

# Benchmarking medications in the last 24 hours of life

Dr Brian Ensor  
& 19 NZ hospices  
2015

# Benchmarking



- Hospices / Practitioners work in isolation
- Governance demands some sense of propriety
- Science vs Art / Culture

# Three cycles

- 2004
  - 7 hospices and 140 patients
- 2008
  - 14 Hospices and 356 patients
- 2015
  - 19 hospices and 512 patients

MPH Raw data 2nd Microsoft Excel

Home Insert Page Layout Formulas Data Review View

Cut Copy Paste Format Painter Clipboard

Arial 10 Bold Italic Underline Font Color Background Color

Wrap Text Merge & Center Alignment

General Number Currency Percentage Increase Decrease

Conditional Formatting Format as Table Cell Styles

Insert Delete Format Cells

AutoSum Fill Clear Sort & Filter Find & Select Editing

	Identifier	Age	Date of Death	HMDS diagnosis	Requiring anticonvulsant	Notes	Mode of death	Place of death	On LCP	Morphine mg			Fentanyl mcg			Methadone		
					Yes/no		expected / sudden	IPU/Home/PH		Oral	S/D	Subcut	Patch	S/D	Subcut	Sublingual	Oral	S/D
24				Respiratory														
25				Sepsis														
26				Stroke														
27				Unknown														
28	1	AAA1234	65	2/10/2014	Haematological Cancer	No		IPU	No						358	200		
29	2	AAA1235	62	27/03/2014	Breast Cancer	No		IPU	No				600		150			
30	3	AAA1236	78	29/09/2014	Lung Cancer	No	Resp death	IPU	No		7	45	600		44			
31	4	AAA1237	58	29/09/2014	Breast Cancer	No	Emboli	IPU	No	60	2	5						
32	5	AAA1238	39	6/10/2014	Other Malignancy Cancer	No		IPU	No						500	150		
33	6	AAA1239	78	7/10/2014	Other GIT Cancer	No	Coma	IPU	Yes		20	10						
34	7	AAA1240	56	9/10/2014	Breast Cancer	No	brain mets, aspiration pneu	IPU	No		11	20						
35	8	AAA1241	66	8/10/2014	Respiratory	No	Respiratory death	IPU	No	35		50						
36	9	AAA1242	36	10/10/2014	Cardiovascular Disease	No	Coma	IPU	Yes						400	250		
37	10	AAA1243	69	16/10/2014	Cancer - Melanoma	No	Series of PE?	IPU	no	10	10	15	300					
38	11	AAA1244	85	18/10/2014	Cardiovascular Disease	No		IPU	Yes						800	125		
39	12	AAA1245	78	29/10/2014	Other GIT Cancer	No	Agitation ?bladder	IPU	No						263	25		
40	13	AAA1246	54	26/10/2014	Other Malignancy Cancer	No		IPU	No			60					10	
41	14	AAA1247	63	27/10/2014	Pancreas Cancer	No		IPU	No		50	30						
42	15	AAA1248	60	24/10/2014	Gynaecological Cancer	no		IPU	Yes				1200					
43	16	AAA1249	80	29/10/2014	Other GIT Cancer	No	Secretions ?infection	IPU	No	10	20							
44	17	AAA1250	58	31/10/2014	Other GIT Cancer	no		IPU	no						200	25		
45	18	AAA1251	65	5/11/2014	Lung Cancer	No	G12h SD,	IPU	Yes				600	1400	100			
46	19	AAA1252	31	1/11/2014	Cardiovascular Disease	No	Swapped to morphine in SE	IPU	Yes		13	37.5	300	450				
47	20	AAA1253	50	4/11/2014	Breast Cancer	No		IPU	No		41	27.5						
48	21	AAA1254	40	19/09/2014	Breast Cancer	No	Just 24 hours in IPU, ?not	IPU	Yes		5							
49	22	AAA1255	82	10/11/2014	Haematological Cancer	no		IPU	Yes	20	107							
50	23	AAA1256	58	11/11/2014	Colorectal Cancer	No		IPU	no				300	300	225			
51	24	AAA1257	79	17/11/2014	Lung Cancer	No		IPU	No						413	400		
52	25	AAA1258	80	15/10/2014	Other Neurological Disease	No	Parkison's	IPU	yes			40			1050	600		
53	26	AAA1259	64	17/11/2014	Colorectal Cancer	No		IPU	no						250			
54	27	AAA1260	70	16/11/2014	Other Neurological Disease	No	MND	IPU	no						450	500		
55	28	AAA1261	55	18/11/2014	Other GIT Cancer	No		IPU	no									
56	29	AAA1262	66	18/11/2014	Unknown Primary Cancer	No	methadone 20mg sc bid	IPU	Yes		20	30	300					
57	30	AAA1263	68	22/11/2014	CNS Cancer	Yes	Pneumonia, im cefurox	IPU	Yes			150						
58	31	AAA1264	61	23/11/2014	Lung Cancer	No	methadone maintenance	IPU	No						400	250		
59	32	AAA1265	78	23/11/2014	Breast Cancer	yes		IPU	Yes		480	270						
60	33	AAA1266	48	23/11/2014	Other GIT Cancer	No	methadone maintenance	IPU	No	80	45				150			
61	34	AAA1267	85	24/11/2014	Breast Cancer	No		IPU	no	10	22.5							
62	35	AAA1268	85	22/11/2014	Other Malignancy Cancer	No		IPU	Yes	250	200							
63	36	AAA1269	37	21/11/2014	Colorectal Cancer	No		IPU	No	10	10							
64	37	AAA1270	63	5/12/2014	Breast Cancer	No		IPU	Yes	40								
65	38	AAA1271	72	6/12/2014	Colorectal Cancer	no		IPU	Yes	39	20							
66	39	AAA1272	30	5/12/2014	Other GIT Cancer	no		IPU	Yes						800	300		
67	40	AAA1273	34	7/12/2014	Melanoma Cancer	no		IPU	No		20	35						
68	41	AAA1274	72	8/12/2014	Lung Cancer	No		IPU	no									
69	42	AAA1275	78	1/12/2014	Lung Cancer	No		IPU	no									

# Data

- Diagnosis (NMDS)
- Age
- Gender
- Place of death
- Use of anticonvulsants
- Expected or sudden death
- Use of LCP

Identifier	Age	Date of Death	NMDS diagnosis	Requiring anticonvulsant	Notes	Mode of death	Place of death	On LCP	Morphine mg	Fentanyl mcg	Methadone						
				Yes/no		expected / sudden	IPU/Home/PH		Oral	S/D	Subcut	Patch	S/D	Subcut	Sublingual	Oral	S/D
1 AAA1234	65	2/10/2014	Respiratory	No			IPU	No						358	200		
2 AAA1235	62	27/03/2014	Sepsis	No			IPU	No			600			150			
3 AAA1236	78	29/03/2014	Breast Cancer	No	Resp death		IPU	No						44			
4 AAA1237	58	29/09/2014	Lung Cancer	No	Emboli		IPU	No	60	2	5			500	150		
5 AAA1238	39	6/10/2014	Breast Cancer	No			IPU	No									
6 AAA1239	78	7/10/2014	Other Malignancy Cancer	No	Coma		IPU	Yes		20	10						
7 AAA1240	56	9/10/2014	Lung Cancer	No	brain mets, aspiration pneu		IPU	No		11	20						
8 AAA1241	66	8/10/2024	Respiratory	No	Respiratory death		IPU	No	35		50						
9 AAA1242	36	10/10/2014	Cardiovascular Disease	No	Coma	Expected	IPU	Yes						400	250		
10 AAA1243	63	16/10/2014	Cancer - Melanoma	No	Series of PE?	Unexpected	IPU	no	10	10	15	300					
11 AAA1244	85	18/10/2014	Cardiovascular Disease	No		Expected	IPU	Yes						800	125		
12 AAA1245	78	29/10/2014	Other GIT Cancer	No	Agitation ?bladder	Expected	IPU	No						263	25		
13 AAA1246	54	26/10/2014	Other Malignancy Cancer	No		Expected	IPU	No			60					10	
14 AAA1247	63	27/10/2014	Prostate Cancer	No		Expected	IPU	No		50	30						
15 AAA1248	60	24/10/2014	Gynaecological Cancer	no		Expected	IPU	Yes						1200			
16 AAA1249	80	29/10/2014	Other GIT Cancer	No	Secretions ?infection	Expected	IPU	No	10	20							
17 AAA1250	58	31/10/2014	Other GIT Cancer	no		Expected	IPU	no						200	25		
18 AAA1251	65	5/11/2014	Lung Cancer	No	Q12h SD,	Expected	IPU	Yes						600	1400	100	
19 AAA1252	31	1/11/2014	Cardiovascular Disease	No	Swapped to morphine in SI	Expected	IPU	Yes	13	37.5	300	450					
20 AAA1253	50	4/11/2014	Other Malignancy Cancer	No		Expected	IPU	No	41		27.5						
21 AAA1254	40	19/03/2014	Breast Cancer	No	Just 24 hours in IPU, ?not	Expected	IPU	Yes		5							
22 AAA1255	82	10/11/2014	Hematological Cancer	no		Expected	IPU	Yes	20	107							
23 AAA1256	58	11/11/2014	Colorectal Cancer	No		ex	IPU	no						300	300	225	
24 AAA1257	79	17/11/2014	Lung Cancer	No		expected	IPU	No						413	400		
25 AAA1258	80	15/10/2014	Other Neurological Disease	No		Expected	IPU	yes			40			1050	600		
26 AAA1259	64	17/11/2014	Other Malignancy Cancer	No		Expected	IPU	no						250			
27 AAA1260	70	16/11/2014	Other Neurological Disease	No	MNI	Expected	IPU	no						450	500		
28 AAA1261	55	18/11/2014	Other GIT Cancer	No		Expected	IPU	no									
29 AAA1262	66	18/11/2014	Unknown Primary Cancer	No	methadone 20mg oc bid	Expected	IPU	Yes		20	30	300					
30 AAA1263	68	22/11/2014	CNS Cancer	Yes	Pneumonia, im cefurox	Expected	IPU	Yes			150						
31 AAA1264	61	23/11/2014	Lung Cancer	No	methadone maintenance	Expected	IPU	No						400	250		
32 AAA1265	78	23/11/2014	Breast Cancer	Yes		Expected	IPU	Yes	480		270						
33 AAA1266	48	23/11/2014	Other Malignancy Cancer	Yes		Expected	IPU	No	80		45					150	
34 AAA1267	85	24/11/2014	Breast Cancer	No		Expected	IPU	no	10		22.5						
35 AAA1268	85	22/11/2014	Other Malignancy Cancer	No		Expected	IPU	Yes	250		200						
36 AAA1269	37	21/11/2014	Colorectal Cancer	No		Expected	IPU	No	10		10						
37 AAA1270	63	5/12/2014	Breast Cancer	No		Expected	IPU	Yes	40								
38 AAA1271	72	6/12/2014	Other Malignancy Cancer	No		Expected	IPU	Yes	39		20						
39 AAA1272	30	5/12/2014	Other GIT Cancer	No		Expected	IPU	Yes						800	300		
40 AAA1273	94	7/12/2014	Melanoma Cancer	no		Expected	IPU	No	20		35						
41 AAA1274	72	8/12/2014	Lung Cancer	No		Expected	IPU	no									
42 AAA1275	78	1/12/2014	Lung Cancer	No		Expected	IPU	no									

# Medications

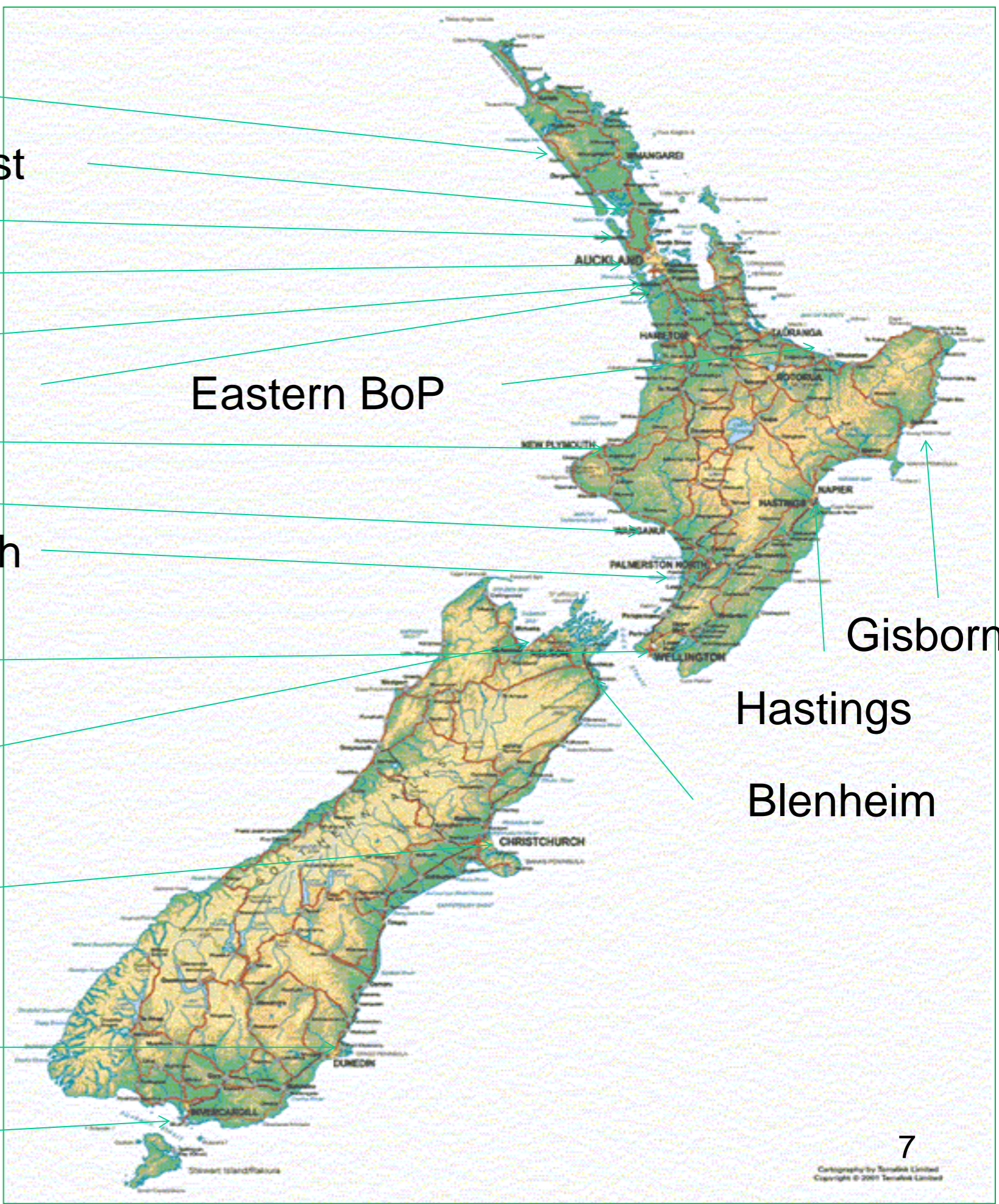
- Opioids
- Benzodiazepines
- Antipsychotics
- Anticholinergics
- Metoclopramide
- Cyclizine
- Others

Identifier	Age	Date of Death	HMDS diagnosis	Requiring anticonvulsant	Notes	Mode of death	Place of death	On LCP	Morphine mg	Fentanyl mcg	Methadone						
				Yes/no		expected / sudden	IPU/Home/PH		Oral	S/D	Subcut	Patch	S/D	Subcut	Sublingual	Oral	S/D
1 AAA1234	65	27/03/2014	Respiratory	No			IPU	No						358	200		
2 AAA1235	62	27/03/2014	Sepsis	No			IPU	No		600				150			
3 AAA1236	78	29/09/2014	Breast Cancer	No	Resp death		IPU	No						44			
4 AAA1237	58	29/09/2014	Lung Cancer	No	Emboli		IPU	No	60	2	5						
5 AAA1238	39	6/10/2014	Breast Cancer	No			IPU	No						500	150		
6 AAA1239	78	7/10/2014	Other Malignancy Cancer	No			IPU	Yes		20	10						
7 AAA1240	56	3/10/2014	Brain abscess	No	Brain abscess, aspiration pneu		IPU	No		11	20						
8 AAA1241	66	8/10/2014	Respiratory	No	Respiratory death		IPU	No	35		50						
9 AAA1242	36	10/10/2014	Cardiovascular Disease	No	Coma	Expected	IPU	Yes						400	250		
10 AAA1243	69	16/10/2014	Cancer - Melanoma	No	Series of PE?	Unexpected	IPU	no	10	10	15		300				
11 AAA1244	85	18/10/2014	Cardiovascular Disease	No		Expected	IPU	Yes						800	125		
12 AAA1245	78	29/10/2014	Other GIT Cancer	No	Agitation ?bladder	Expected	IPU	No						263	25		
13 AAA1246	54	26/10/2014	Other Malignancy Cancer	No		Expected	IPU	No			60					10	
14 AAA1247	63	27/10/2014	Pancreas Cancer	No		Expected	IPU	No		50	30						
15 AAA1248	60	24/10/2014	Gynaecological Cancer	no		Expected	IPU	Yes					1200				
16 AAA1249	80	29/10/2014	Other GIT Cancer	No	Secretions ?infection	Expected	IPU	No	10	20							
17 AAA1250	58	31/10/2014	Other GIT Cancer	no		Expected	IPU	no						200	25		
18 AAA1251	65	5/11/2014	Lung Cancer	No	Q12h SD,	Expected	IPU	Yes					600	1400	100		
19 AAA1252	31	1/11/2014	Other Neurological Disease	No	Clipped to morphine in SI	Expected	IPU	Yes		13	37.5		300	450			
20 AAA1253	50	4/11/2014	Breast Cancer	No		Expected	IPU	No		41	27.5						
21 AAA1254	40	19/09/2014	Breast Cancer	No	Just 24 hours in IPU, ?not	Expected	IPU	Yes		5							
22 AAA1255	82	10/11/2014	Hematological Cancer	no		Expected	IPU	Yes	20	107							
23 AAA1256	58	11/11/2014	Colorectal Cancer	No		Expected	IPU	no					300	300	225		
24 AAA1257	79	17/11/2014	Lung Cancer	No		Expected	IPU	No						413	400		
25 AAA1258	80	15/10/2014	Other Neurological Disease	No	Parkinson's	Expected	IPU	yes			40			1050	600		
26 AAA1259	64	17/11/2014	Colorectal Cancer	No		Expected	IPU	no						250			
27 AAA1260	70	16/11/2014	Other Neurological Disease	No	MIND	Expected	IPU	no						450	500		
28 AAA1261	55	18/11/2014	Other GIT Cancer	No		Expected	IPU	no									
29 AAA1262	66	18/11/2014	Unknown Primary Cancer	No	methadone 20mg oc bid	Expected	IPU	Yes		20	30		300				
30 AAA1263	68	22/11/2014	CNS Cancer	Yes	Pneumonia, im cefurox	Expected	IPU	Yes			150						
31 AAA1264	61	23/11/2014	Lung Cancer	No	methadone maintenance	Expected	IPU	No						400	250		
32 AAA1265	78	23/11/2014	Breast Cancer	No		Expected	IPU	Yes		480	270						
33 AAA1266	48	23/11/2014	Other Neurological Disease	No		Expected	IPU	No		80	45				150		
34 AAA1267	85	24/11/2014	Breast Cancer	No	methadone maintenance	Expected	IPU	no		10	22.5						
35 AAA1268	85	22/11/2014	Other Malignancy Cancer	No		Expected	IPU	Yes		250	200						
36 AAA1269	37	21/11/2014	Colorectal Cancer	No		Expected	IPU	No		10	10						
37 AAA1270	63	5/12/2014	Breast Cancer	No		Expected	IPU	Yes		40							
38 AAA1271	72	6/12/2014	Other Neurological Disease	no		Expected	IPU	Yes		39	20						
39 AAA1272	30	5/12/2014	Other GIT Cancer	no		Expected	IPU	Yes						800	300		
40 AAA1273	94	7/12/2014	Melanoma Cancer	no		Expected	IPU	No		20	35						
41 AAA1274	72	8/12/2014	Lung Cancer	No		Expected	IPU	no									
42 AAA1275	78	1/12/2014	Lung Cancer	No		Expected	IPU	no									

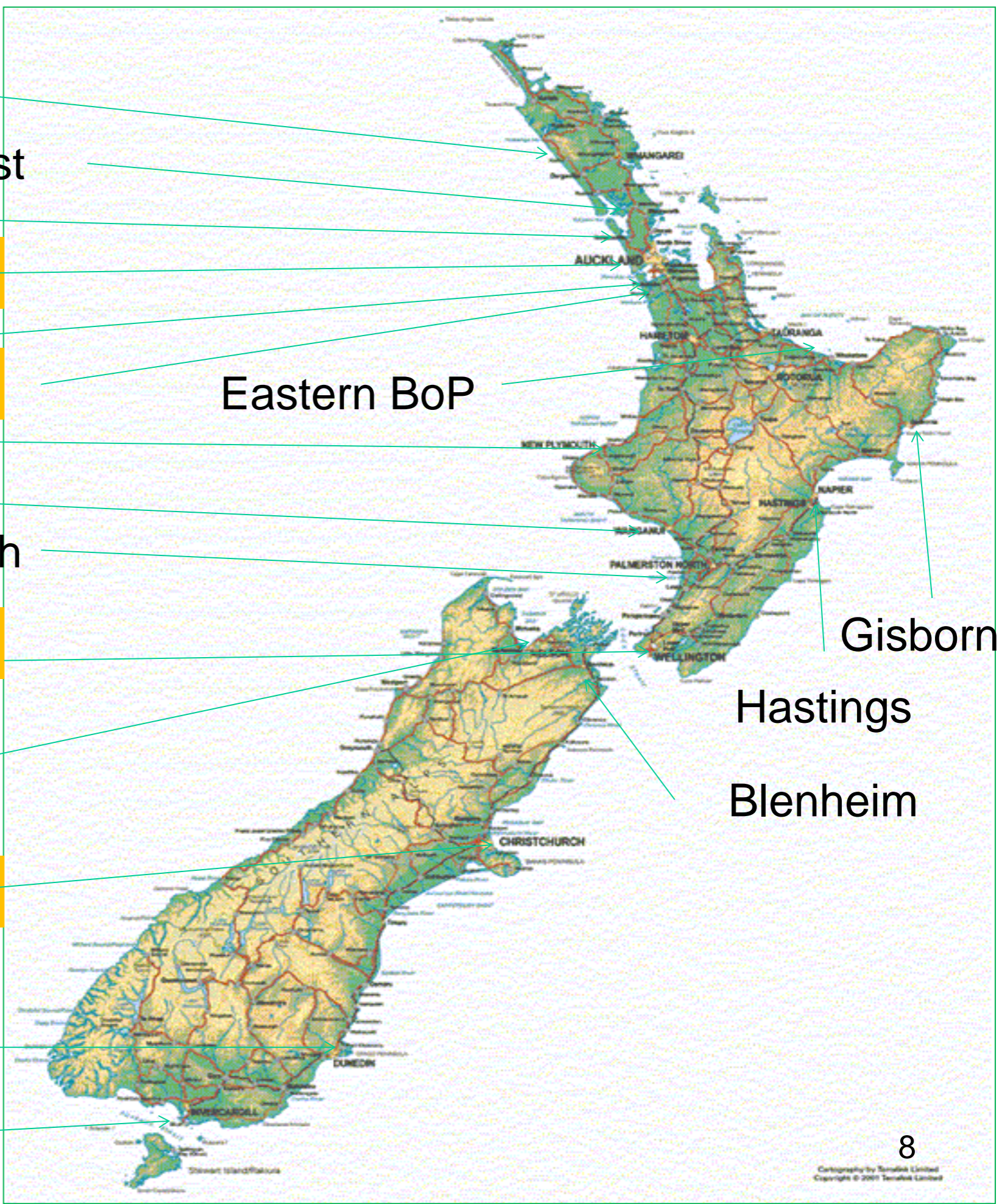
Whangarei  
Hibiscus Coast  
North Shore  
Auckland  
West Auckland  
South Auckland  
Taranaki  
Wanganui  
Palmerston Nth  
Hutt Valley  
Wellington  
Nelson  
Christchurch  
Dunedin  
Southland

Eastern BoP

Gisborne  
Hastings  
Blenheim



Whangarei  
Hibiscus Coast  
North Shore  
**Auckland**  
West Auckland  
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Taranaki  
Wanganui  
Palmerston Nth  
**Hutt Valley**  
**Wellington**  
Nelson  
**Christchurch**  
Dunedin  
Southland



Eastern BoP

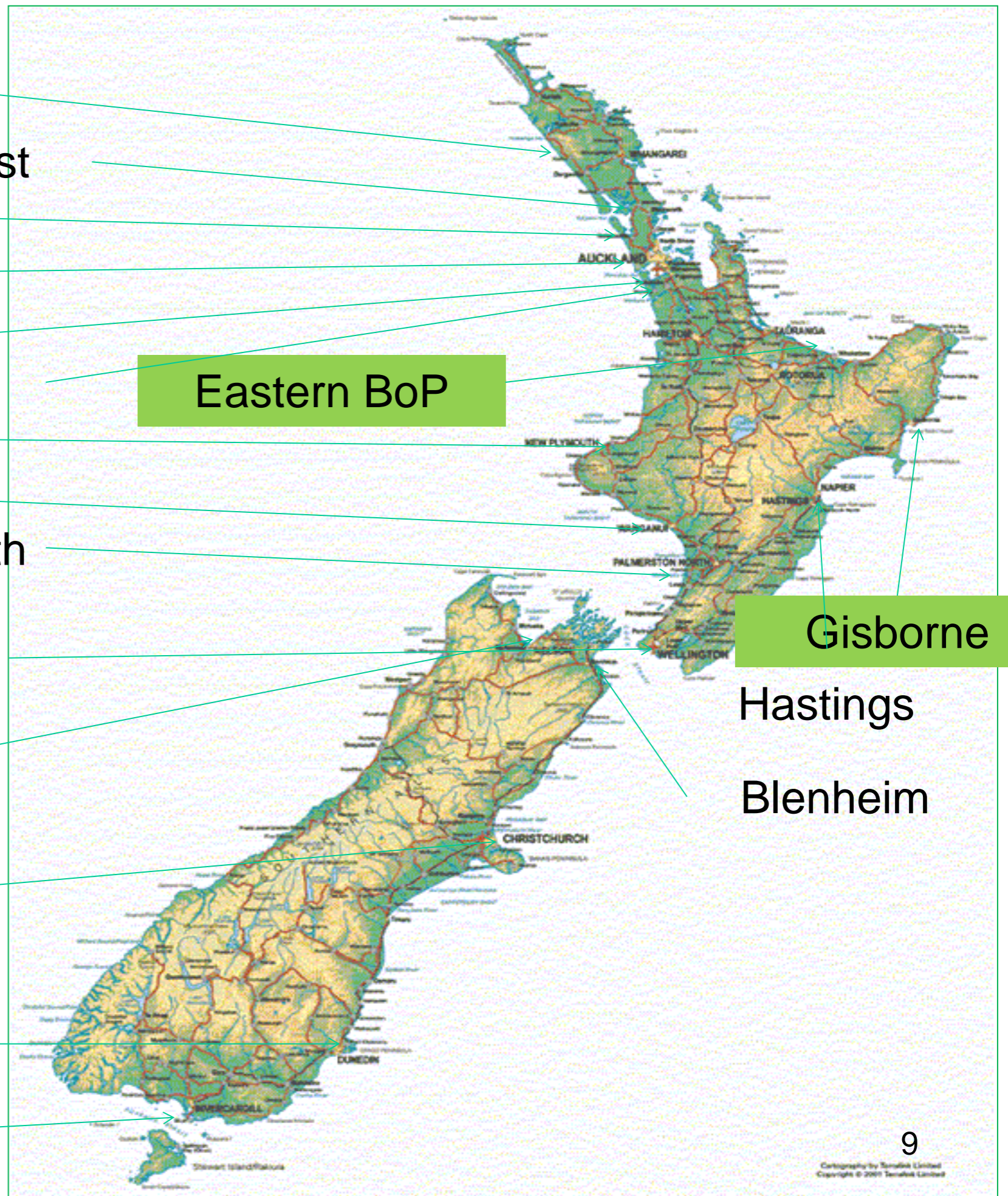
Gisborne

Hastings

Blenheim



Whangarei  
Hibiscus Coast  
North Shore  
Auckland  
West Auckland  
South Auckland  
Taranaki  
Wanganui  
Palmerston Nth  
Hutt Valley  
Wellington  
Nelson  
Christchurch  
Dunedin  
Southland



Eastern BoP

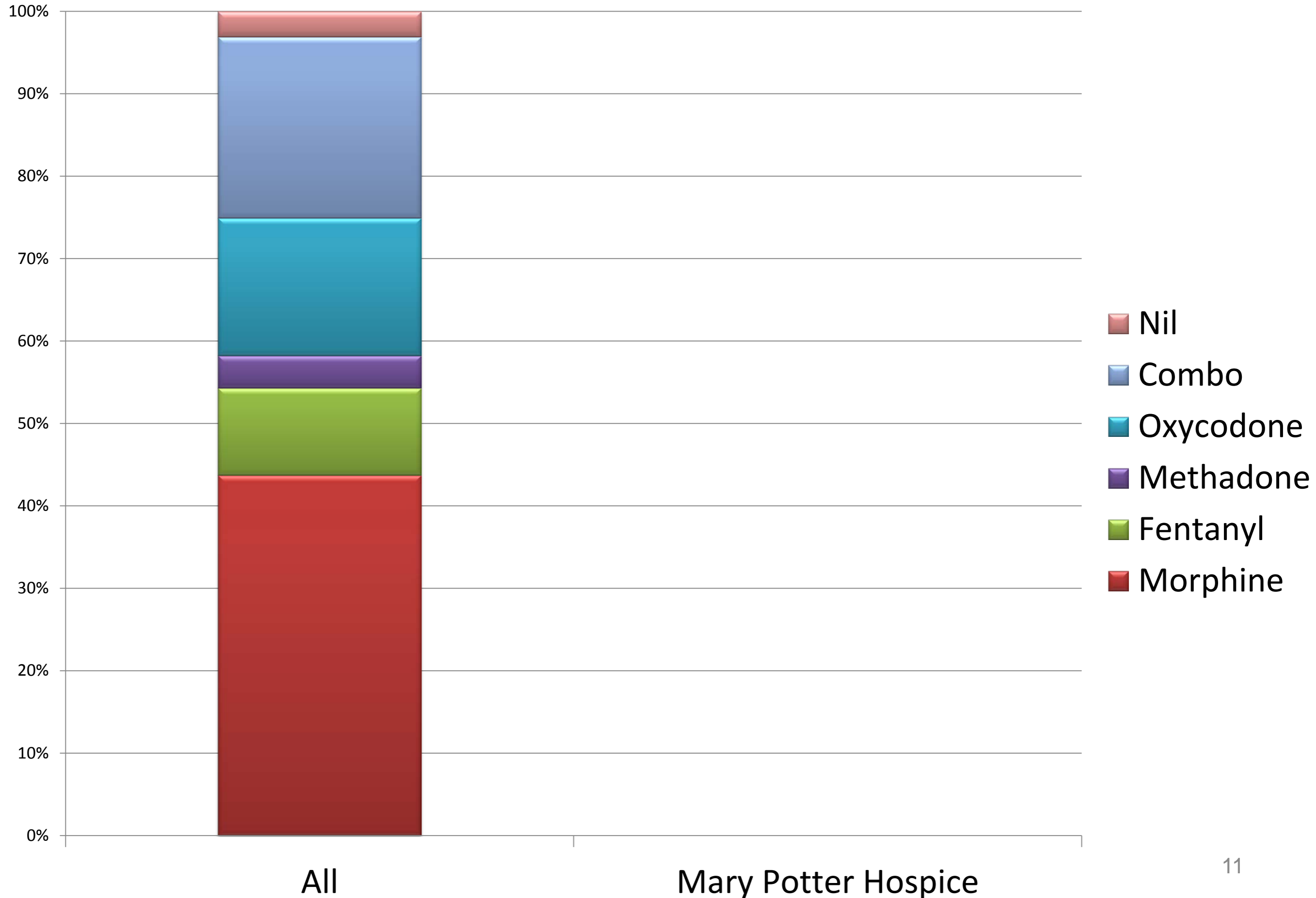
Gisborne

Hastings

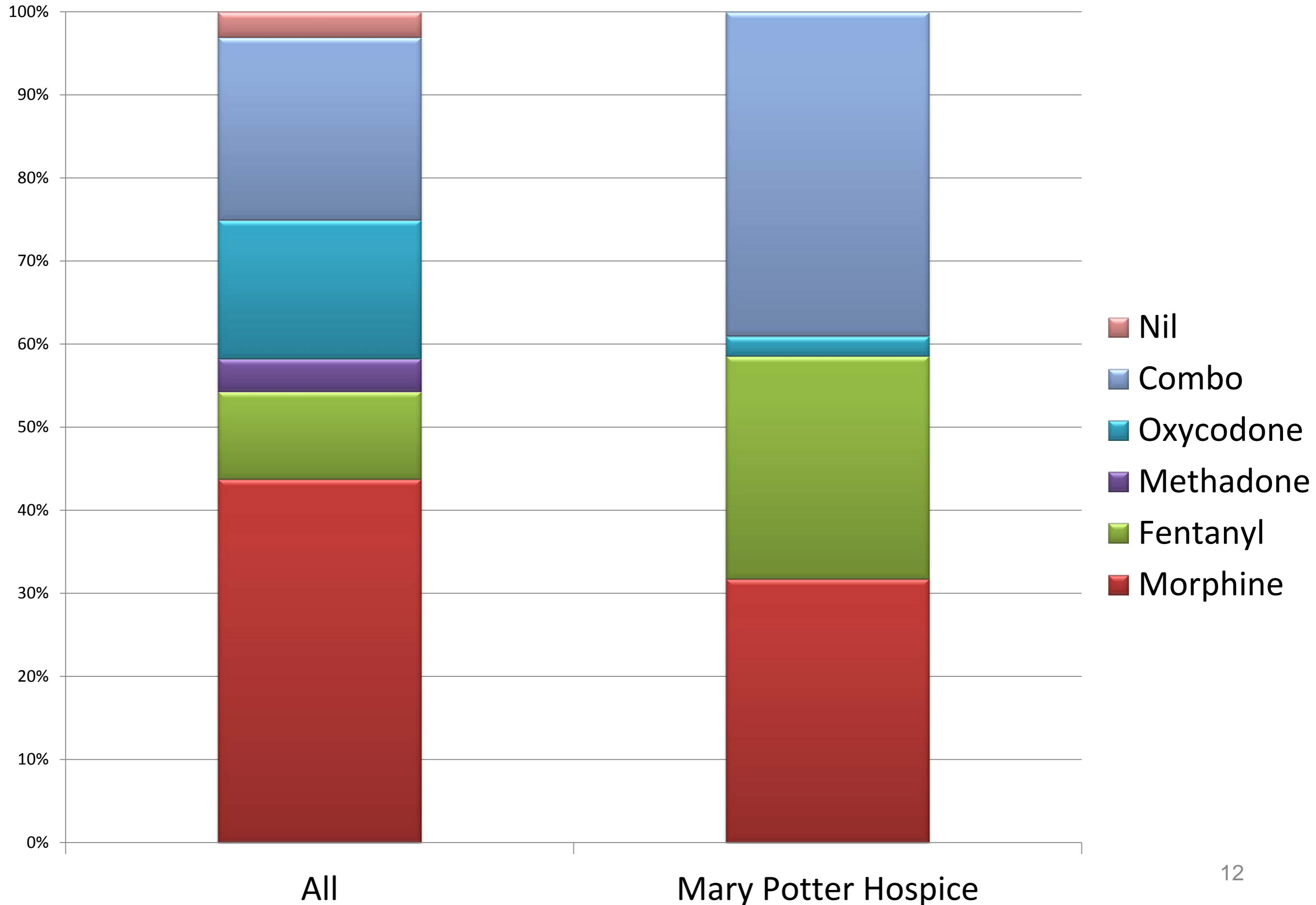
Blenheim

# PATTERNS OF USE

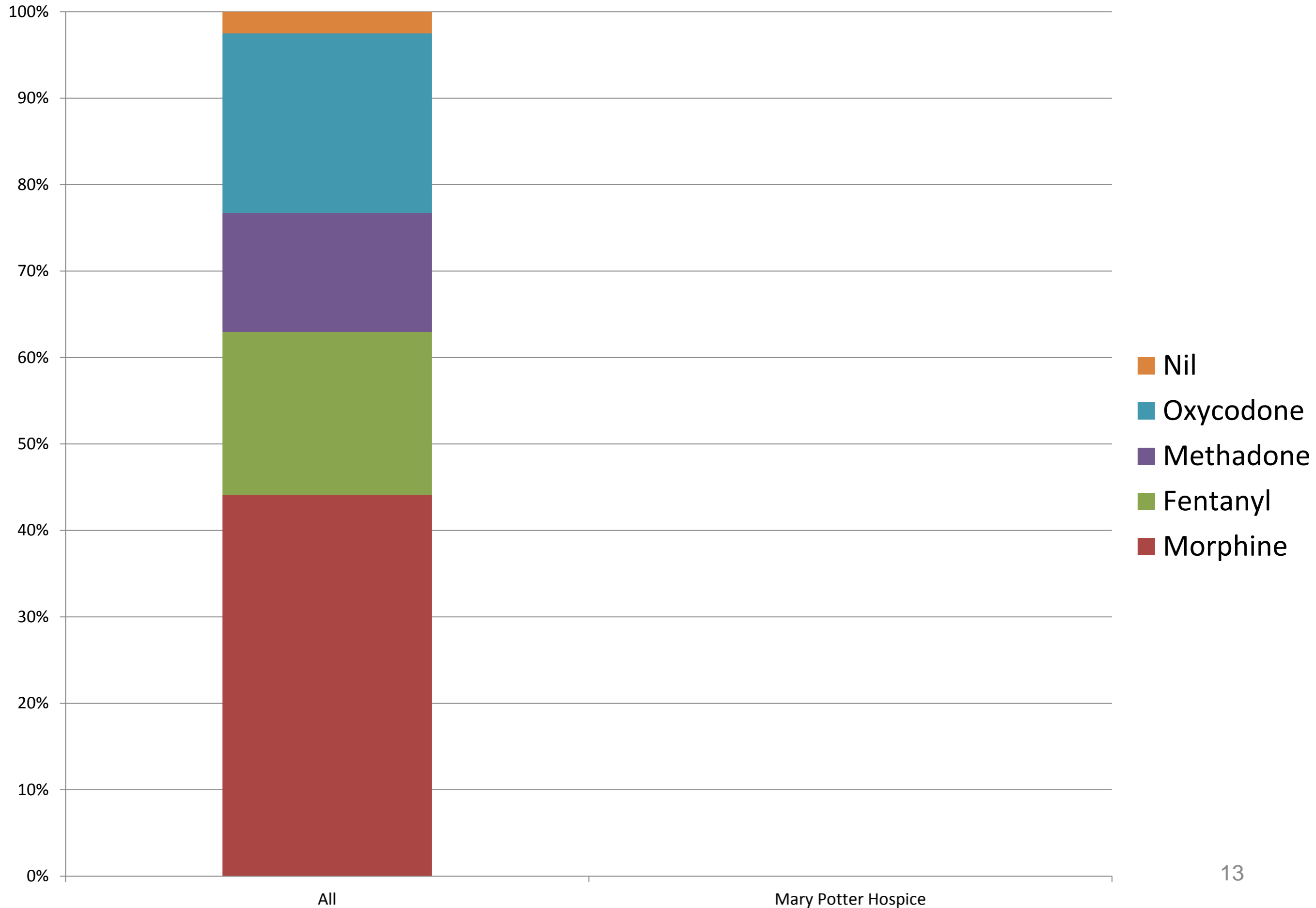
# Opioid Footprints per patient 2015.



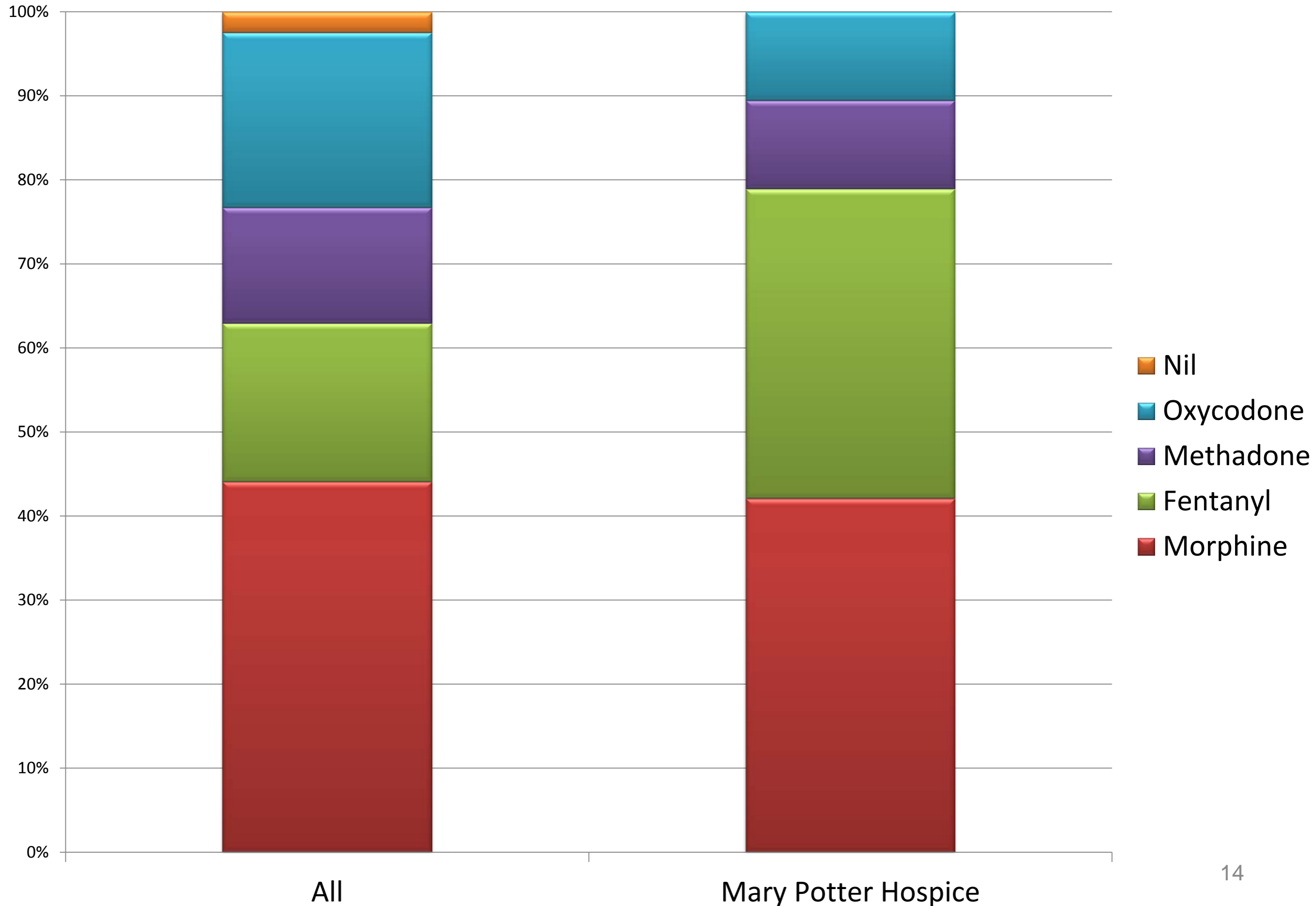
# Opioid Footprints per patient 2015.



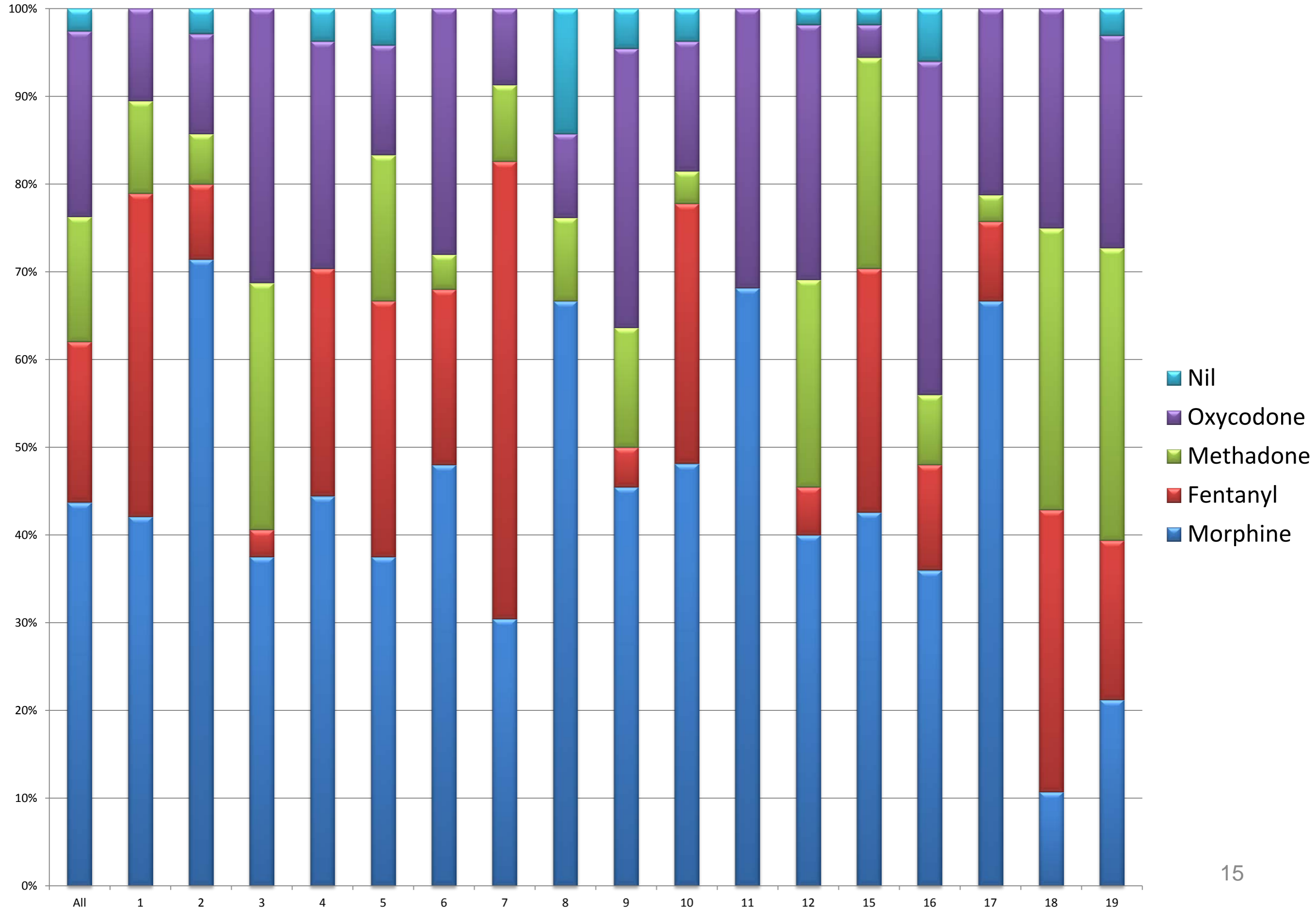
# Opioid footprint by Drug 2015



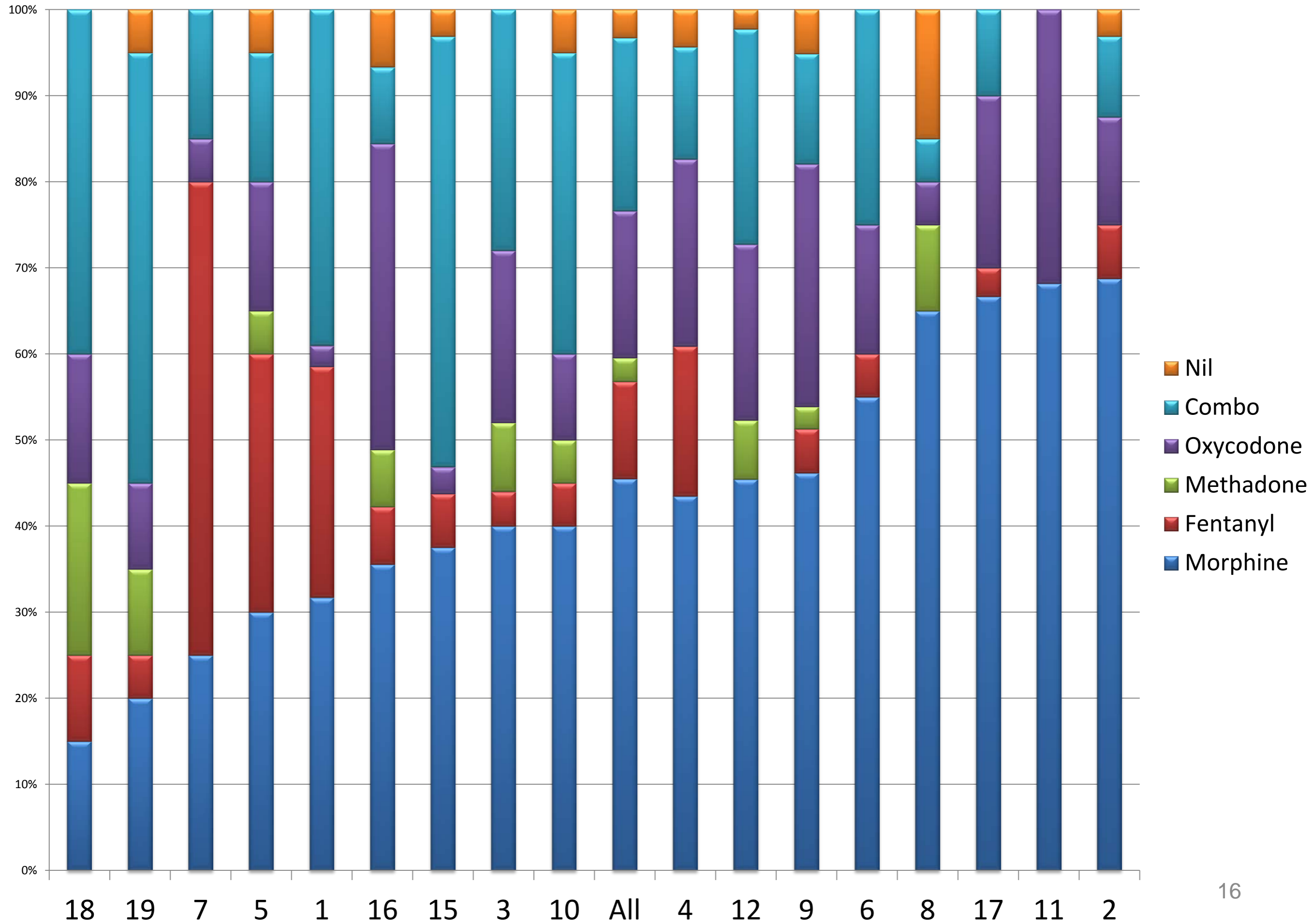
# Opioid footprint by Drug 2015



# Opioid Footprints per drug 2015

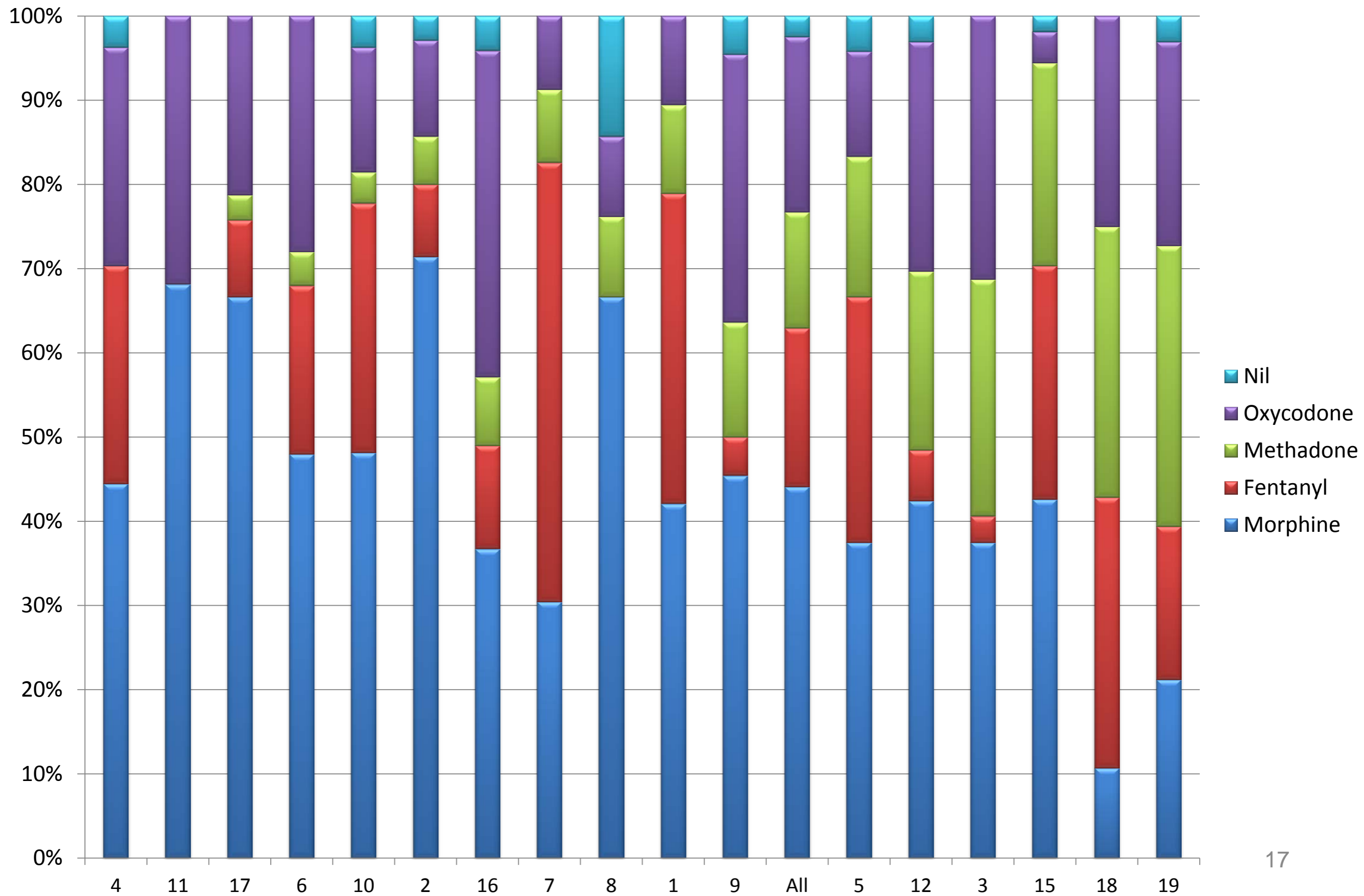


# Opioid footprint in order of increasing use of morphine

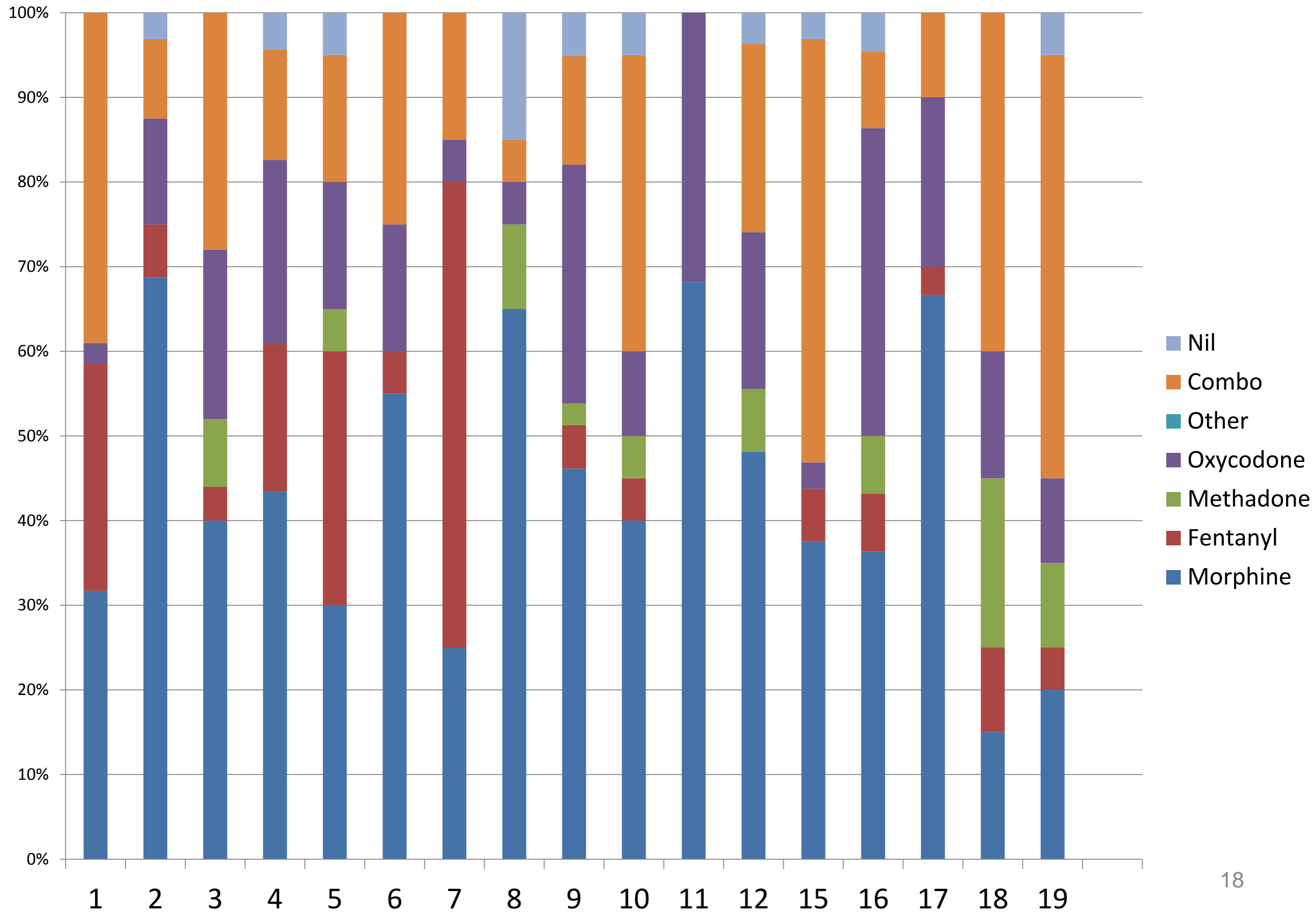




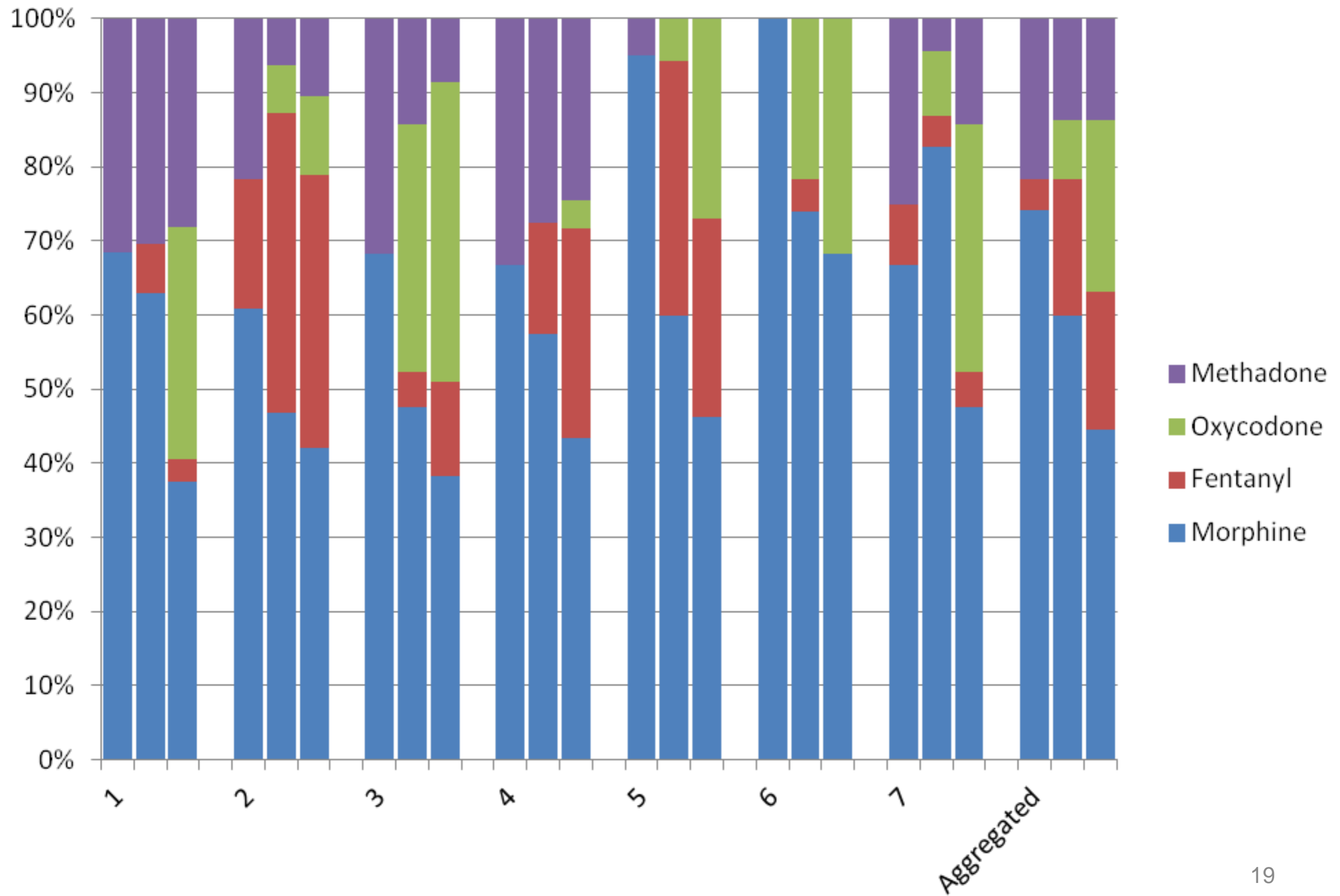
# Opioid Footprint by drug ordered by methadone



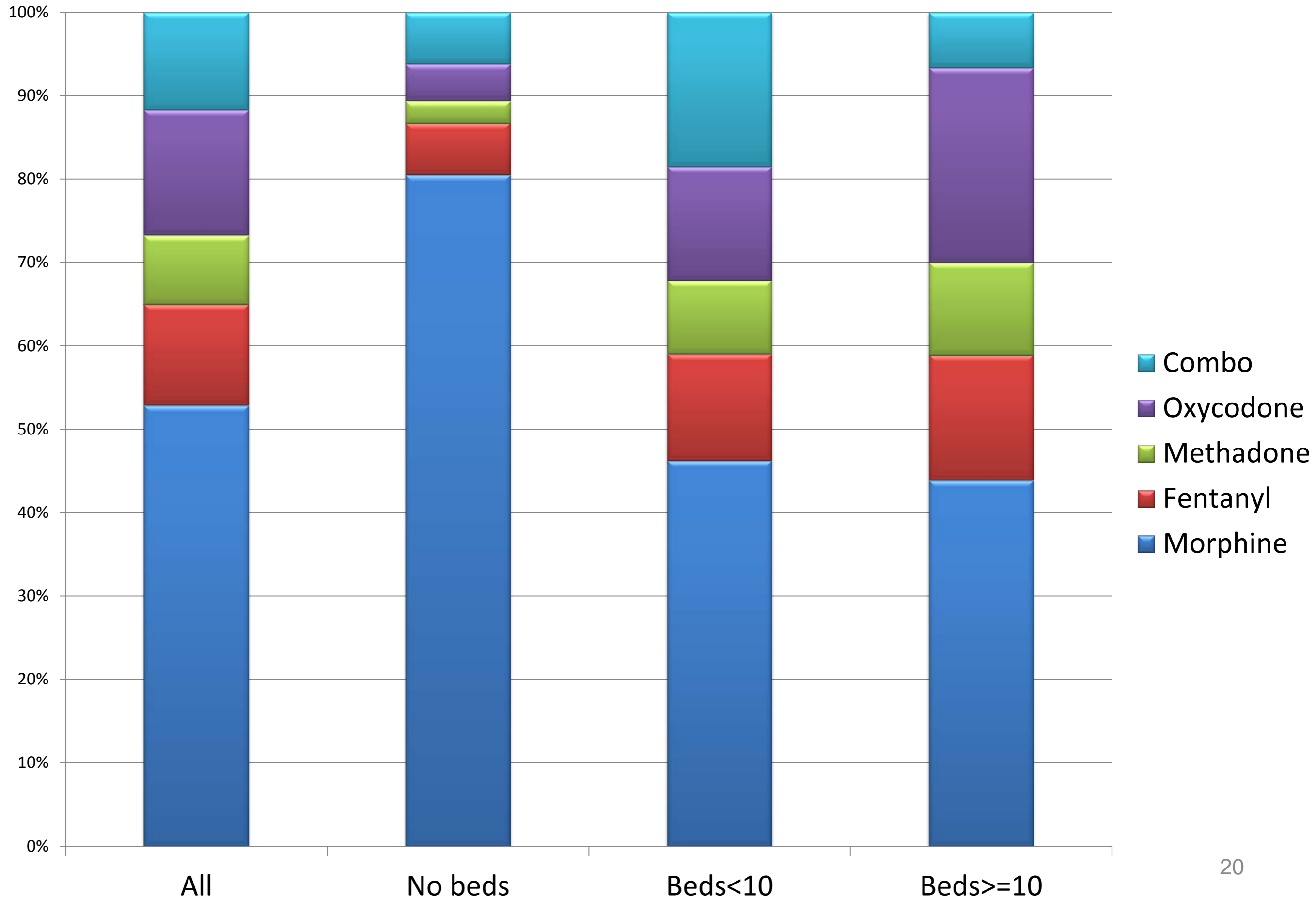
# Opioid footprint, ordered by Combo frequency



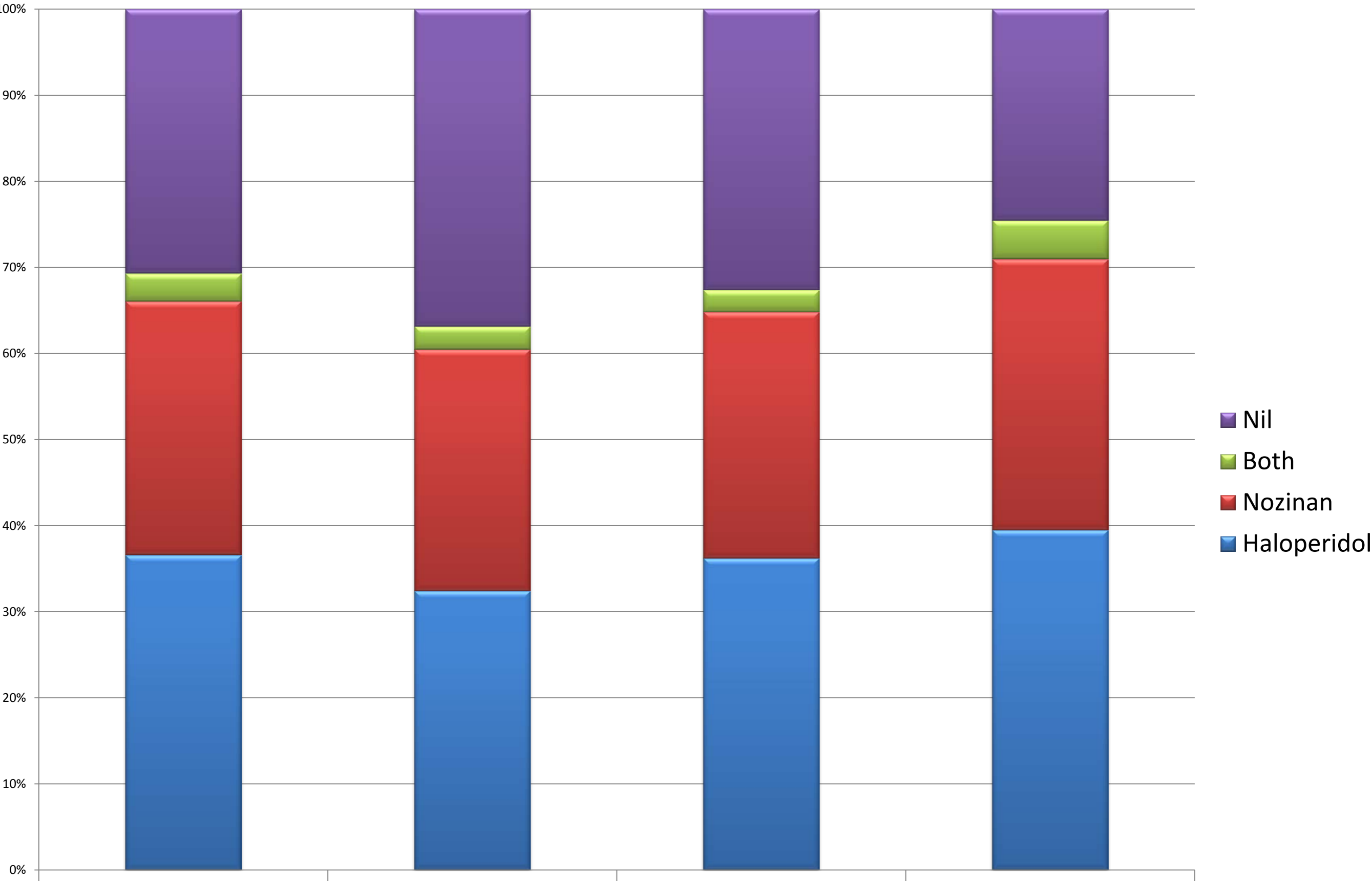
# Changing opioid use 2004,2008,2014



# Syringe driver Opioids by Service Bed Size



# Syringe Driver Antipsychotic footprint by Service Size



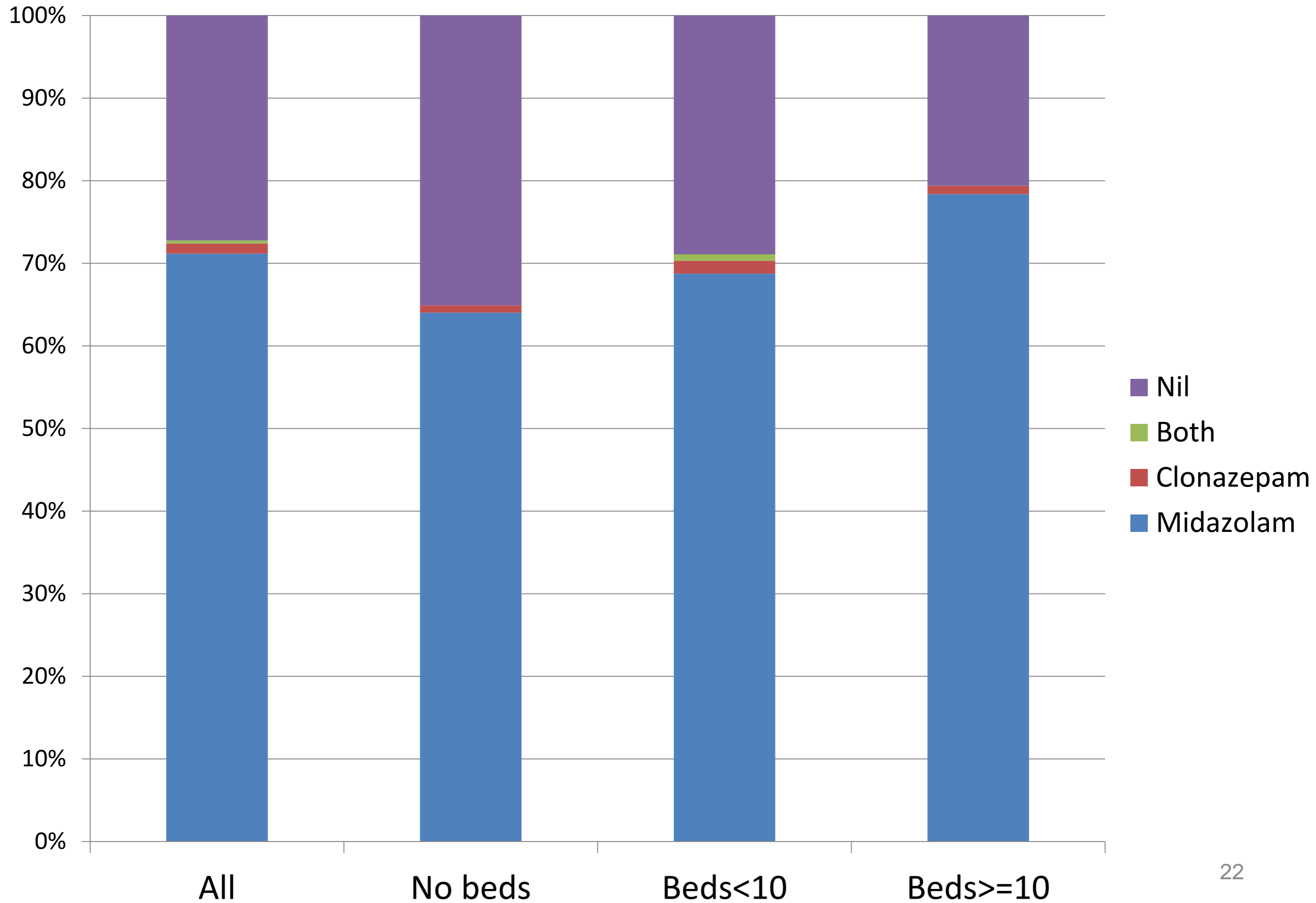
All

Rural

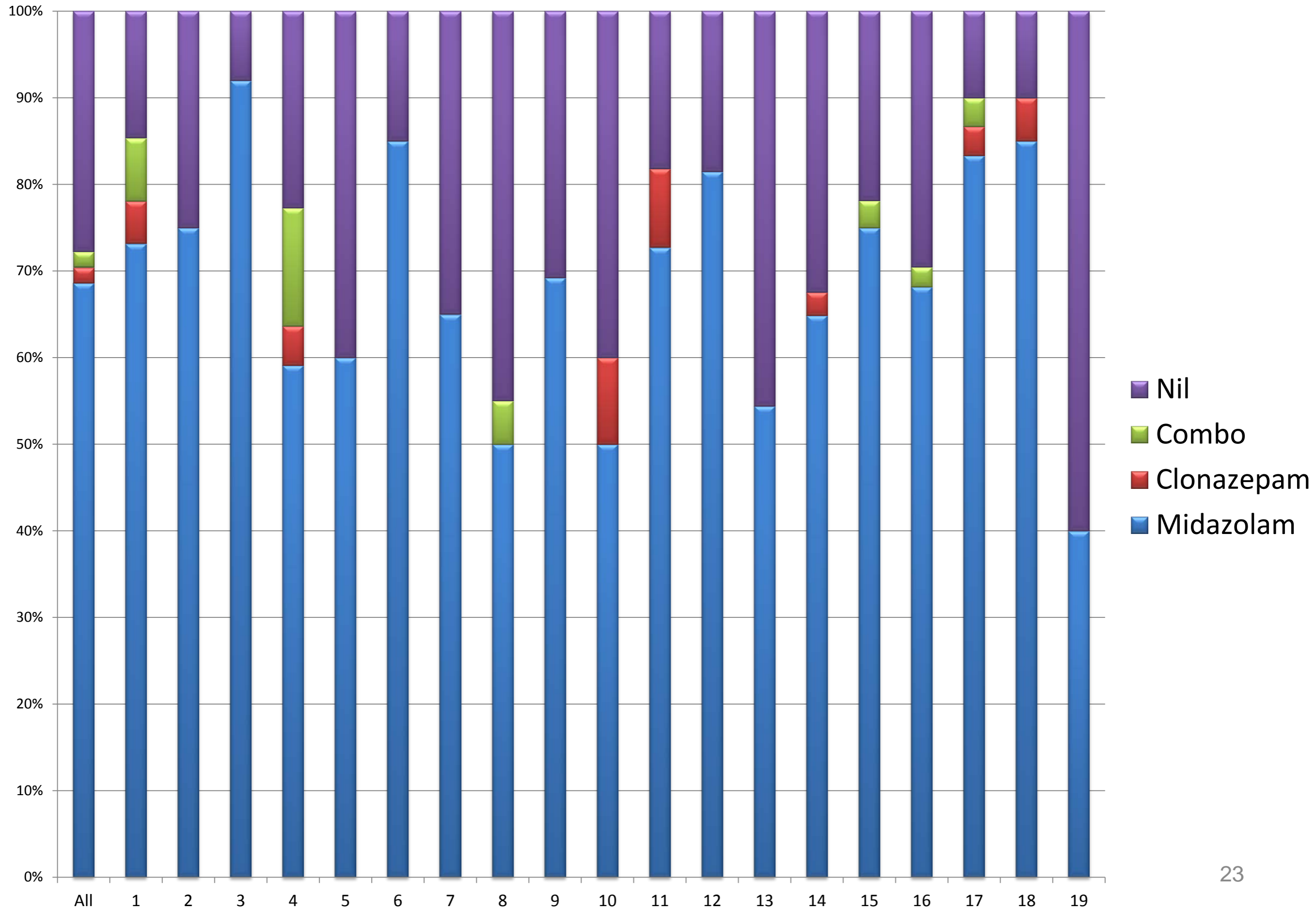
Beds < 10

Beds ≥ 10

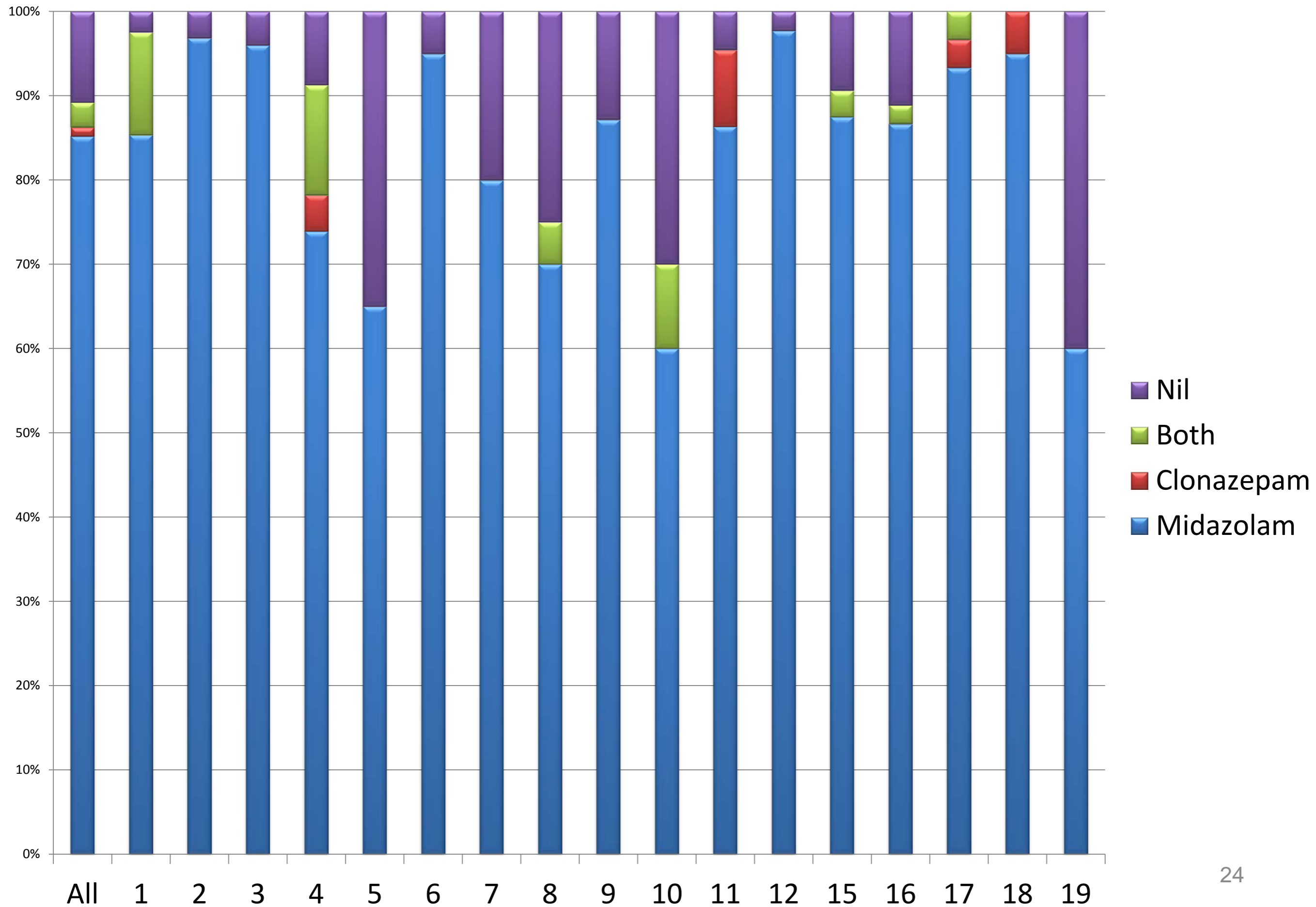
# Syringe Driver Benzo Footprint by Service Size



# Benzodiazepines in SD

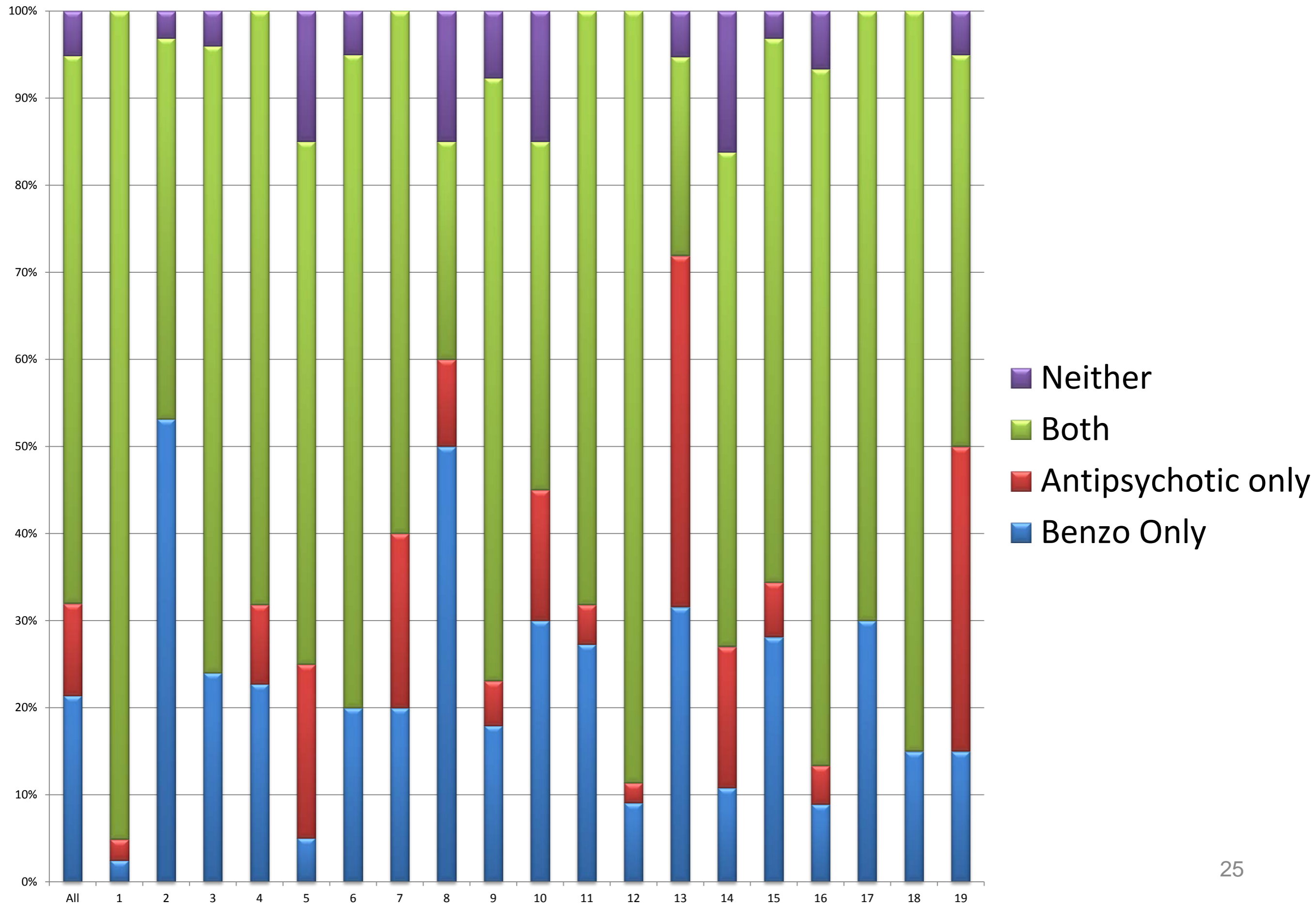


# Benzodiazepine Footprint per patient 2015



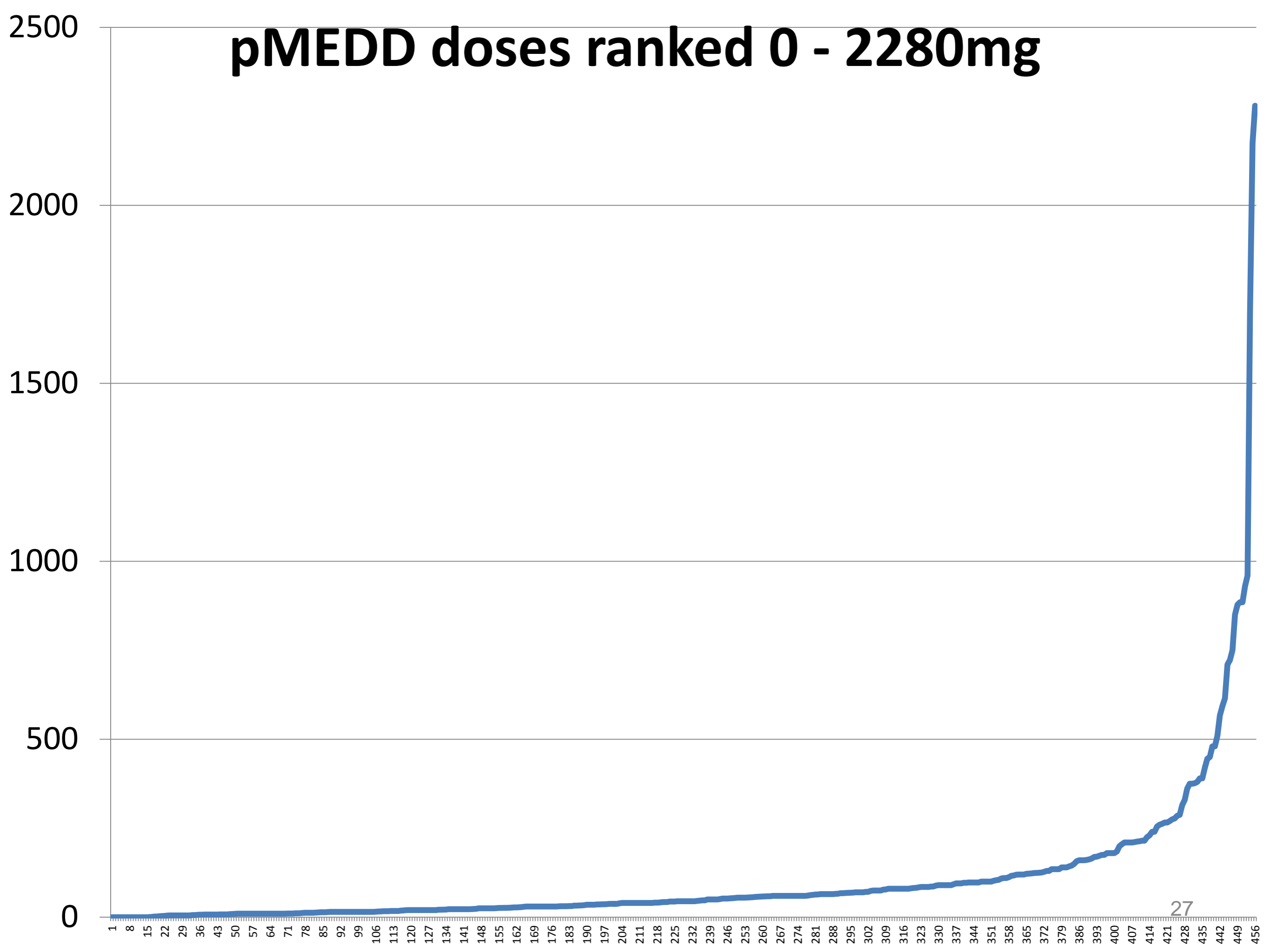


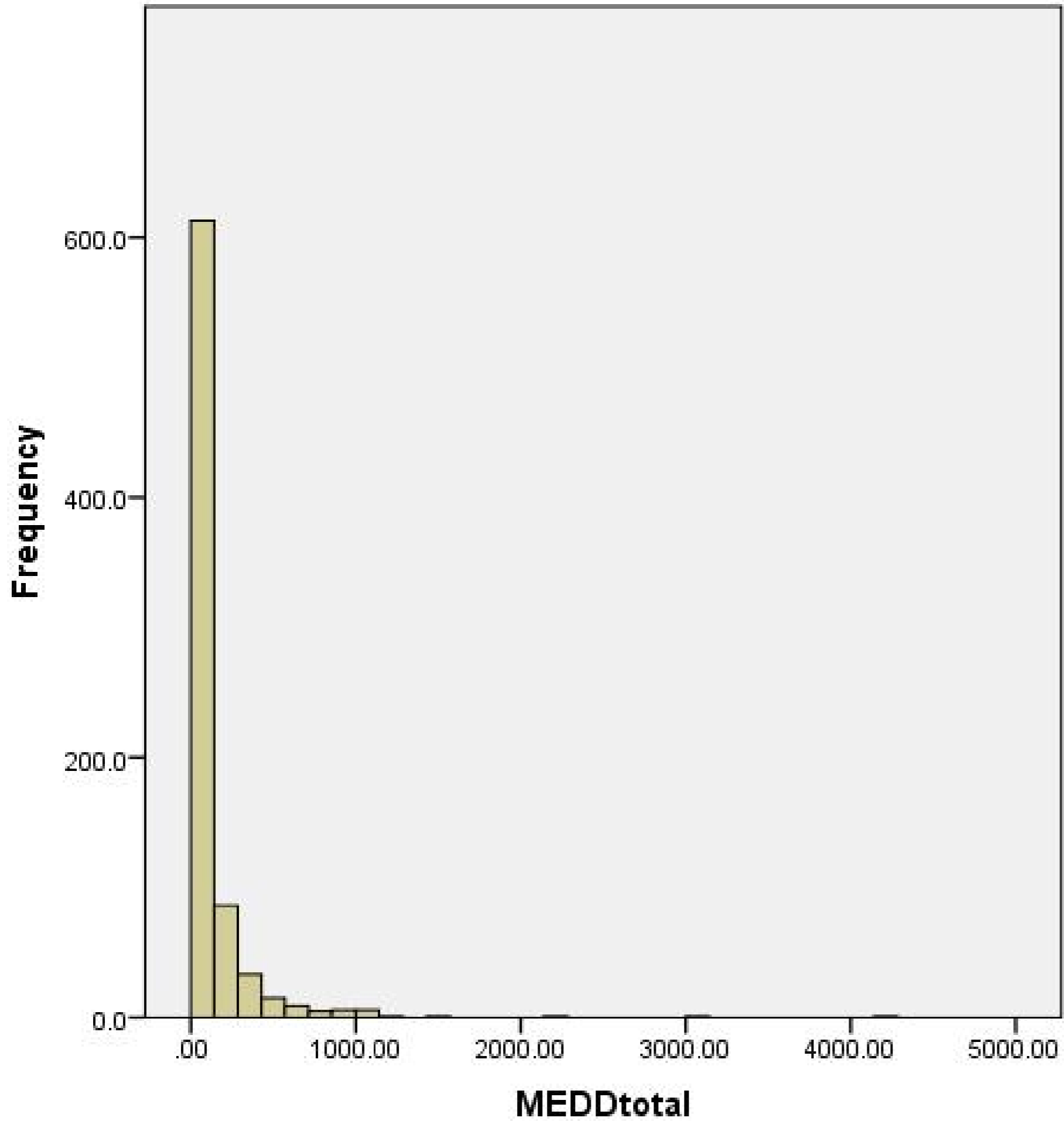
# Use of psychoactive medication in SD



# DOSAGES ANALYSIS

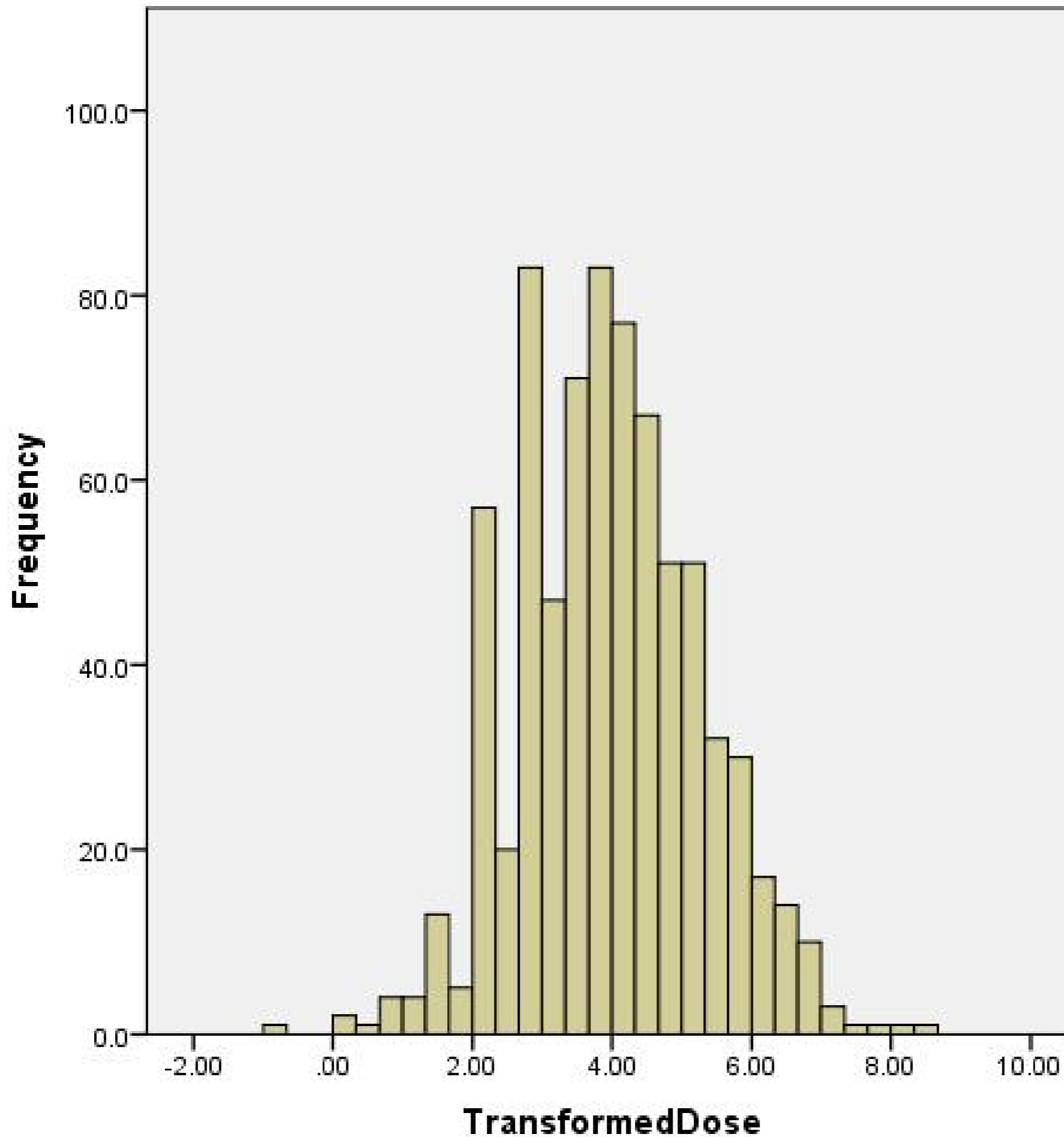
# pMEDD doses ranked 0 - 2280mg





Mean = 124.0491  
Std. Dev. = 270.52773  
N = 778

Opioid  
doses



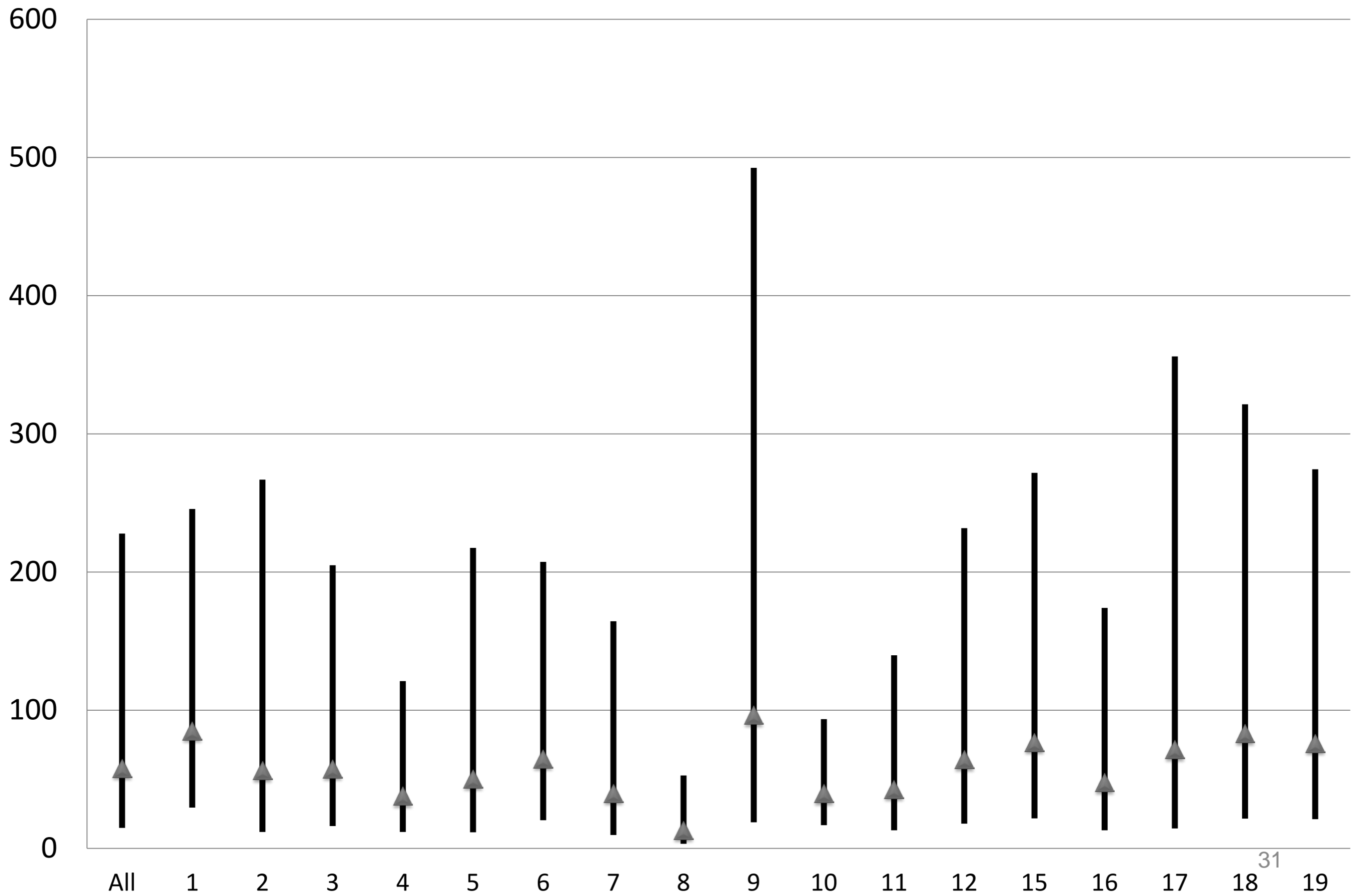
Histogram  
of log  
transform  
ation of  
total  
opioid  
dose

# Morphine Equivalent Daily Dose (parenteral)

Opioid	Route	Conversion
Morphine	Oral	X 1.5
	Subcut	X 1
Fentanyl	Patch	X 0.1
	Subcut	X 0.1
	Sublingual	X 0.05
Oxycodone	Oral	X 0.63
	Subcut	X 1.5
Methadone	Oral	X 4
	Subcut	X 8

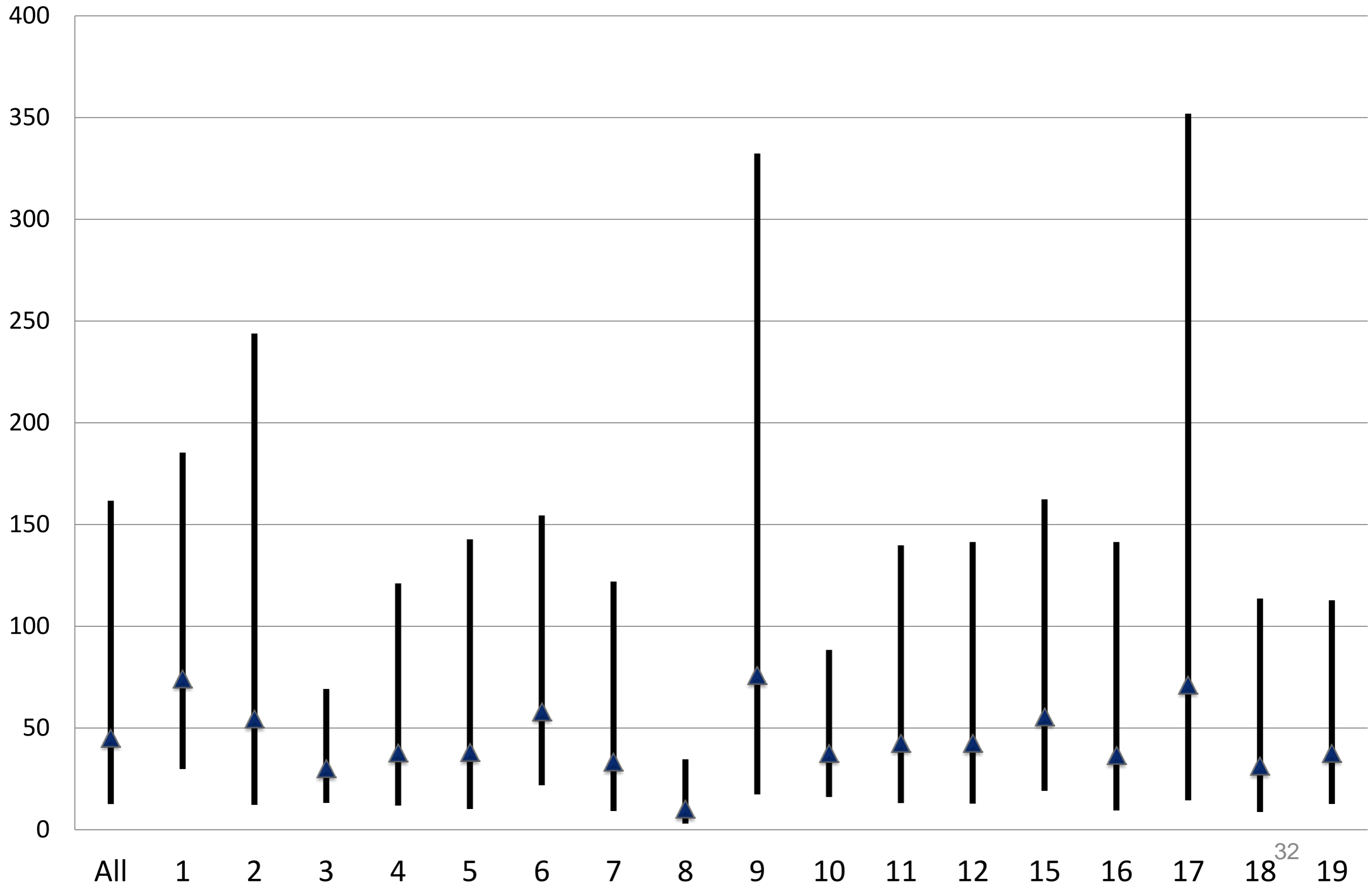
# Opioid MEDD Geographic means & Std Dev

(including Methadone)



# Opioid MEDD Geographic means & Standard Dev.

(Methadone not converted)





# ANOVA

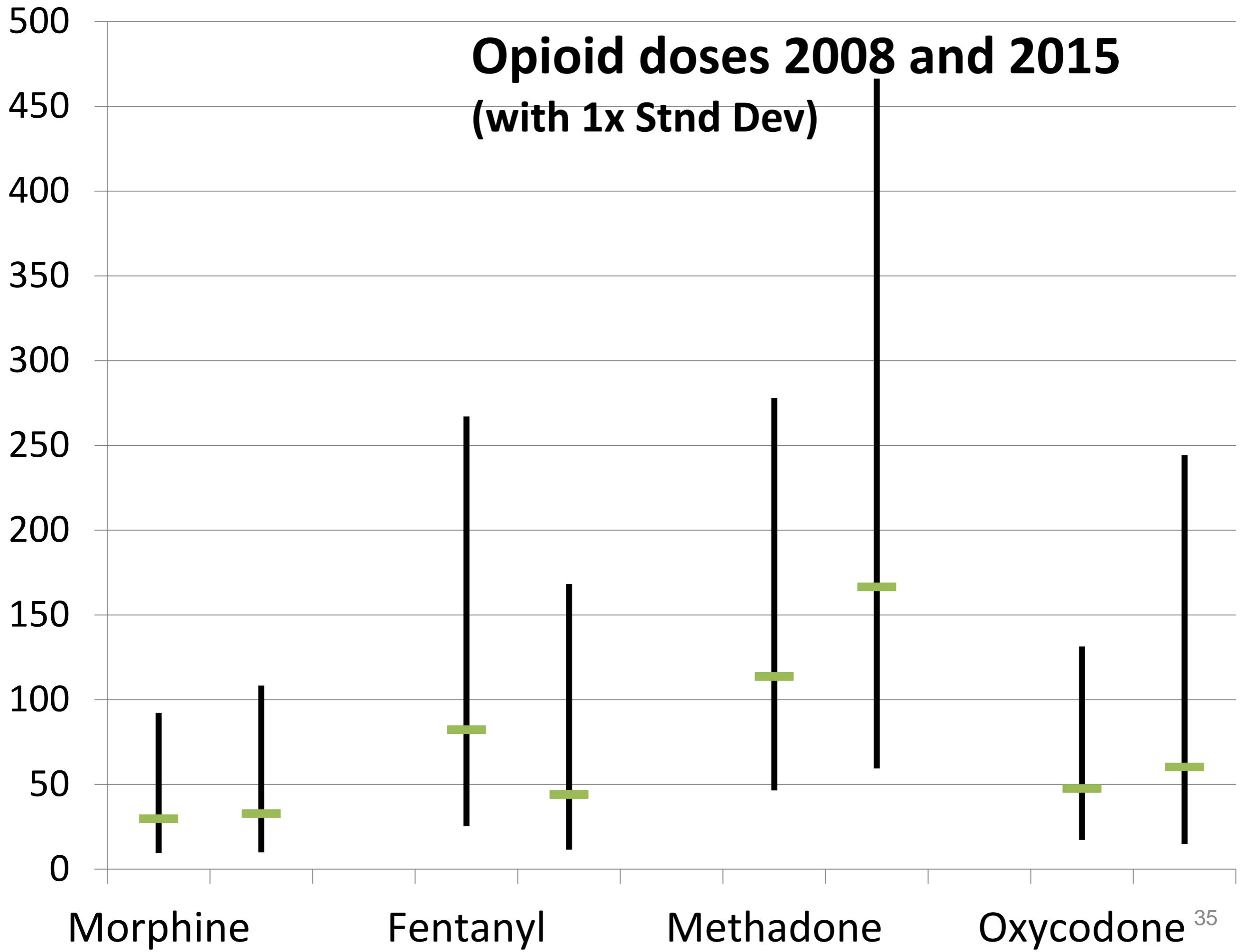
Transformed  
Dose

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	72.574	14	5.184	2.968	.000
Within Groups	663.706	380	1.747		
Total	736.279	394			

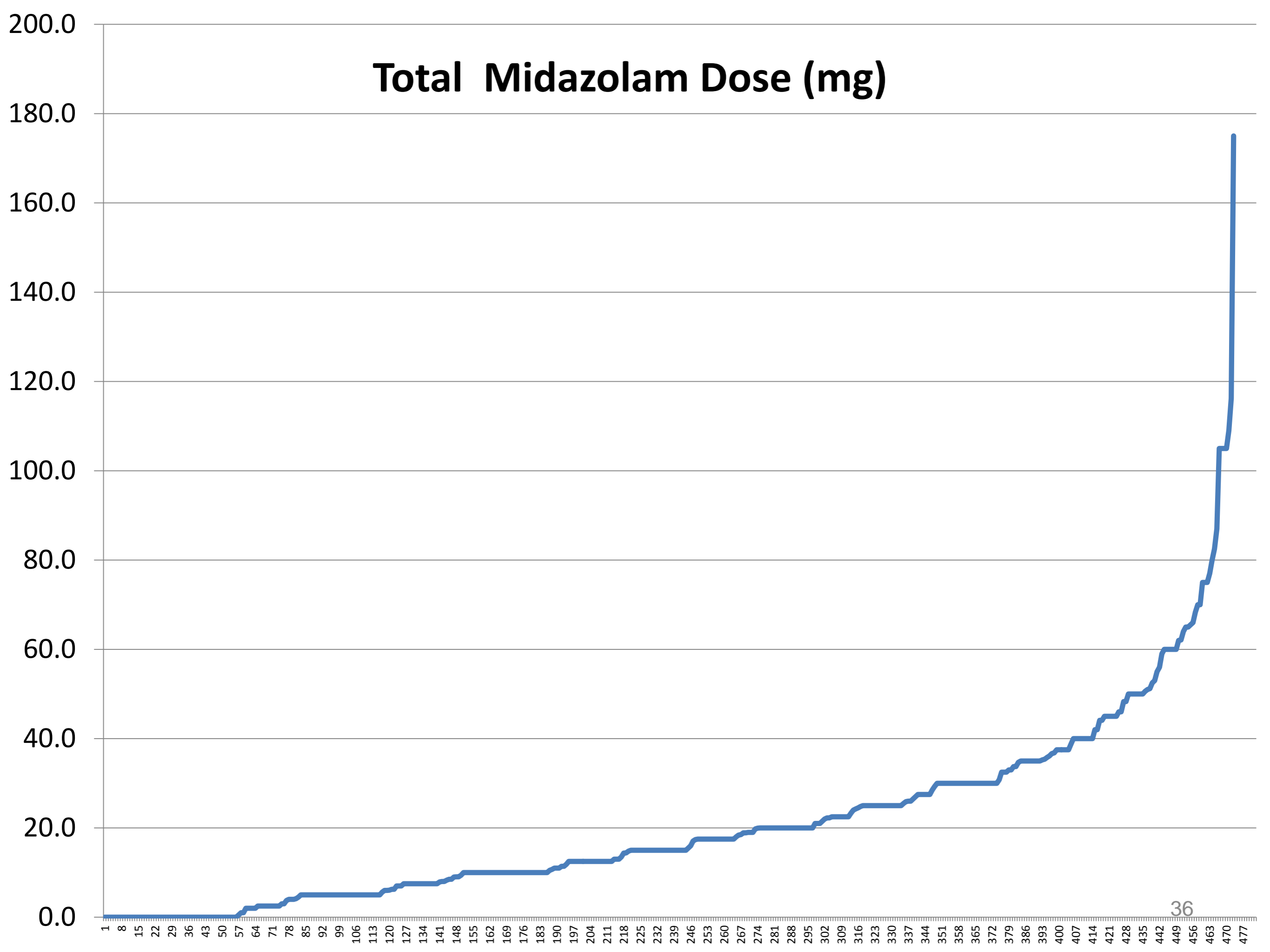
		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
(I) Hospice						
1	2	.41298	.31455	.993	-.6609	1.4868
	3	.39183	.33536	.998	-.7530	1.5367
	4	.80939	.34927	.578	-.3830	2.0018
	5	.52594	.36678	.984	-.7262	1.7781
	6	.27013	.36046	1.000	-.9604	1.5007
	7	.75719	.36046	.734	-.4734	1.9878
	8	1.85915*	.38124	.000	.5577	3.1607
	9	-.12499	.29968	1.000	-1.1481	.8981
	10	.76357	.36678	.746	-.4886	2.0157
	11	.68867	.34927	.814	-.5037	1.8810
	15	.10331	.31455	1.000	-.9705	1.1771
	16	.57925	.29015	.799	-.4113	1.5698
	17	.17298	.32067	1.000	-.9217	1.2677
	18	.02347	.36046	1.000	-1.2071	1.2540

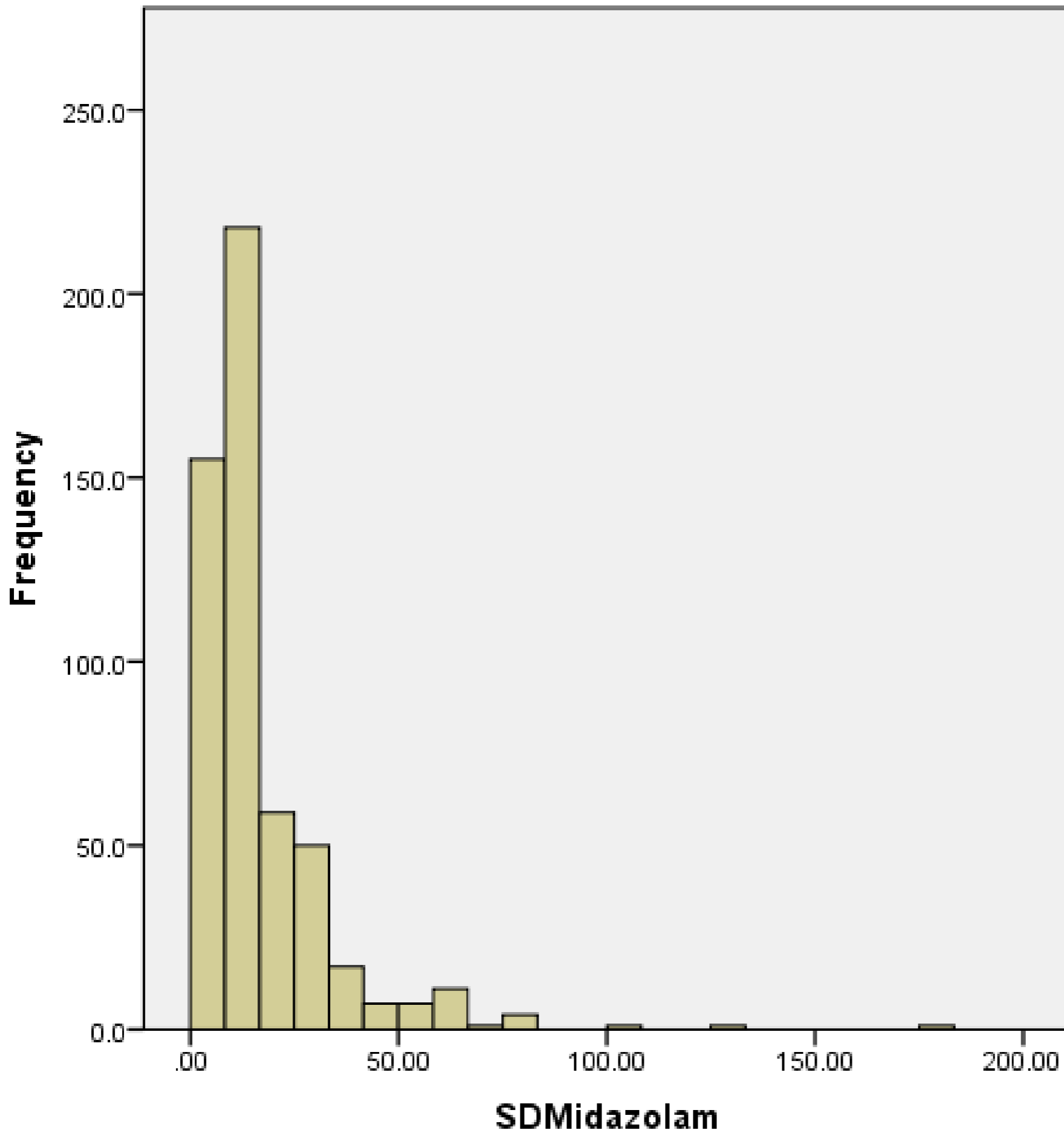
# Opioid doses 2008 and 2015

(with 1x Stnd Dev)

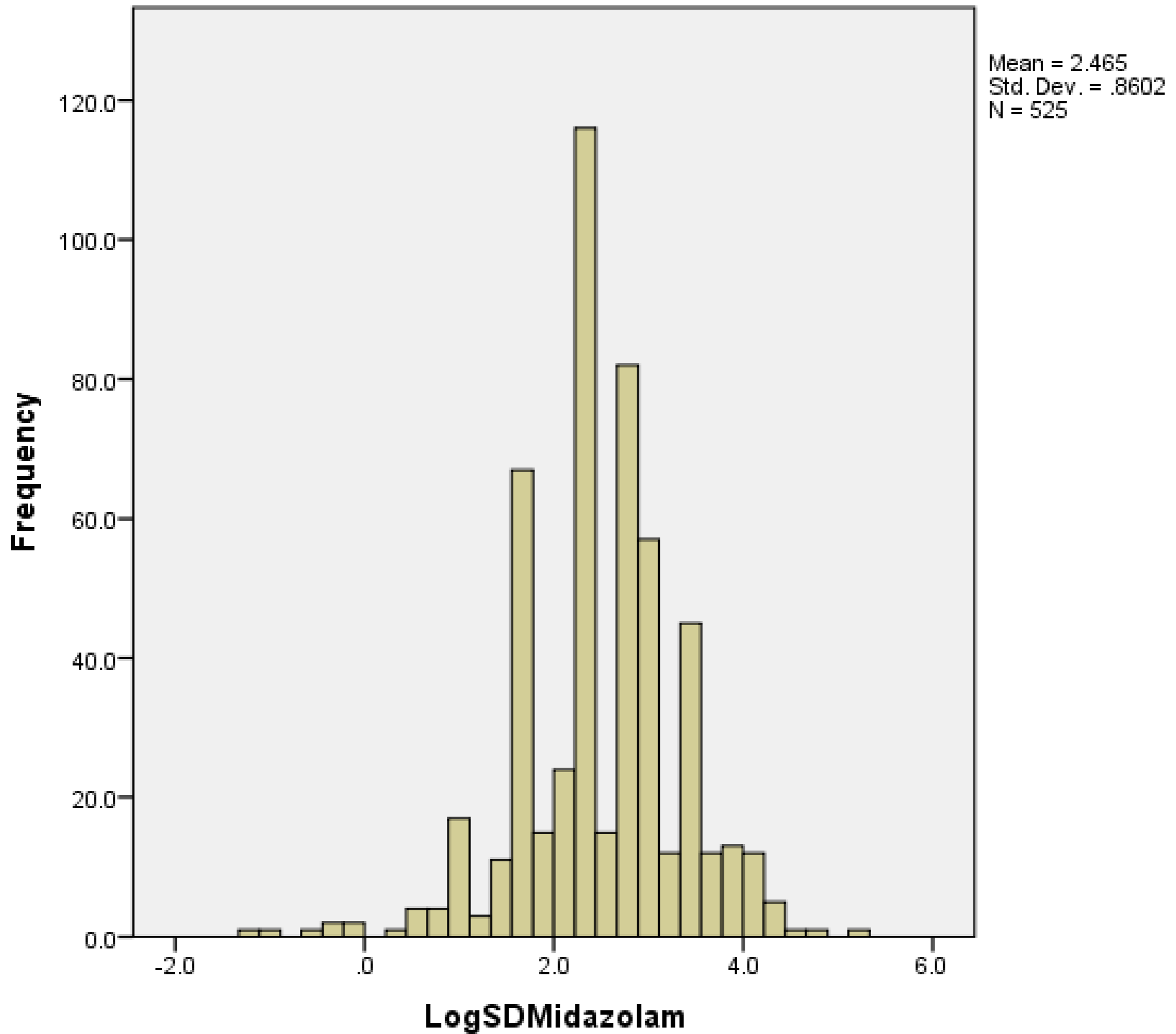


# Total Midazolam Dose (mg)





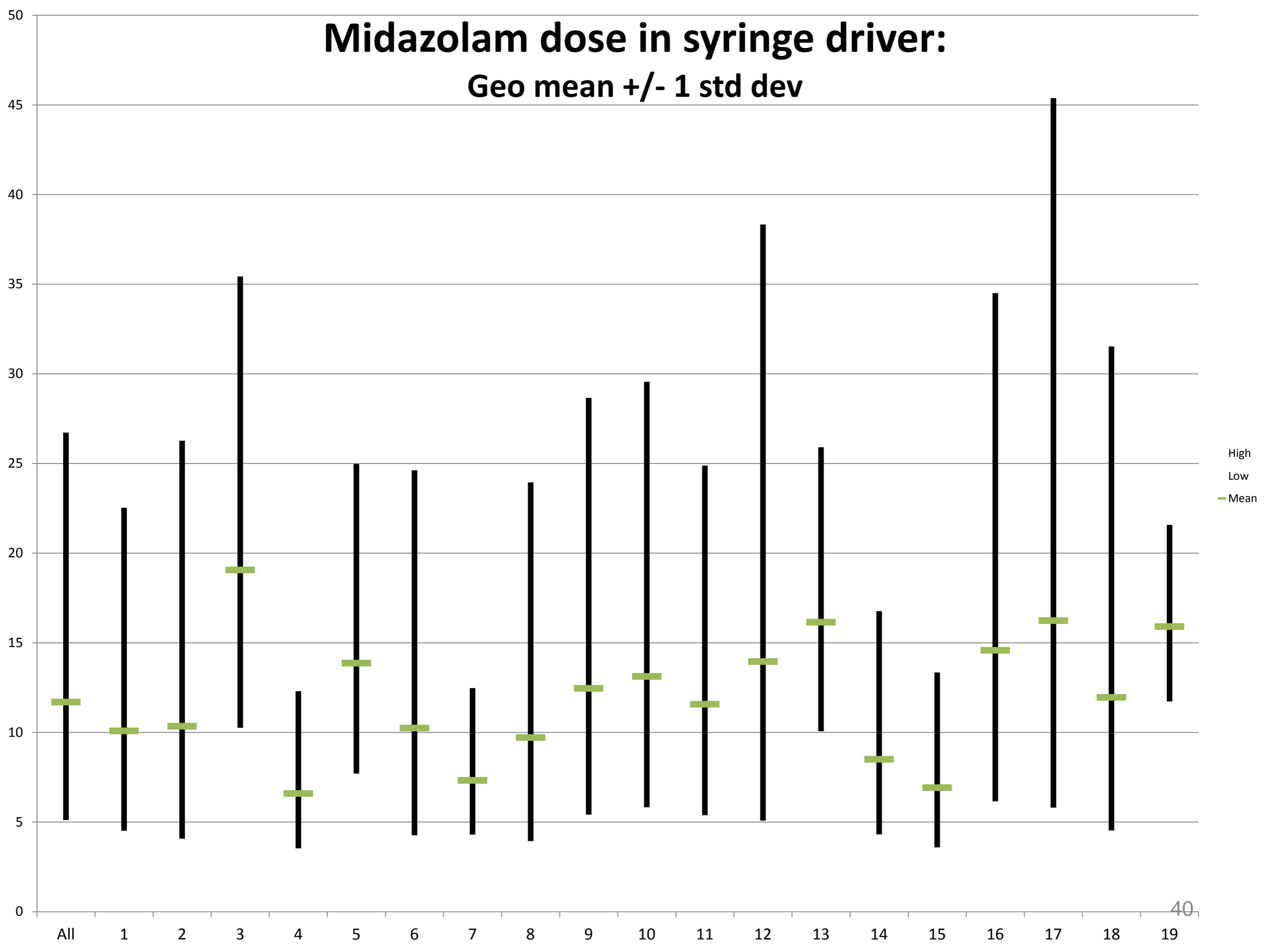
Mean = 16.4416  
Std. Dev. = 16.44403  
N = 532



	Morphine in the SD		Total Morphine		
2008	28mg		47mg		
2015	24mg	0.233	57mg	0.114	
Midazolam in SD					
2008	12mg				
2015	12mg	0.84			

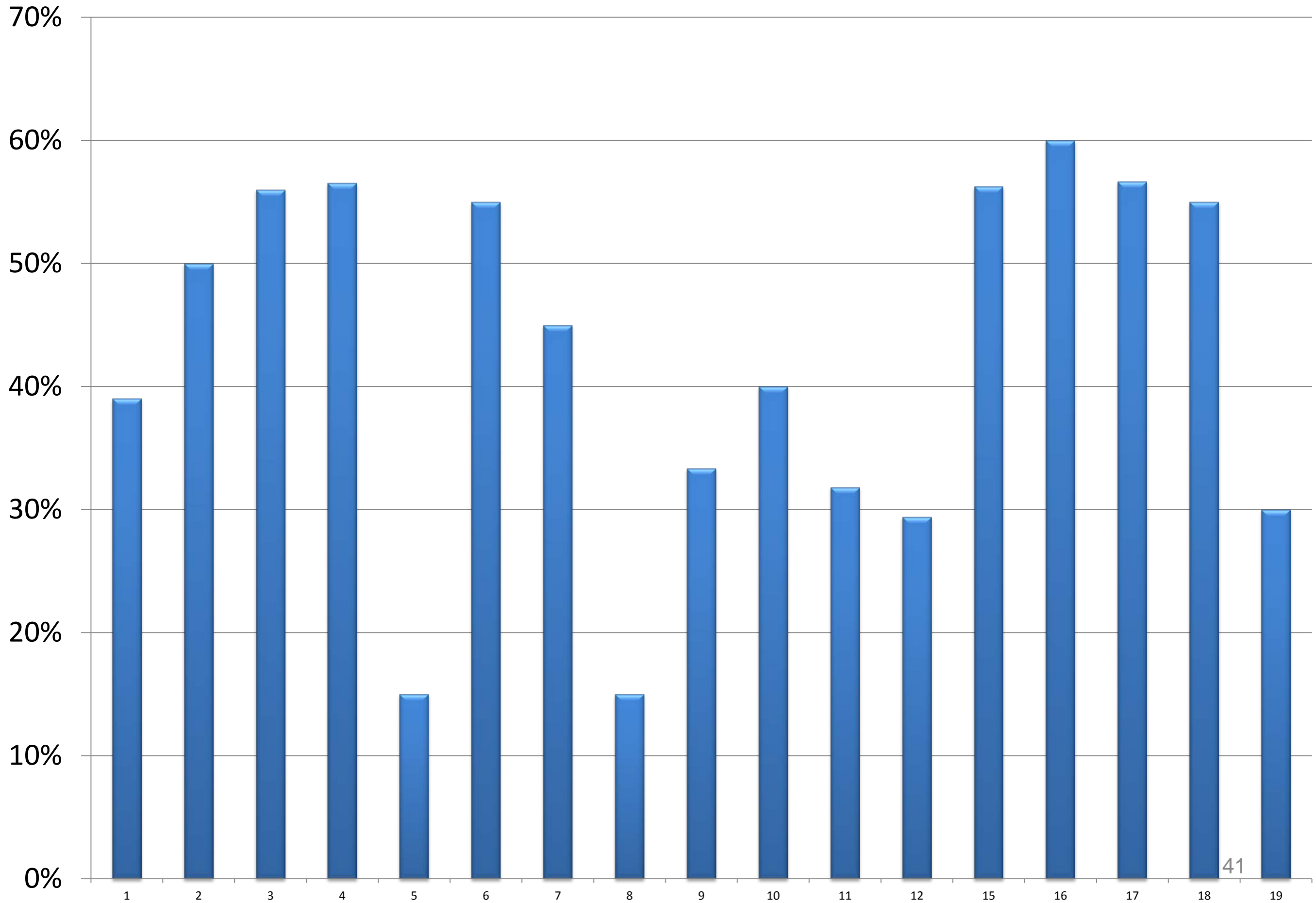
# Midazolam dose in syringe driver:

Geo mean  $\pm$  1 std dev





# Percentage of patients getting Buscopan



# Benchmarking



- 50mg parenteral morphine in the last 24 hours
- Opioid dosages are reasonably constant
- Descriptive analyses of medication use has value for self reflection & governance
- The use of psychoactive medications and opioids is likely to vary by hospice, not by locality or diagnosis.

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