Arguments Against Opioid Therapy Following Refractive Surgery

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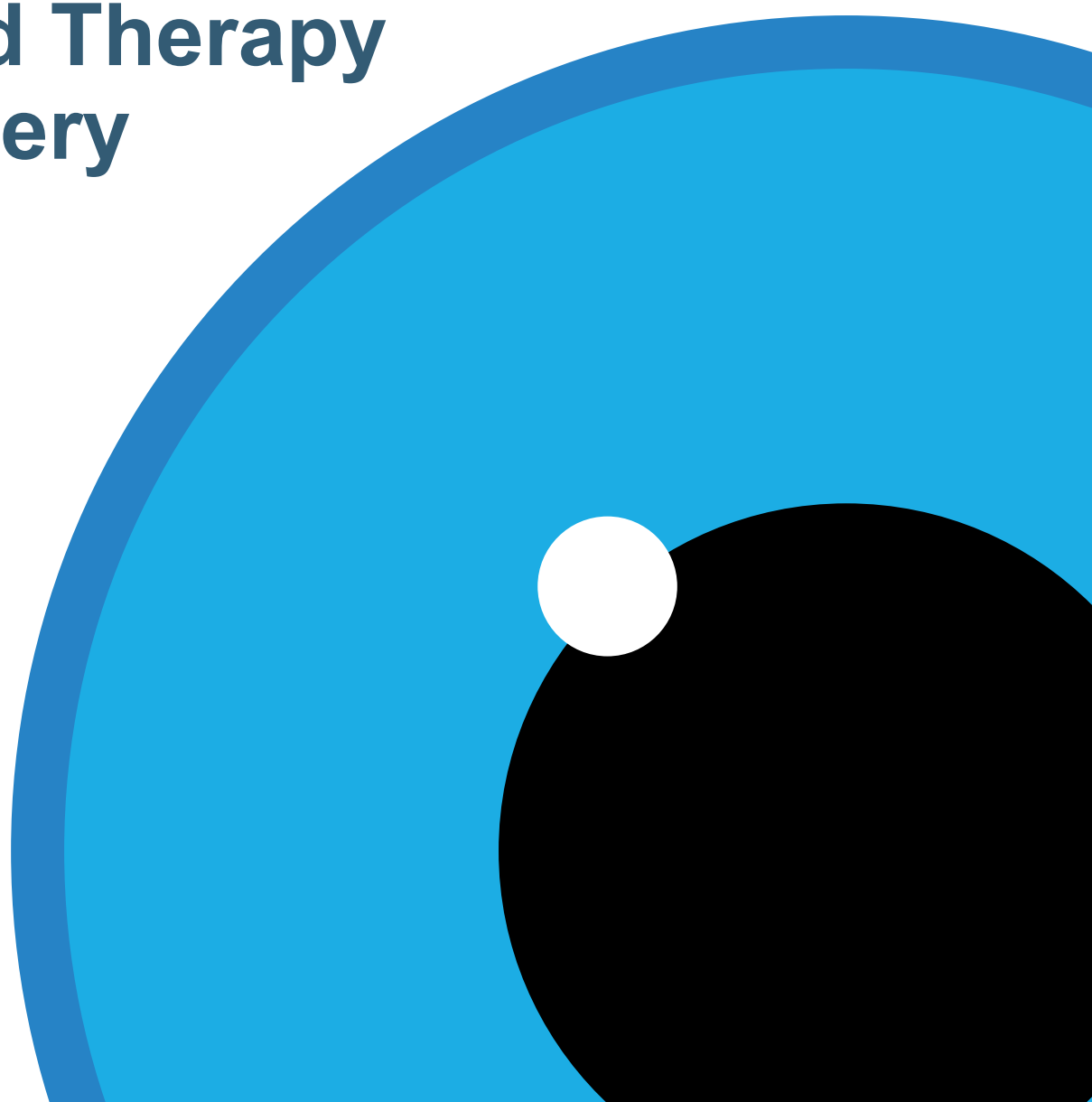

Financial Disclosures

I have no financial disclosures.

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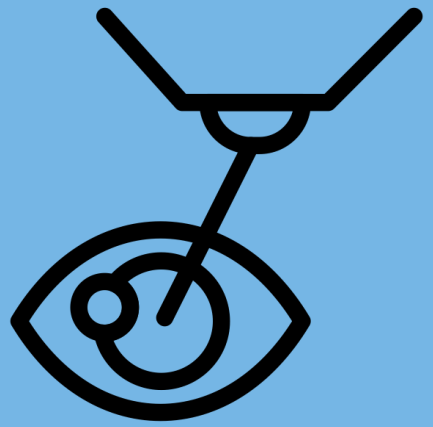
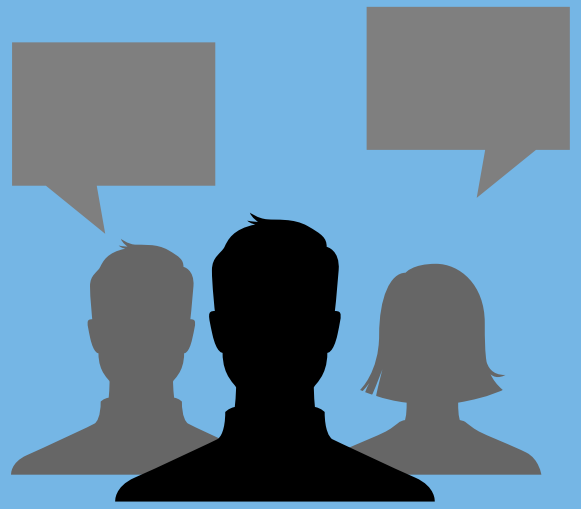
Background



- Refractive surgery is one of the safest and most performed surgical procedures in the military and worldwide
- Multicomponent treatment approach to mitigate postoperative pain
- Opioids work centrally to provide analgesia

Questions to Ask



- Are opioids necessary?
  - Low pain scores reported overall, regardless of therapy
  - Short recovery period
- Do they work “better”? What do studies show us?
- What are others doing?

JAMA Ophthalmology | Original Investigation

Association of Opioids With Incisional Ocular Surgery

Anton M. Kolomeyer, MD, PhD; Yinxi Yu, MS; Brian L. VanderBeek, MD, MPH, MSCE

Table 1. Opioid Prescriptions Filled After Incisional Surgery for All Eye Surgery (Pooled) and Subspecialty Specific Ophthalmic Surgery for Individual Cohort Years

Cohort Year	Surgery, No. (%)[a]																	
	All Surgeries		Cataract		Strabismus		Glaucoma		Retina (Combined)		Retina (Vitrectomy)		Retina (Scleral Buckle)		Trauma		Cornea	
	Opioids Prescribed	Total	Opioids Prescribed	Total	Opioids Prescribed	Total	Opioids Prescribed	Total	Opioids Prescribed	Total	Opioids Prescribed	Total	Opioids Prescribed	Total	Opioids Prescribed	Total	Opioids Prescribed	Total
Total, No.	45 776	2 407 962	19 494	2 060 766	5296	27 124	2564	141 429	15 716	140 904	12 147	116 661	3569	24 243	459	2388	2247	35 351
2000-2001	671 (1.24)	53 912	158 (0.36)	43 788	99 (7.80)	1270	28 (0.83)	3372	330 (7.79)	4236	274 (7.43)	3687	56 (10.20)	549	7 (7.78)	90	49 (4.24)	1156
2002	897 (1.74)	51 504	241 (0.59)	41 091	124 (10.04)	1235	51 (1.45)	3507	421 (9.36)	4499	336 (8.53)	3939	85 (15.18)	560	9 (10.11)	89	51 (4.71)	1083
2003	1074 (1.92)	56 021	272 (0.61)	44 269	219 (15.22)	1439	47 (1.15)	4071	454 (8.95)	5074	388 (8.57)	4526	66 (12.04)	548	18 (17.48)	103	64 (6.01)	1065
2004	1228 (1.82)	67 526	322 (0.60)	53 327	201 (12.01)	1673	59 (1.19)	4974	550 (8.93)	6157	475 (8.52)	5573	75 (12.84)	584	22 (19.64)	112	74 (5.77)	1283
2005	1685 (1.91)	88 277	520 (0.73)	71 112	247 (13.29)	1858	84 (1.42)	5906	712 (9.25)	7698	609 (8.71)	6993	103 (14.61)	705	27 (20.61)	131	95 (6.04)	1572
2006	2260 (2.16)	104 702	709 (0.83)	85 549	323 (17.38)	1858	104 (1.55)	6712	990 (11.46)	8637	866 (11.00)	7873	124 (16.23)	764	18 (15.93)	113	116 (6.33)	1833
2007	2216 (1.80)	122 945	762 (0.75)	101 699	293 (15.37)	1906	122 (1.54)	7917	914 (9.79)	9339	819 (9.56)	8571	95 (12.37)	768	27 (17.76)	152	98 (5.07)	1932
2008	2220 (1.65)	134 660	815 (0.72)	112 675	269 (15.74)	1709	111 (1.29)	8605	891 (9.56)	9323	668 (8.95)	7467	223 (12.02)	1856	20 (11.36)	176	114 (5.25)	2172
2009	2434 (1.54)	158 034	963 (0.71)	134 762	296 (16.72)	1770	153 (1.64)	9326	860 (9.14)	9408	620 (8.48)	7309	240 (11.43)	2099	31 (19.87)	156	131 (5.02)	2612
2010	2589 (1.50)	172 107	1185 (0.80)	148 538	287 (17.28)	1661	155 (1.61)	9657	797 (8.42)	9466	553 (7.60)	7273	244 (11.13)	2193	19 (11.52)	165	146 (5.57)	2620
2011	3376 (1.78)	190 190	1597 (0.97)	164 941	281 (15.97)	1760	204 (1.97)	10 370	1081 (10.63)	10 170	762 (9.70)	7859	319 (13.80)	2311	29 (16.67)	174	184 (6.63)	2775
2012	3746 (1.74)	215 736	1771 (0.94)	188 029	368 (20.42)	1802	236 (2.02)	11 698	1138 (10.30)	11 046	845 (9.76)	8662	293 (12.29)	2384	42 (22.34)	188	191 (6.42)	2973
2013	4605 (1.89)	243 364	2219 (1.04)	212 811	472 (24.60)	1919	226 (1.70)	13 325	1450 (12.19)	11 893	1084 (11.58)	9358	366 (14.44)	2535	35 (19.44)	180	203 (6.27)	3236
2014	5559 (2.51)	221 910	2633 (1.36)	193 735	573 (33.85)	1693	324 (2.56)	12 675	1734 (15.98)	10 850	1255 (15.04)	8346	479 (19.13)	2504	59 (30.89)	191	236 (8.53)	2766
2015	5365 (2.19)	244 968	2480 (1.15)	215 185	654 (36.70)	1782	310 (2.24)	13 813	1645 (15.05)	10 927	1256 (13.76)	9129	389 (21.64)	1798	50 (26.04)	192	226 (7.36)	3069
2016	5851 (2.07)	282 106	2847 (1.14)	249 255	590 (32.98)	1789	350 (2.26)	15 501	1749 (14.36)	12 181	1337 (13.24)	10 096	412 (19.76)	2085	46 (26.14)	176	269 (8.40)	3204

Figure 2. Percentage of Surgeries Associated With a Filled Opioid Prescription Over Time

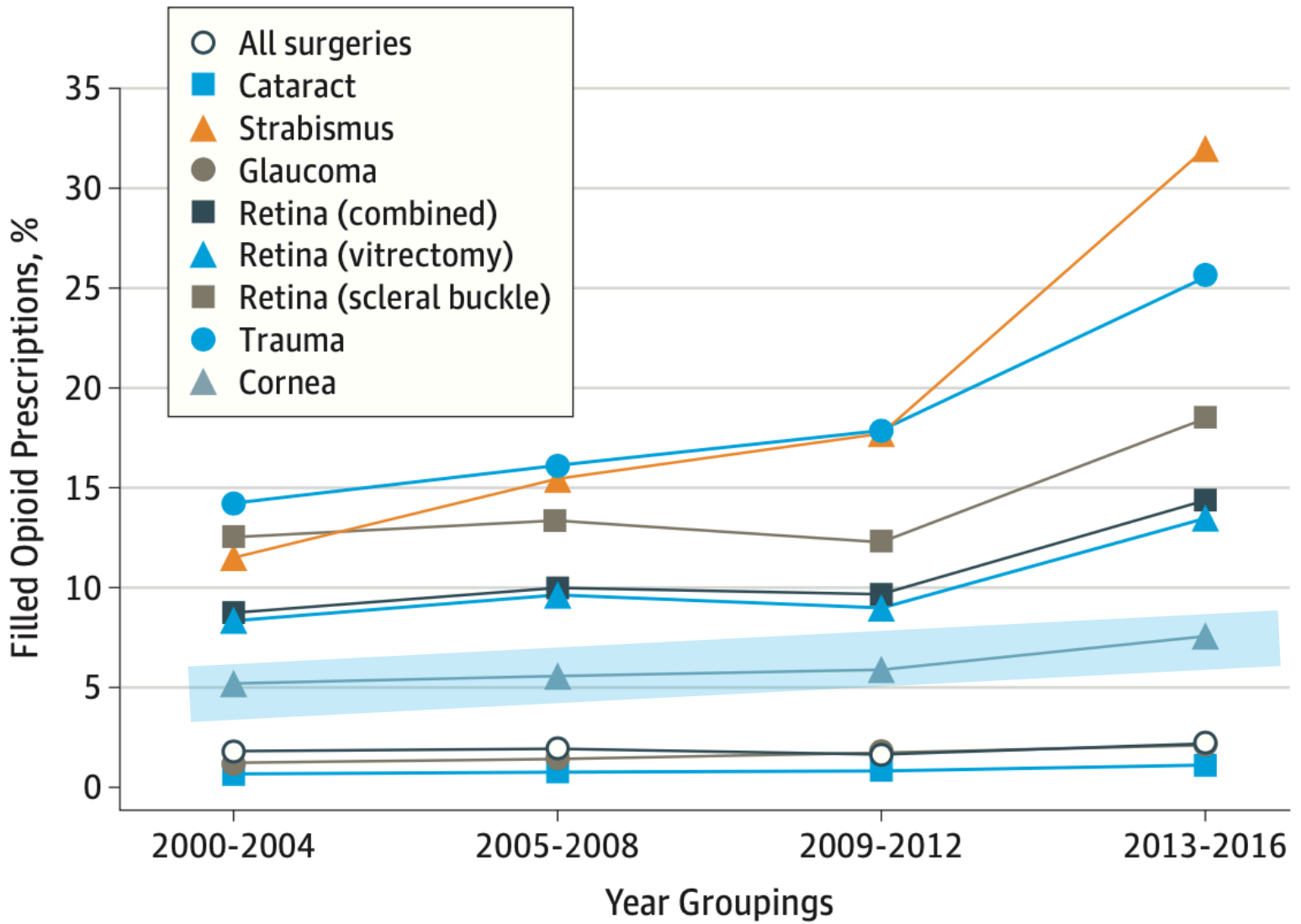


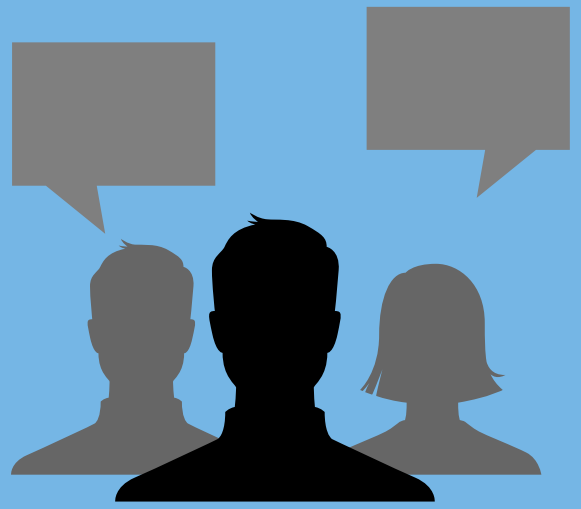
Table 2. Patient and Surgical Characteristics and Multivariate Logistic Regression Using Generalized Estimating Equations Analysis Determining the Odds of Filling an Opioid Prescription[a] (continued)

Characteristic	No Opioids Prescribed, No.	Opioids Prescribed, No.	Opioid Prescription Rate %	Odds Ratio (95% CI)	*P* Value
Individual cohort year					
2000-2001	53 948	618	1.27	1 [Reference]	<.001
2002	51 504	897	1.74	1.34 (1.17-1.53)	
2003	56 021	1074	1.92	1.41 (1.24-1.61)	
2004	67 526	1228	1.82	1.36 (1.20-1.53)	
2005	88 277	1685	1.91	1.57 (1.39-1.76)	
2006	104 702	2260	2.16	1.87 (1.67-2.10)	
2007	122 945	2216	1.80	1.73 (1.55-1.95)	
2008	134 660	2220	1.65	1.66 (1.48-1.86)	
2009	158 034	2434	1.54	1.76 (1.57-1.97)	
2010	172 107	2589	1.50	1.88 (1.68-2.10)	
2011	190 190	3376	1.78	2.29 (2.05-2.55)	
2012	215 736	3746	1.74	2.35 (2.11-2.62)	
2013	243 364	4605	1.89	2.70 (2.42-3.01)	
2014	221 910	5559	2.51	3.71 (3.33-4.13)	
2015	244 968	5365	2.19	3.33 (2.99-3.70)	
2016	282 106	5851	2.07	3.27 (2.94-3.63)	
Grouped cohort year					
2000-2004	257 385	3870	1.48	1 [Reference]	<.001
2005-2008	442 203	8381	1.86	1.33 (1.26-1.40)	
2009-2012	723 922	12 145	1.65	1.62 (1.54-1.70)	
2013-2016	970 962	21 380	2.15	2.51 (2.39-2.64)	

Table 3. Opioid Prescriptions Filled After Incisional Surgery for All Eye Surgery (Pooled) and Subspecialty Specific Ophthalmic Surgery for Grouped Cohort Years[a] (continued)

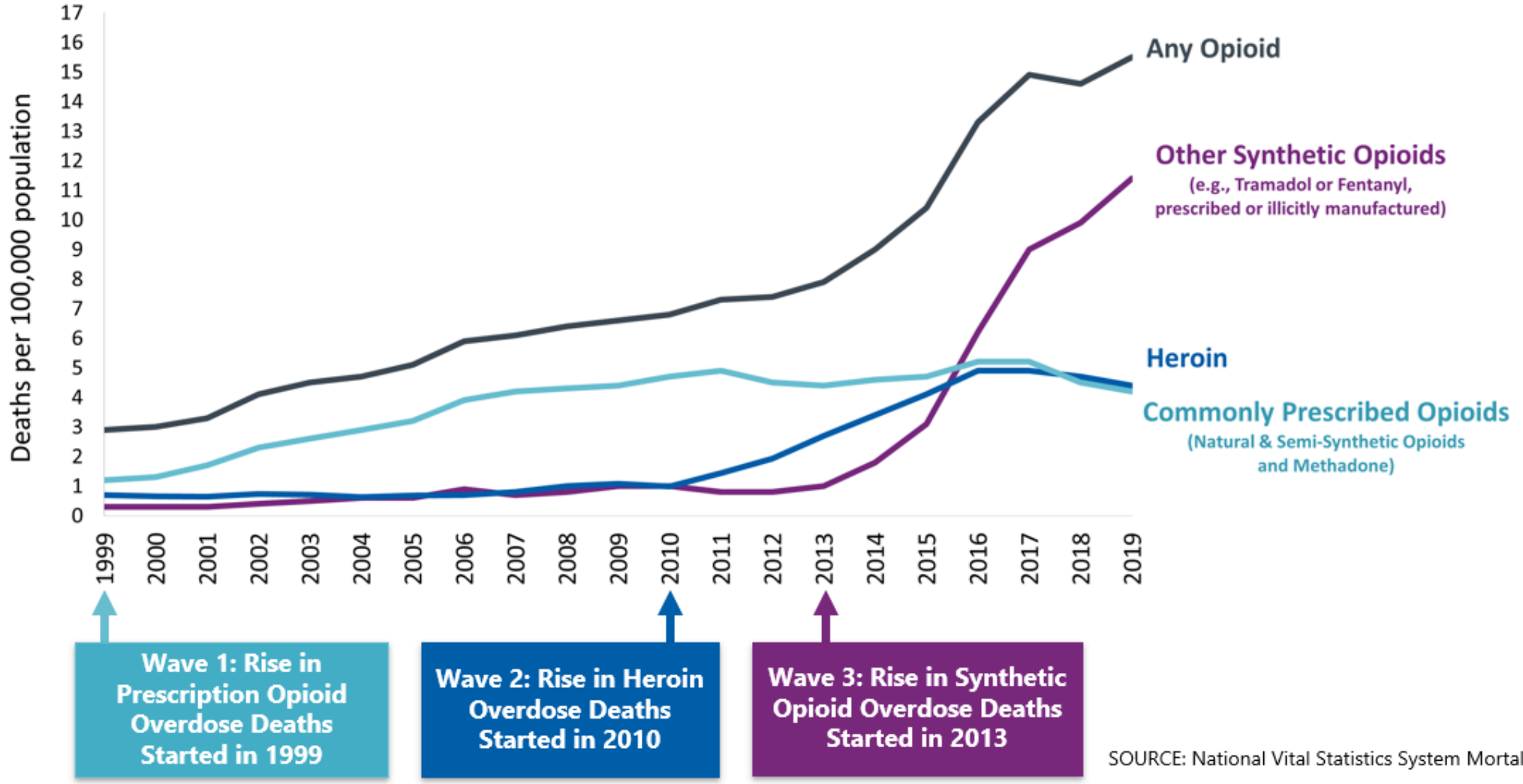
Surgery Type	Surgeries, No. (%)	
	Opioids Prescribed	Total
Retina (vitrectomy)		
All years combined, No.	12 147	116 661
2000-2004	1473 (8.31)	17 725
2005-2008	2962 (9.58)	30 904
2009-2012	2780 (8.94)	31 103
2013-2016	4932 (13.36)	36 929
Retina (scleral buckle)		
All years combined, No.	3569	24 243
2000-2004	282 (12.58)	2241
2005-2008	545 (13.32)	4093
2009-2012	1096 (12.20)	8987
2013-2016	1646 (18.45)	8922
Trauma		
All years combined, No.	459	2388
2000-2004	56 (14.21)	394
2005-2008	92 (16.08)	572
2009-2012	121 (17.72)	683
2013-2016	190 (25.71)	739
Cornea		
All years combined, No.	2247	35 351
2000-2004	238 (5.19)	4587
2005-2008	423 (5.63)	7509
2009-2012	652 (5.94)	10 980
2013-2016	934 (7.61)	12 275

Considerations



- Adverse Effects
  - Drowsiness
  - Nausea, vomiting
  - Constipation, GI distress
  - Tolerance
  - Respiratory depression
  - Addiction
  - Death
- History of substance misuse
- Cost
- Current opioid crisis
  - Local clinical practice guidelines
  - VA
  - HHS
  - CDC

Three Waves of the Rise in Opioid Overdose Deaths



SOURCE: National Vital Statistics System Mortality File.

JAMA Ophthalmology | Brief Report

Association of Limiting Opioid Prescriptions With Use of Opioids After Corneal Surgery

Maria A. Woodward, MD, MSc; Yibing Zhang, BA; Bradford Tannen, MD, JD; Nicholas Behunin, MD; Leslie M. Niziol, MS; Jennifer Waljee, MD

Conditions of the Study

- Patients receiving PK, CXL, PRK, SK
- 2 cohorts, one pre- and one post opioid guideline implementation and statewide opioid monitoring program

Measurements of Outcomes

- Opioid use between cohorts
- Detailed survey regarding pain control and opioid disposal

Table 2. Patient Sociodemographic and Clinical Information

Characteristic	Opioid Use Cohort[a]		*P* Value[b]
	Before Guideline Change (n = 38)	After Guideline Change (n = 44)	
Age at surgery, mean (SD) [range], y	37.7 (14.1) [19.3-78.3]	46.7 (19.8) [20.8-89.8]	.02
Household income, mean (SD) [range], $	65 912 (22 658) [25 951-115 031]	67 435 (21 780) [31 285-128 583]	.76
Sex, No. (%)			
Male	21 (55)	21 (48)	.50
Female	17 (45)	23 (52)	
Race, No. (%)[c]			
White	31 (82)	35 (81)	.78
Black	1 (3)	3 (7)	
Asian	4 (11)	4 (9)	
Other	2 (5)	1 (2)	
Ethnicity, No. (%)			
Non-Hispanic	35 (92)	44 (100)	.10
Hispanic	3 (8)	0	
Type of surgery, No. (%)			
Collagen cross-linking	6 (16)	5 (11)	.19
Penetrating keratoplasty	5 (13)	7 (16)	
Photorefractive keratectomy	24 (63)	21 (48)	
Superficial keratectomy	3 (8)	11 (25)	
Medication prescribed, No. (%)			.87
Acetaminophen with codeine phosphate	29 (85)	26 (84)	
Hydrocodone (Norco)	5 (15)	5 (16)	

Table 3. Opioids Prescribed After Corneal Surgery in Patients Receiving a Prescription

Tablet Variable	Opioid Use Cohort						Difference, Mean (95% CI)	*P* Value[a]
	Before Guideline Changes (n = 38)			After Guideline Changes (n = 31)				
	No. of Tablets	Mean (SD)	Median (Range)	No. of Tablets	Mean (SD)	Median (Range)		
Prescribed	34	18.8 (4.2)	20 (3-30)	31	6.6 (3.1)	5 (1-15)	12.2 (10.4-14.0)	<.001
Used	29	8.3 (7.0)	6 (0-30)	28	4.0 (3.2)	4 (0-14)	4.3 (1.4-7.2)	.005
Remaining	29	10.3 (6.9)	12 (0-20)	28	2.9 (2.7)	2.5 (0-10)	7.5 (4.7-10.2)	<.001

[a] Calculated using the 2-sample *t* test.

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Impact of Standardized Prescribing Guidelines on Postoperative Opioid Prescriptions after Ophthalmic Surgery

Matthew R. Starr, MD, Sanjay V. Patel, MD, FRCOphth, George B. Bartley, MD, Erick D. Bothun, MD

Conditions of the Study

- Maximum prescription of 80 OME (oral morphine equivalents)
- Department evaluated surgeries and created 3 target prescribing strategies
  - Level 0, recommended 0 OME
  - Level 1, ≤40 OME
  - Level 2, ≤80 OME
- Encouraged no more than 7 day course when deemed necessary
- Education to the surgeons, trainees (residents), department meetings, and guidelines posted in every operating room
- Electronic flags built into electronic health record

Measurements of Outcomes

- Prescriptions >80 OME
- Frequency of opioid prescriptions
- Mean OME
- Refill rates

Table 1. Surgical Procedures Categorized by Opioid Prescribing Level Based on the Consensus of Surgeons within the Department

Surgical Procedure	Level 0, 0 Oral Morphine Equivalent	Level 1, <40 Oral Morphine Equivalent	Level 2, <80 Oral Morphine Equivalent
Cataract			
Phacoemulsification	X		
Complex cataract and IOL surgery (large incision)	X		
Cornea or ocular surface			
Pterygium or conjunctival surgery	X		
Keratoplasty (penetrating, lamellar, and endothelial)	X		
Keratorefractive excimer surgery		X	
Glaucoma			
Trabeculectomy and bleb revision	X		
Glaucoma drainage device		X	
Cyclophotocoagulation		X	
Retina or ocular oncology			
Pars plana vitrectomy	X		
Scleral buckle		X	
Brachytherapy plaque application or removal			X
Oculoplastics or orbital			
Blepharoplasty, ptosis repair, or eyelid	X		
Brow ptosis repair	X		
Orbitotomy			X
Lacrimal drainage system and DCR	X		
Enucleation or evisceration			X
Adult strabismus surgery		X	
Trauma, IOFB, or open globe		X	

DCR = dacryocystorhinostomy; IOFB = intraocular foreign body; IOL = intraocular lens.

Table 2. Opioid Prescribing Patterns to Opioid-Naïve Patients for Acute Postsurgical Pain before and after Implementation of Standardized Opioid Prescribing Guidelines

	Before Intervention (n = 2613)	After Intervention (n = 2736)	P
No. (%) of opioid prescriptions	115 (4.4)	81 (3.0)	0.005
OME (mg), mean (standard deviation)	93 (63)	42 (22)	<0.001
No. (%) of opioid prescription refills	31 (1)	39 (1)	0.44
No. (%) of surgical cases that met prescribing guidelines	2510 (96)	2697 (99)	<0.001
No. (%) of opioid prescriptions			
>200 OME	5 (0.2)	0 (0.0)	0.02
>80 OME	56 (2)	4 (0.1)	<0.001
>40 OME	106 (4)	37 (1)	<0.001

OME = oral morphine equivalent.

Table 3. Opioid Prescribing Patterns after Ophthalmic Surgery before and after Implementation of Opioid Prescribing Guidelines According to the Levels Recommended for Type of Surgery

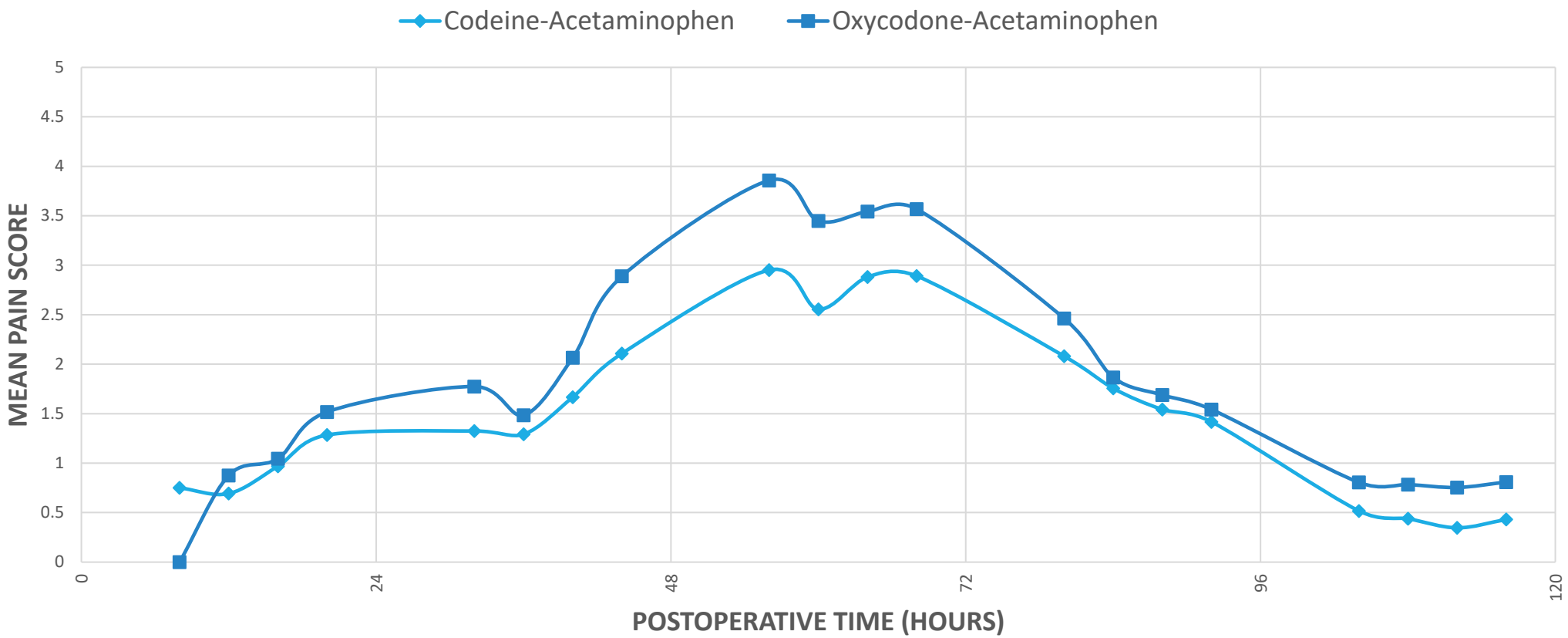
	Level 0 (No Opioids Recommended)			Level 1 (≤40 Oral Morphine Equivalent)			Level 2 (≤80 Oral Morphine Equivalent)		
	Before Intervention (n = 2096)	*After Intervention (n = 2304)*	P	*Before Intervention (n = 479)*	*After Intervention (n = 408)*	P	*Before Intervention (n = 38)*	*After Intervention (n = 24)*	P
No. (%) of opioid prescriptions	48 (2.3)	24 (1.0)	0.001	57 (11.9)	51 (12.5)	0.79	10 (26.3)	6 (25.0)	1
OME (mg), mean (standard deviation)	114.1 (82.5)	54.9 (23.1)	<0.001	80.7 (36.9)	32.6 (12.4)	<0.001	62.4 (34.1)	51.7 (34.5)	0.26
No. (%) of opioid prescription refills	22 (1.0)	29 (1.3)	0.52	9 (1.9)	10 (2.5)	0.56	0 (0.0)	0 (0.0)	1
No. (%) of surgical cases that met prescribing guidelines	2048 (98)	2280 (99.0)	0.001	426 (89)	393 (96)	<0.001	36 (95)	24 (100)	0.52
No. (%) of opioid prescriptions									
>200 OME	4 (0.2)	0 (0.0)	0.04	1 (0.2)	0 (0.0)	0.36	0 (0.0)	0 (0.0)	1
>80 OME	35 (1.7)	4 (0.2)	<0.001	19 (4.0)	0 (0.0)	<0.001	2 (5.3)	0 (0.0)	0.52
>40 OME	44 (2.1)	16 (0.7)	0.001	53 (11)	15 (3.7)	<0.001	9 (24)	6 (25)	1

OME = oral morphine equivalent.

Persistent Opioid Use in Cataract Surgery Pain Management and the Role of Non-Opioid Alternatives

Richard S. Davidson MD[1], Kendall Donaldson MD, MS[2], Maggie Jeffries MD[3,4], Sumitra Khandelwal MD[5], Michael Raizman MD[6], Yasaira Rodriguez Torres MD[7], Terry Kim MD[8]

Results: Pain Scores by Group for Postoperative Days 1–4



	Day 0	Day 1	Day 2	Day 3	Day 4
Codeine	1.03 ± 1.26	1.61 ± 1.67	2.84 ± 2.03	1.69 ± 1.83	0.42 ± 0.66
Oxycodone	1.17 ± 1.32	2.09 ± 1.71	3.58 ± 2.29	1.88 ± 1.90	0.72 ± 1.20
P-value	0.436	0.051	0.017	0.475	0.034

Conclusions

- Pre-operative counseling
- Pain control should be individualized
  - Use your prescription monitoring program information

- Frequent artificial tear use
- Topical and systemic alternatives

- Establish and follow a clear escalation plan

Pain is not the only factor to a successful surgery and happy postoperative patient!

Figure 4. Step-wise Approach to Acute Pain Management[2]

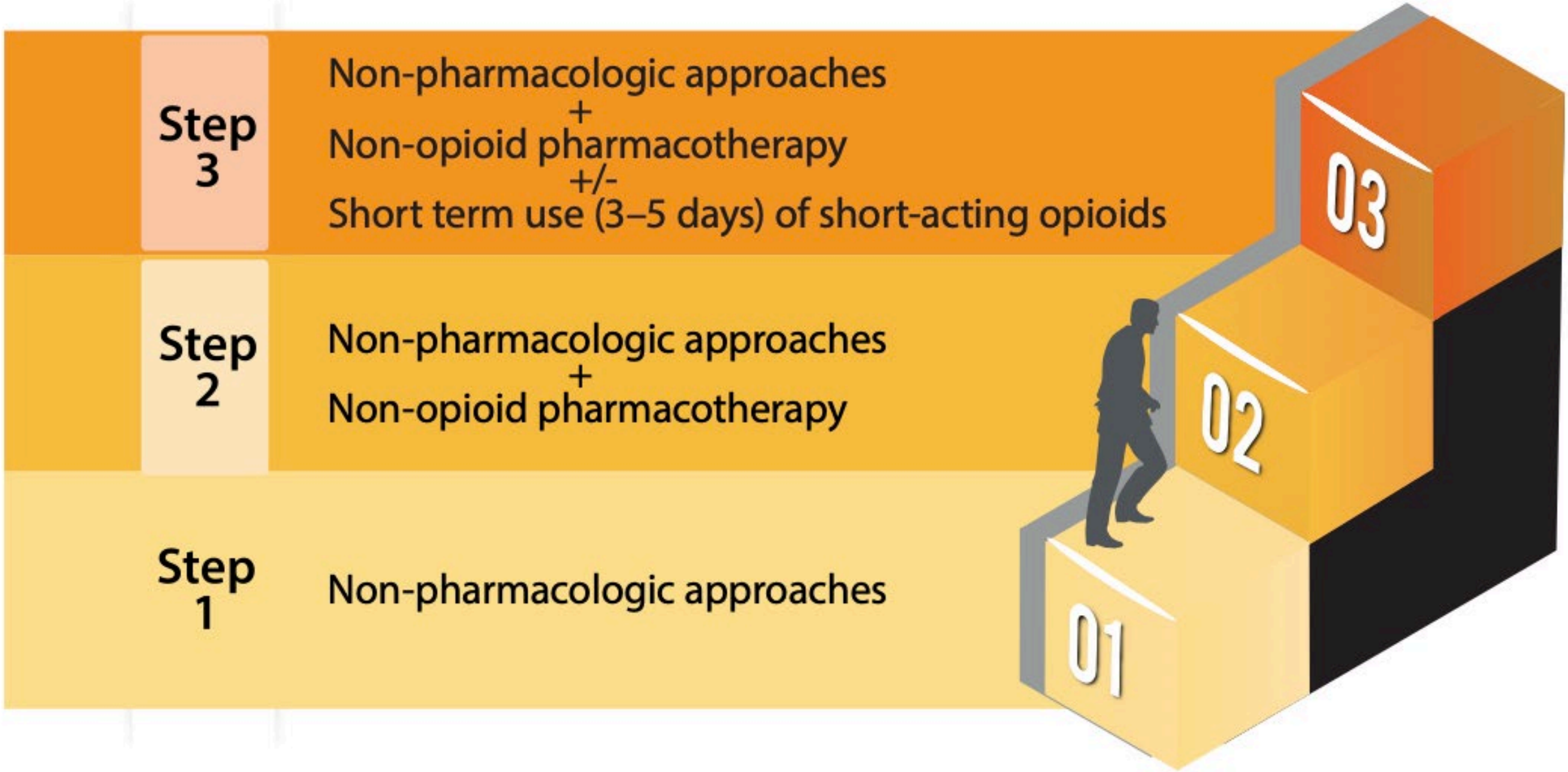
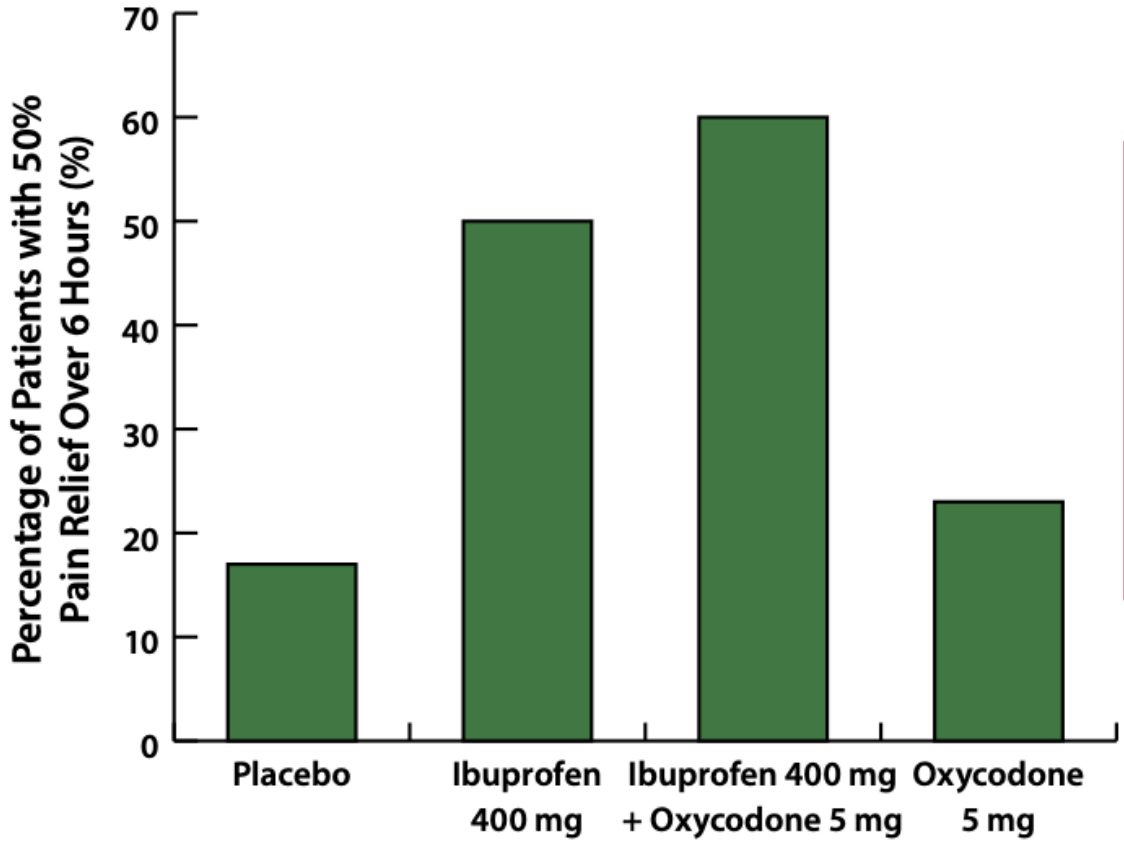


Figure 14. NSAIDs are More Effective than Opioids in Reducing Post-surgical Pain[55]



Ibuprofen 400 mg was more effective in reducing pain than oxycodone 5 mg. No statistically significant difference in pain reduction between ibuprofen and ibuprofen + oxycodone.

Table 1. Non-opioid Drugs and Nonpharmacologic Techniques Used for Minimizing Pain After Surgery

Local anesthetics
- lidocaine, 0.5%–2% SQ/IV
- bupivacaine, 0.125%–0.5% SQ
- levobupivacaine, 0.125%–0.5% SQ
- ropivacaine, 0.25%–0.75% SQ

Nonsteroidal antiinflammatory drugs
- ketorolac, 15–30 mg PO/IM/IV
- diclofenac, 50–100 mg PO/IM/IV
- ibuprofen, 300–800 mg PO
- indomethacin, 25–50 mg PO/PR/IM
- naproxen, 250–500 mg PO
- celecoxib, 200–400 mg PO
- rofecoxib, 25–50 mg PO
- valdecoxib, 20–40 mg PO
- parecoxib 20–40 mg IV

Miscellaneous analgesic compounds
- acetaminophen, 0.5–2 g PO/PR/IV
- propacetamol, 0.5–2 g IV
- ketamine, 10–20 mg PO/IM/IV
- dextromethorphan, 40–120 mg PO/IM/IV
- amantadine, 200–400 mg PO/IV
- clonidine, 0.15–0.3 mg PO/TC/IM/IV
- dexmedetomidine, 0.5–1 μg/kg, followed by 0.4–0.8 μg/kg/h IV
- gabapentin, 600–1200 mg PO
- magnesium, 30–50 mg/kg, followed by 7–15 mg/kg/h IV
- neostigmine, 1–10 μg/kg EPI/IT

Nonpharmacologic therapies
- transcutaneous electrical nerve stimulation (TENS)
- transcutaneous acupoint electrical stimulation (TAES)
- acupuncture-like transcutaneous electrical nerve stimulation (ALTENS)

Table 2. Techniques for Administering Local Anesthesia During the Perioperative Period

Peripheral nerve blocks
- ilioinguinal/hypogastric (e.g., herniorrhaphy)
- paracervical (e.g., dilation/curettage, cone biopsy)
- dorsal penile (e.g., circumcision)
- peroneal/femoral/saphenous/tibial/sural (e.g., podiatric)
- femoral/obturator/lateral femoral cutaneous/sciatic (e.g., leg)
- brachial plexus/axillary/ulnar/median/radial (e.g., arm/hand)
- peribulbar/retrobulbar (e.g., ophthalmologic procedures)
- mandibular/maxillary (e.g., oral surgery)
- intravenous regional (Bier block) (e.g., arms, legs)
- intercostal/paravertebral (e.g., breast surgery)

Tissue infiltration and wound instillation
- cosmetic procedures (e.g., blepharoplasty, nasal, septum, endosinus)
- excision of masses and biopsies (e.g., breast, axilla, lipomas)
- field blocks or instillation technique (e.g., hernia repair, vasovasotomy)
- laparoscopic procedures (e.g., cholecystectomy, tubal ligation)
- arthroscopic procedures (e.g., knee, shoulder, wrist, ankle)

Topical analgesia
- eutectic mixture of local anesthetics (EMLA®) (e.g., skin lesions)
- lidocaine spray (e.g., bronchoscopy, endoscopy, hernia repair)
- lidocaine gel or cream (e.g., circumcision, urologic, oral surgery)
- cocaine paste (e.g., nasal, endosinus surgery)

Table 4. Potential Side Effects of Opioid and Non-Opioid Analgesic Drugs

Opioid analgesics
- respiratory and cardiovascular depression
- nausea, vomiting, retching and ileus
- urinary hesitancy and retention
- pruritus and skin rash
- sedation and dizziness
- tolerance and dependence

Local anesthetics
- residual motor weakness
- peripheral nerve irritation
- cardiac arrhythmias
- allergic reactions
- sympathomimetic effects (due to vasoconstrictors)

Nonsteroidal antiinflammatory drugs and COX-2 inhibitors
- operative-site bleeding
- gastrointestinal bleeding
- renal tubular dysfunction
- allergic reactions (e.g., Steven's-Johnson syndrome)
- bronchospasm
- hypertension
- pedal edema

Acetaminophen
- gastrointestinal upset
- sweating
- hepatotoxicity
- agranulocytosis

Ketamine and NMDA antagonists
- hypertension
- diplopia and nystagmus
- dizziness and confusion
- cardiac arrhythmias
- nausea and vomiting
- psychomimetic reactions

Alpha-2 adrenergic agonists
- sedation
- dizziness
- hypotension
- bradycardia

Miscellaneous drugs
- somnolence, dizziness and peripheral edema (gabapentin)
- nausea and vomiting (neostigmine)
- muscle weakness and sedation (magnesium)

Nonpharmacologic techniques
- skin irritation and erythema
- cutaneous discomfort

NMDA = *N*-methyl-D-aspartate; COX-2 = cyclooxygenase-2.
Adapted from White (4).

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Additional Slides

- Results: Number of subjects that consumed pain tablets by treatment group

Results: Number of subjects that consumed pain tablets by treatment group

Tablet Consumption	Codeine/ Acetaminophen Group # of group (%)	Oxycodone/ Acetaminophen Group # of group (%)
Day 0	76 (78.3%)	78 (78%)
Day 1	83 (85.6%)	85 (85%)
Day 2	87 (89.7%)	88 (88%)
Day 3	61 (62.9%)	65 (65%)
Day 4	37 (38.1%)	36 (36%)