fringe counties of metro ≥ 1 million	31927 (25.5)	19102 (25.2)	29681 (25.6)		162 (24.6)	342 (25.6)	830 (25.8)	
Micropolitan counties	11689 (9.3)	8105 (10.7)	13589 (11.7)		74 (11.2)	133 (10.0)	301 (9.4)	

Non-metro or micropolitan counties	7686 (6.1)	5723 (7.5)	9988 (8.6)		46 (7.0)	83 (6.2)	191 (5.9)	
Mean household income by zip code (%)								
0-25th percentile	39288 (31.4)	23711 (31.3)	32191 (27.7)	<0.0 01	242 (36.7)	453 (33.9)	862 (26.8)	<0.0 01
26th to 50th percentile	31579 (25.2)	19495 (25.7)	30446 (26.2)		170 (25.8)	362 (27.1)	797 (24.8)	
51st to 75th percentile	29319 (23.4)	17633 (23.3)	27827 (24.0)		149 (22.6)	282 (21.1)	838 (26.0)	
76th to 100th percentile	24884 (19.9)	14997 (19.8)	25634 (22.1)		98 (14.9)	239 (17.9)	721 (22.4)	
Primary payer for insurance (%)								
Medicare	10744 (8.6)	20863 (27.5)	103764 (89.4)	<0.0 01	176 (26.7)	490 (36.7)	2,894 (89.9)	<0.0 01
Medicaid	40290 (32.2)	11069 (14.6)	1708 (1.5)		202 (30.7)	281 (21.0)	51 (1.6)	
Private insurance	53659 (42.9)	34164 (45.0)	8832 (7.6)		198 (30.0)	428 (32.0)	231 (7.2)	
Self-pay	12954 (10.4)	5342 (7.0)	552 (0.5)		52 (7.9)	79 (5.9)	11 (0.3)	
No pay	1291 (1.0)	666 (0.9)	79 (0.1)		6 (0.9)	7 (0.5)	2 (0.1)	
Other	6132 (4.9)	3732 (4.9)	1163 (1.0)		25 (3.8)	51 (3.8)	29 (0.9)	

†Routine discharge is included in the total percentage and is shown in the main tables

Abbreviations: GMP: General medical population, ICF: Intermediate care facility, SNF: Skilled nursing facility. <sup>a</sup> p values that are marked represent ANOVA analyses. GMP without muscle loss vs GMP with muscle loss, between each age group: \* p <0.05, \*\* p <0.01, \*\*\* p <0.001.

**Supplementary table 6. Comorbidities, insurance type and geographic distribution of hospitalized heart failure patients with and without muscle loss phenotype stratified by age.**

Age categories (years)	HF without muscle loss phenotype			P value <sup>a</sup>	HF with muscle loss phenotype			P value <sup>a</sup>
	≤50	51-65	>65		≤50	51-65	>65	
Number of patients	5,205	22,576	22,022		730	3,248	4,695	
Comorbidities (%)								
Anemia	1,923 (36.9)	7,994 (35.4)	10,146 (36.2)	0.052	318 (43.6)	1,367 (42.1)	1,987 (42.3)	0.767
Coagulopathy	1,652 (31.7)	7,108 (31.5)	8,057 (28.8)	<0.001	312 (42.7)	1,278 (39.3)	1,532 (32.6)	<0.001
Depression	745 (14.3)	3,245 (14.4)	2,995 (10.7)	<0.001	99 (13.6)	406 (12.5)	492 (10.5)	0.004
Drug abuse	792 (15.2)	2,096 (9.3)	348 (1.2)	<0.001	80 (11.0)	262 (8.1)	73 (1.6)	<0.001
Hypothyroidism	565 (10.9)	3,207 (14.2)	6,132 (21.9)	<0.001	84 (11.5)	405 (12.5)	971 (20.7)	<0.001
Lymphoma	26 (0.5)	188 (0.8)	381 (1.4)	<0.001	5 (0.7)	27 (0.8)	85 (1.8)	<0.001
Metastatic cancer	47 (0.9)	288 (1.3)	605 (2.2)	<0.001	6 (0.8)	102 (3.1)	207 (4.4)	<0.001
Peptic ulcer disease	5 (0.1)	16 (0.1)	23 (0.1)	0.813	1 (0.1)	3 (0.1)	2 (0.0)	0.544
Solid tumors	61 (1.2)	673 (3.0)	1,115 (4.0)	<0.001	11 (1.5)	102 (3.1)	251 (5.3)	<0.001
Disposition of patient upon discharge (%) <sup>†</sup>								
Transfer to short-term hospital	197 (4.1)	826 (4.0)	844 (3.3)	<0.001	44 (7.0)	136 (4.9)	147 (3.8)	<0.001
Transfer other: SNF, ICF	629 (13.1)	4,592 (22.1)	9104 (36.1)		165 (26.3)	1,081 (39.2)	2,116 (54.6)	
Home Health Care	669 (13.9)	3,813 (18.4)	6,134 (24.3)		129 (20.5)	567 (20.6)	904 (23.3)	
Against medical advice	178 (3.7)	453 (2.2)	139 (0.6)		16 (2.5)	38 (1.4)	14 (0.4)	
Urban-rural classification for US county (%)								
Metro areas ≥ 1 million	1,922 (36.9)	7,731 (34.2)	8,314 (29.7)	<0.001	246 (33.7)	1,045 (32.2)	1,515 (32.3)	0.02 <sup>a</sup>
Metro areas of 250,000-999,999	982 (18.9)	4,177 (18.5)	5,181 (18.5)		128 (17.5)	656 (20.2)	809 (17.2)	
Metro areas of 50,000-249,999	448 (8.6)	2,167 (9.6)	2,638 (9.4)		87 (11.9)	339 (10.4)	473 (10.1)	
Fringe counties of metro ≥ 1 million	1,025 (19.7)	4,826 (21.4)	6,830 (24.4)		150 (20.5)	686 (21.1)	1,122 (23.9)	
Micropolitan counties	502 (9.6)	2,144 (9.5)	2,887 (10.3)		70 (9.6)	305 (9.4)	435 (9.3)	

Non-metro or micropolitan counties	326 (6.3)	1,531 (6.8)	2,172 (7.8)		49 (6.7)	217 (6.7)	341 (7.3)	
Mean household income by zip code (%)								
0-25th percentile	2,242 (43.1)	9,150 (40.5)	8,826 (31.5)	<0.0 01	292 (40.0)	1,250 (38.5)	1,481 (31.5)	<0.0 01
26th to 50th percentile	1,370 (26.3)	5,889 (26.1)	7,293 (26.0)		203 (27.8)	894 (27.5)	1,189 (25.3)	
51st to 75th percentile	1,031 (19.8)	4,647 (20.6)	6,462 (23.1)		145 (19.9)	687 (21.2)	1,120 (23.9)	
76th to 100th percentile	562 (10.8)	2,890 (12.8)	5,441 (19.4)		90 (12.3)	417 (12.8)	905 (19.3)	
Primary payer for insurance (%)								
Medicare	1,739 (33.4)	10,189 (45.1)	25,207 (90.0)	<0.0 01	221 (30.3)	1,466 (45.1)	4,213 (89.7)	<0.0 01
Medicaid	1,949 (37.4)	5,739 (25.4)	541 (1.9)		261 (35.8)	777 (23.9)	91 (1.9)	
Private insurance	832 (16.0)	4,595 (20.4)	1,837 (6.6)		141 (19.3)	702 (21.6)	306 (6.5)	
Self-pay	442 (8.5)	1,140 (5.0)	122 (0.4)		78 (10.7)	177 (5.4)	18 (0.4)	
No pay	50 (1.0)	123 (0.5)	14 (0.0)		4 (0.5)	15 (0.5)	5 (0.1)	
Other	193 (3.7)	790 (3.5)	301 (1.1)		25 (3.4)	111 (3.4)	62 (1.3)	

†Routine discharge is included in the total percentage and is shown in the main tables

Abbreviations: ICF: Intermediate care facility, SNF: Skilled nursing facility.

<sup>a</sup> p values that are marked represent ANOVA analyses. HF without muscle loss vs HF with muscle loss, between each age group: \* p <0.05, \*\* p <0.01, \*\*\* p <0.001.

**Supplementary Table 7. Linear regression analysis for hospitalized general medicine and HF patients with Elixhauser comorbidity score as the dependent variable.**

	Heart Failure Elixhauser comorbidity score unadjusted (95% CI)	Heart Failure Elixhauser comorbidity score <b>adjusted</b> (95% CI)	GMP Elixhauser comorbidity score unadjusted (95% CI)	GMP Elixhauser comorbidity score <b>adjusted</b> (95% CI)
Age category 51-65y (compared to ≤50)	0.56 (0.27-0.84)	0.32 (0.08-0.55)	2.32 (2.25-2.38)	0.87 (0.82-0.92)
Age category >65y (compared to ≤50)	2.29 (2.01-2.57)	1.89 (1.66-2.12)	4.38 (4.32-4.44)	2.37 (2.32-2.42)
Muscle loss phenotype (%)	10.41 (10.18-10.64)	9.24 (9.07-9.41)	15.73 (15.53-15.92)	11.47 (11.31-11.62)

**Linear regression analysis comparing hospitalized general medicine and HF patients across age strata with Elixhauser comorbidity score as the dependent variable.**

	CHF vs GMP Elixhauser comorbidity score unadjusted (95% CI)	CHF vs GMP Elixhauser comorbidity score adjusted (95% CI)
Age Group ≤50	3.74 (3.72-3.75)	3.64 (3.61-3.67)
Age Group 51-65	3.77 (3.76-3.78)	3.65 (3.64-3.67)
Age Group >65	3.77 (3.76-3.78)	3.67 (3.66-3.69)



**Supplementary Table 8. Regression analysis for hospitalized general medicine and heart failure patients with muscle loss phenotype.**

	CHF vs GMP age 66-75		CHF vs GMP age >75	
	Unadjusted OR (95% CI)	Adjusted* OR (95% CI)	Unadjusted OR (95% CI)	Adjusted* OR (95% CI)
CoH	0.96 (0.90-1.03)	<b>1.14 (1.12-1.16)</b>	<b>1.11 (1.05-1.17)</b>	<b>1.26 (1.24-1.28)</b>
In-hospital mortality	<b>1.46 (1.19-1.80)</b>	<b>1.66 (1.31-2.11)</b>	<b>1.74 (1.47-2.07)</b>	<b>1.96 (1.62-2.38)</b>
LoS	0.95 (0.90-1.00)	<b>1.25 (1.23-1.26)</b>	1.04 (1.00-1.09)	<b>1.25 (1.23-1.27)</b>
Elixhauser	<b>1.26 (1.25-1.28)</b>	<b>1.26 (1.24-1.28)</b>	<b>1.32 (1.31-1.34)</b>	<b>1.29 (1.27-1.30)</b>

Bold text indicates significant differences. Abbreviations: CI: Confidence interval; CoH: Cost of hospitalization per admission; GMP: General medical population; LoS: Length of stay; OR: Odds ratio.

\* Adjusted for sex, race, and comorbidities (acute kidney injury, congestive heart failure, anemia, chronic lung disease, alcohol abuse, coagulopathy, metastatic cancer, cancer with solid tumors, diabetes [uncomplicated], diabetes [complicated])

**Supplementary Table 9. Sub analysis of patients with Systolic Heart Failure versus Diastolic Heart Failure; comorbidities, insurance type and geographic distribution of hospitalized heart failure patients with and without muscle loss phenotype stratified by age.**

	Systolic Heart Failure	Diastolic Heart Failure	p-value
Number of Patients	843	881	
Female (%)	258 (30.6)	468 (53.1)	<0.001
Age (mean (SD))	66.7 (12.2)	68.6 (12.2)	0.001
Race (%)			N/A
White	315 (64.7)	396 (78.4)	
Black	90 (18.5)	39 (7.7)	
Hispanic	55 (11.3)	37 (7.3)	
Other	27 (5.5)	33 (6.5)	
LoS (mean(SD))	14.23 (12.72)	15.05 (14.24)	0.207
In-hospital mortality (%)	184 (21.8)	156 (17.7)	0.037
CoH in USD (median (IQR))	10,231.16 (6081.90,21,800.06)	10,325.88 (6,820.83, 18,326.25)	0.823
Number of diagnoses on discharge (mean (SD))	21.11 (5.19)	21.06 (5.20)	0.871
Elixhauser score (mean (SD))	30.22 (8.20)	30.10 (8.29)	0.862
Comorbidities (%)			
Acute kidney injury	308 ( 35.0)	302 ( 35.8)	0.745
Alcohol abuse	210 (24.9)	198 (22.5)	0.257
Diabetes (uncomplicated)	170 (20.2)	191 (21.7)	0.476
Diabetes (complicated)	104 (12.3)	100 (11.4)	0.576
Hypertension	410 (48.6)	458 (52.0)	0.179
Home Discharge	80 (19.9)	78 (17.7)	0.809

†Routine discharge is included in the total percentage and is shown in the main tables

Abbreviations: ICF: Intermediate care facility, SNF: Skilled nursing facility.

<sup>a</sup> p values that are marked represent ANOVA analyses. HF without muscle loss vs HF with muscle loss, between each age group: \* p <0.05, \*\* p <0.01, \*\*\* p <0.001.

**Supplementary Table 10. Regression analysis for hospitalized general medicine and heart failure patients with muscle loss phenotype comparing systolic versus diastolic heart failure.**

	Systolic vs Diastolic HF age ≤50		Systolic vs Diastolic HF age 51-65		Systolic vs Diastolic age >65	
	Unadjusted OR (95% CI)	Adjusted* OR (95% CI)	Unadjusted OR (95% CI)	Adjusted* OR (95% CI)	Unadjusted OR (95% CI)	Adjusted* OR (95% CI)
CoH	1.22 (0.89-1.68)	1.22 (0.82-1.81)	1.10 (0.94-1.28)	1.21 (0.97-1.52)	0.92 (0.81-1.05)	0.97 (0.82-1.15)
In-hospital mortality	1.25 (0.50-3.26)	0.69 (0.14-3.74)	1.05 90.99-1.11)	1.47 (0.83-2.67)	1.04 (0.99-1.10)	<b>1.09 (1.02-1.17)</b>
LoS	0.99 (0.77-1.27)	0.90 (0.66-1.22)	0.99 (0.89-1.11)	0.98 (0.83-1.15)	0.88 (0.80-0.96)	0.91 (0.80-1.03)
Elixhauser score	1.10 (0.96-1.27)	0.97 (0.90-1.04)	0.97 (0.90-1.04)	0.90 (0.87-1.06)	1.03 90.98-1.08)	0.93 (0.81-1.02)

Bold text indicates significance. Abbreviations: CI: Confidence interval; CoH: Cost of hospitalization per admission; GMP: General medical population; LoS: Length of stay; OR: Odds ratio.

\* Adjusted for sex, race, and comorbidities (acute kidney injury, congestive heart failure, anemia, chronic lung disease, alcohol abuse, coagulopathy, metastatic cancer, cancer with solid tumors, diabetes [uncomplicated], diabetes [complicated])