CPDB Injury Trends: Checkpoint 1

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Theme:

As members of the healthcare community our team would like to look into complaints and use of force in which injury was reported. Either alleged or sustained injury has the possibility to incite EMS or healthcare resource allocation for physical or mental treatment. Interesting topics within this overarching theme include assessing differences in race, gender and neighborhood as it relates to injury prevalence. This can be examined for officer injury as well as complainant; in particular, it would be interesting to explore these demographics and potentially elicit patterns of abuse that could prevent further injury. The severity and immediacy of EMS services could speak to restraint, or lack thereof, in the extreme, and even potentially to officer regret and responsibility in trying to immediately alleviate mistakes.

As the course advances this topic would lend itself to traversing through the data parsing and visualization modules planned. While these are enumerated below, the ultimate task would be to try to parse through reports, using NLP, to add medical resource utilization to the known outcomes of TRR reports, either through parsing reports or inclusion of civil suits. This data, currently not included in attributes, would provide strong additional evidence to explore individual and societal impact.

1. What percentage of use of force incidents result in injury for citizens? Police officers? Broken down by race, age, neighborhood, use of force (physical, taser, firearm, etc.), and other demographics?
2. Are there differences in injury pattern in relation to different types of uses of force, i.e. taser vs. firearms vs. other (non-taser, non-firearm), stratified by citizen race?
3. Are neighborhoods with higher rates of officer injury reports more likely to be associated with complaints and use of force fillings?
4. Are individual officers more likely to be involved in use of force incidents that lead to injury?
5. Are individual officers more likely to underreport injuries - ie are they less likely to report injury in TRR when injury is alleged by a complainant?

Question 1: What percentage of use of force incidents result in injury for citizens? Police officers? Broken down by race, age, neighborhood, use of force (physical, taser, firearm, etc.) and other demographics?

Table 1. Totals

total_use_of_force_incidents	67019
total_subject_injuries	17854
percent_subject_injuries	26
total_officer_injuries	15327
percent_officer_injuries	22
total_alleged_subject_injuries	14494
percent_alleged_subject_injuries	21
percent_subject_alleged_injuries_not_counted	18
officer_injuries_per_officer	0.2296799136845891
subject_injuries_per_officer	0.26754780315291016

Overall, out of a total of 67,019 use of force incidents reported in the tactical response reports, 17,854(26%) resulted in subject injury and 15,327 (22%) resulted in officer injury. There were 14,494 officer documented alleged subject injuries, 18% of which were not documented as a true subject injury in the TRR report. The rate of officer injury per officer was 0.23 and the rate of subject injury per officer was 0.27.

Table 2A. Subject injuries broken down by subject race - totals

subject_race	total_use_of_force_ev... 1	subject_injuries	alleged_injuries
BLACK	49747	12217	10377
HISPANIC	9369	3150	2285
WHITE	6540	2116	1536
<null>	878	238	198
ASIAN/PACIFIC ISLANDER	431	124	92
NATIVE AMERICAN/ALASKAN NATIVE	54	9	6

The majority of use of force events were clearly committed against black citizens (49,747). Similarly, overall more black citizens have been injured by police (12,217).

Table 2B. Subject injuries broken down by subject race - percentages

subject_race	percent_subject_inju... 1	percent_subject_alleged_injuries_not_co...
HISPANIC	33	15
WHITE	32	13
ASIAN/PACIFIC ISLANDER	28	13
<null>	27	18
BLACK	24	19
NATIVE AMERICAN/ALASKAN NATIVE	16	16

However, when expressed as a percentage of use of force incidents that result in injury, Hispanic citizens are most likely to be injured by police officer in a use of force incident (33%), followed by white citizens (32%). Black citizens, however, were more likely to have an officer document an “alleged” injury, but not count it as an injury in the TRR (19%).

Table 3A. Subject injuries broken down by officer race - totals

officer_race	total_use_of_force_ev... 1	subject_injuries	alleged_injuries
White	38731	10263	8217
Hispanic	15064	4154	3274
Black	10599	2715	2411
Asian/Pacific	2028	553	448
Native American/Alaskan Native	310	83	72

Table 3B. Subject injuries broken down by officer race - percentages

officer_race	percent_subject_injuries	percent_subject_alleged_injuries_not_counted
Asian/Pacific	27	16
Black	25	19
Hispanic	27	18
Native American/Alaskan Native	26	19
White	26	17

Table 3C. Subject injuries broken down by officer race – injuries per officer

officer_race	subject_injuries_per_officer
Asian/Pacific	0.2357001972386588
Black	0.22728559298046985
Hispanic	0.23712161444503452
Native American/Alaskan Native	0.24516129032258063
White	0.22426480080555627

When broken down by officer race, though overall more use of force events and injuries were committed by white officers, this appears to be related to the overall demographic make-up of the force as there were no significant differences in the percent of use of force incidents resulting in injury, or subject injuries per officer on the force when broken down by officer race.

Table 4. Subject injuries broken down by officer and subject race

subject_race	officer_race	percent_subject_inju... ▼ 1	percent_officer_injuries
HISPANIC	Asian/Pacific	40	24
WHITE	Hispanic	35	25
HISPANIC	White	33	21
NATIVE AMERICAN/ALASKAN NATIVE	Black	33	0
<null>	Native American/Alaskan Native	33	33
HISPANIC	Black	32	23
HISPANIC	Hispanic	32	23
ASIAN/PACIFIC ISLANDER	White	31	19
WHITE	Asian/Pacific	31	25
WHITE	White	31	23
HISPANIC	Native American/Alaskan Native	30	21
<null>	Hispanic	30	24
WHITE	Native American/Alaskan Native	29	29
<null>	Black	28	23
WHITE	Black	27	25
ASIAN/PACIFIC ISLANDER	Black	26	12
<null>	White	26	23
BLACK	Black	25	22
BLACK	Hispanic	25	23
BLACK	Native American/Alaskan Native	25	24
BLACK	White	24	22
BLACK	Asian/Pacific	23	22
ASIAN/PACIFIC ISLANDER	Asian/Pacific	21	25
ASIAN/PACIFIC ISLANDER	Hispanic	21	18
<null>	Asian/Pacific	20	29

In order to assess for any patterns in combination of officer-subject race in propensity to cause injury during a sue of force event, we grouped results by both officer and subject race. Interestingly, use of force events involving an Asian officer and Hispanic citizen were most likely to result in subject injury (40%). This was followed by encounters between a white officer and

Hispanic citizen (35%) and encounters between a Hispanic officer and white citizen (33%, *tied with others).

Table 5. Subject injuries broken down by subject age

age_group	total_use_of_force_events	subject_injuries	alleged_injuries	percent_subject_injuries
0-18	3485	753	600	21
18-40	52849	14015	11371	26
40-65	10255	2964	2435	28
>65	400	115	81	28
<null>	30	7	7	23

Overall, more use of force events and injuries occurred for citizens in the 18-40 age group (52,849 and 14,815 respectively), however, citizens 40 and older who were involved in a use of force event were more likely to result in injury (28%).

Table 6. Subject and officer injuries by gender of subject

subject_gender	percent_subject_injuries	percent_officer_injuries
F	13	24
M	28	22

Table 7. Subject and officer injuries by gender of officer

officer_gender	percent_subject_injuries	percent_officer_injuries
F	20	29
M	27	22

Interestingly, when a use of force event involved a male citizen it was much more likely to result in citizen injury than those involving female citizens (28% vs. 13%). Conversely, when a use of force event involved a female officer, it was more likely to result in injury to the officer (29% vs. 22%), but less likely to result in citizen injury (20% vs. 27%).

Table 8. Subject and officer injuries broken down by type of Use of Force

firearm_used	percent_subject_injuries	percent_officer_injuries
false	26	22
• true	64	18

taser	percent_subject_injuries	percent_officer_injuries
false	25	23
• true	40	9

Not surprisingly, use of force events were much more likely to result in citizen injury when a firearm was used (64%) or when a taser was used (40%). Interestingly, officer injuries were less common in use of force events where the officer used a taser (9% vs. 23%).

Table 9. Subject and officer injuries broken down by neighborhood

beat	total_use_of_force_ev...	subject_injuries	officer_injuries	percent_subject_injuries	percent_officer_injuries
1134	859	239	149	27	17
1112	816	200	173	24	21
1533	663	192	152	28	22
621	845	179	184	21	21
1824	599	178	135	29	22
1522	679	172	144	25	21
713	708	172	155	24	21
624	611	170	129	27	21
1133	558	158	112	28	20
1531	566	157	125	27	22

The top 10 beats where the most documented injuries to subjects occurred include 11--, 15--, 6--, 18--, and 7--. These areas include the West side of Chicago (near the medical complex of Rush, Cook County, Jesse Brown VA), the downtown area, and south side of Chicago. These areas are known to have a higher proportion of citizens with a lower socioeconomic status which is a hypothesis provoking finding. The proximity to major medical centers also raises the possibility that injury reporting is linked to proximity to a medical center.

Question 2: Are there differences in injury pattern in relation to different types of uses of force, i.e. taser vs. firearms vs. other, stratified by subject race?

Table 1A. Totals for firearms and taser use by officer race

officer_race	total_firearm	percent_firearm	total_taser	percent_taser
Asian/Pacific	23	1	123	6
Black	232	2	701	6
Hispanic	255	1	1117	7
Native American/Alaskan Native	5	1	49	15
White	511	1	2618	6

Table 1B. Totals for firearm and taser use by subject race

subject_race	total_firearm	percent_firearm	total_taser	percent_taser
ASIAN/PACIFIC ISLANDER	10	2	31	7
BLACK	780	1	3513	7
HISPANIC	159	1	617	6
NATIVE AMERICAN/ALASKAN NATIVE	0	0	1	1
WHITE	64	0	395	6

Overall, both firearm and taser use were relatively rare in the tactical response reports. Again, overall more firearm use of force events occurred against black citizens than any other race, however, a similar percent of use of force events involved a firearms across subject races. This was similar for taser use. Percent of firearm use was also similar across officer races (with the exception of taser use among Native American officers, however this is likely due to small sample size).

Table 2. Likelihood of injury broken down by weapon type

weapon_type	total_use_of_force_events	subject_injuries	percent_subject_inju... 1
SEMI-AUTO PISTOL	954	628	65
RIFLE	27	17	62
REVOLVER	39	21	53
TASER (PROBE DISCHARGE)	4127	1724	41
OTHER (SPECIFY)	88	33	37
SHOTGUN	10	3	30
TASER (DRIVE STUN MODE)	210	60	28
CHEMICAL WEAPON	3754	932	24

Not surprisingly, when we break down weapon type further, those use of force incidents that involved firearms (semi-auto pistol, rifle, revolver) were most likely to cause subject injury (>50% likelihood of injury).

Table 3A. Taser use of force events broken down by subject race

subject_race	total_use_of_force_events	subject_injuries	percent_subject_injuries 1
WHITE	395	196	49
ASIAN/PACIFIC ISLANDER	31	15	48
HISPANIC	617	297	48
<null>	59	28	47
BLACK	3505	1317	37
NATIVE AMERICAN/ALASKAN NATIVE	1	0	0

Table 3B. Firearm use of force events broken down by subject race

subject_race	total_use_of_force_events	subject_injuries	officer_injuries	percent_subject_inju... 1
WHITE	64	49	17	76
BLACK	780	512	130	65
HISPANIC	159	95	35	59
<null>	13	6	2	46
ASIAN/PACIFIC ISLANDER	10	4	1	40

Table 3C. Other (non-taser, non-firearm) use of force events broken down by subject race

subject_race	total_use_of_force_events	subject_injuries	percent_subject_inju... 1
HISPANIC	8565	2745	32
WHITE	6040	1859	30
ASIAN/PACIFIC ISLANDER	390	105	26
<null>	802	203	25
BLACK	45251	10330	22
NATIVE AMERICAN/ALASKAN NATIVE	53	9	16

Once again, when we break use of force event categories down further by race, looking at total numbers there are a greater number of firearm discharges, taser use, and other use of force events that for other races. Interestingly, white and Hispanic citizens appear to have higher rates of injury reported in the TRR than other races for tasers, firearms, and other forms of use of force (with the exception of firearm use where black citizens have the second highest rate of injury at 65%). This is interesting and proposes two hypotheses:

1) Use of force events against whites and Hispanics are more likely to have intent to injure (ie "shoot to kill" or "shoot to injure")

Or More likely:

2) There is underreporting of subject injuries in use of force events against black citizens, especially when less than lethal use of force is used (tasers or other uses of force)

The likelihood of hypothesis 2 is a line of future further investigation, where we can compare reported injuries from complaint reports to reported injuries in the TRR (by attempting to link the 2) in order to discover whether alleged injuries are less likely to be reported in the TRR for black citizens.

Question 3. Are neighborhoods with higher rates of officer injury reports more likely to be associated with subject injuries or total number of events.

The beat with the highest number of total events (1134) also had the highest number of subjects injured (251 and 28% of total events; see Table 3-1). While there were a high number of officers injured in that beat (160) this was not the beat the highest number of officers injured or the highest percent of officers injured. The beat with the highest number of officers injured was beat 621, with 190 officers injured (22% of total events in that beat, see Table 3-2). The beat with the highest rate of officer injuries per number of events was beat 1652, with a 71% officer injury rate (though only 14 total events) and no subjects injured (Table 3-3). So while there appears to high numbers of subjects injured in neighborhoods with a high number of events, it is not necessarily the neighborhoods with the high officer injury events or rates.

Table 3-1:

	beat	total_events	officer_injured	percent_officer_injured	subject_injured	percent_subject_injured
1	1134	881	160	18	251	
2	621	854	190	22	182	
3	1112	816	173	21	200	
4	713	718	155	21	173	
5	1522	679	144	21	172	
6	1122	666	127	19	125	
7	1533	663	152	22	192	
8	624	623	135	21	170	
9	531	618	131	21	151	
10	1824	599	135	22	178	

Table 3-2:

	beat	total_events	officer_injured	percent_officer_injured	subject_injured	percent_subject_injured
1	621	854	190	22	182	21
2	1112	816	173	21	200	24
3	1134	881	160	18	251	28
4	713	718	155	21	173	24
5	1533	663	152	22	192	28
6	1522	679	144	21	172	25
7	1824	599	135	22	178	29
8	624	623	135	21	170	27
9	1822	460	132	28	106	23
10	531	618	131	21	151	24

Table 3-3:

	beat	total_events	officer_injured	percent_officer_injured	subject_injured	percent_subject_injured
1	1652	14	10	71	0	0
2	4100	4	2	50	1	25
3	1921	43	18	41	20	46
4	1911	85	35	41	27	31
5	2031	68	27	39	20	29
6	121	13	5	38	5	38
7	1933	117	43	36	23	19
8	1333	115	41	35	47	40
9	134	314	110	35	100	31
10	214	77	27	35	19	24

Question 4: Are individual officers more likely to be involved with in use of force incidents that lead to injury?

Yes. Specifically, of all officers who had any use of force events where subjects were injured, the officer with the most use of force events was 10583, who had 72 total events. Of those, 19 (26%) lead to subjects being injured (see Table 1 for details). The officer with the next highest use of force events had 65 events of which 14 (21%) lead to injured subjects. However, when sorting by most subjects injured (see Table 2) you can see that the officer with the most number of subjects injured (officer 23132) had this occur 30 times out of 47 total use of force events (63% of the time). The officers with the second and third most events had 24 and 23 subjects injured which was 51% and 74% of their of total use of force events, respectively. Not shown are a handful of officers with 100% of their events leading to injury, but a majority of those officers only had 1-2 total events. In summary, these tables seem to show that some officers do have a higher percent of events leading to injury – sometimes as high as 60-70% events and with a not insignificant number of total events.

Table 4-1.

	officer_id	total_use_of_force_events	subject_injured	as_percent_of_events
1	<null>	287	86	29
2	10583	72	19	26
3	32118	65	14	21
4	29670	64	20	31
5	14400	62	15	24
6	10152	59	12	20
7	16385	59	18	30
8	22150	58	11	18
9	6097	58	20	34
10	32105	56	21	37

Table 4-2.

Question 5: Are individual officers more likely to underreport injuries - ie are they less likely to report injury in TRR when injury is alleged by a complainant?

In order to analyze this question we evaluated two primary metrics.

First we assessed data regarding each officer's use of force event reported in trr_trr and complaints against that officer for use of force. The data_officerallegation data set was parsed for data_allegationcategories pertaining to the use of force. On average, an officer had 31% as many complaints filed against them for use of force as they had reported uses of force. However, illustrated in Table 5.1, certain officer ID's were well above the average with as many as 427% complaints to reported uses of force. While this does not adjust for multiple complaints filed pertaining to the same event, these officers are likely underreporting what their peers define as a substantial use of force warranting an official TRR. This discrepancy, the possibility of force that is used and not reported, should warrant further investigation into these officers' cases, and may even speak to injuries that are not reported and data that is missing.

Table 5.1: complaint_percentages

	officer_id	total_use_of_force_events	total_use_of_force_complaints	percent_complaint
1	32265	11	47	427
2	29033	14	54	385
3	2015	15	41	273
4	8138	21	57	271
5	13784	11	27	245
6	30417	13	30	230
7	12313	15	33	220
8	833	14	30	214
9	21468	24	49	204
10	27439	13	26	200
11	31422	17	33	194
12	24425	17	32	188
13	27504	12	22	183
14	14442	11	19	172
15	16927	13	22	169
16	22622	11	18	163
17	23633	11	18	163
18	3897	17	27	158
19	16700	18	28	155
20	11305	11	17	154

Finally, for each officer we calculated the percentage of cases where a subject alleged injury in a TRR report and the department claimed there was no injury. This was performed by joining data officer and trr_trr. In the data the average officer's report discounted about 19% of subject injuries. Table 5.2 illustrates that there are some officers, who have 10 or more alleged injuries where TRR reports do not verify as many as 50% of the injuries. Overall however if you limited just to those officers with 10 or more alleged injuries, TRRs discount injuries less often at about 17%.

Table 5.2 alleged_injuries_not_counted

	officer_id	alleged_injuries	subject_injuries	percent_subject_alleged_injuries_not_counted
1	18894	10	5	50
2	22929	11	6	45
3	30290	19	11	42
4	26846	10	6	40
5	30352	10	6	40
6	4549	15	9	40
7	25155	10	6	40
8	13473	13	8	38
9	14706	11	7	36
10	8176	11	7	36
11	25177	11	7	36
12	11257	14	9	35
13	26018	12	8	33
14	31127	10	7	30
15	22392	10	7	30
16	15987	10	7	30
17	18959	10	7	30
18	28797	10	7	30
19	3082	10	7	30
20	22150	13	9	30

Ultimately we feel that this data shows that there are certain officers with discrepancies that possible results from the under-filing of use of force reports. This occurs in two ways: First, some reports appear to be missing compared to complainant accounts of use of force compared to the CPD average. Second, certain officer's reports are inconsistent in validating alleged versus real injury, again at a level well above the CPD's average. Hopefully these metrics could be used to spark internal or external review of the content of officer's reports if not their behavior in the field.

Additional Discussion:

During this analysis we discovered some interesting associations that we were not expecting that could be potential areas for future research.

1. Black citizens were injured far more often by police than any other race overall (total counts), but race did not appear to be associated with risk of injury during use of force events (i.e. rates of injury per use of force event were similar across race). However, officer gender did show an interesting pattern with female officers being more likely to suffer an injury in use of force events and less likely to cause injury, while female citizens were less likely to be injured in a use of force event than male citizens.
2. There were more subject injuries in neighborhoods with relatively lower socioeconomic status (west-side and south-side). There are likely complex interactions and effects that underlie this relationship which could be investigated further.

3. We did find that certain officers were more likely to be involved in events that lead to injury, and these were not necessarily the officers with the highest number of total events recorded. It may be important in the future to assess rates of injury as opposed to just total use of force events when investigating these findings. There may be behavioral patterns that underlie these relationships which could be key avenues to focus intervention efforts.