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IV vs PO: The Acetaminophen Showdown at Swedish

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Swedish Learning & Celebration Days 2024

IV vs PO:

The Acetaminophen Showdown at Swedish

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Adam Corson, MD

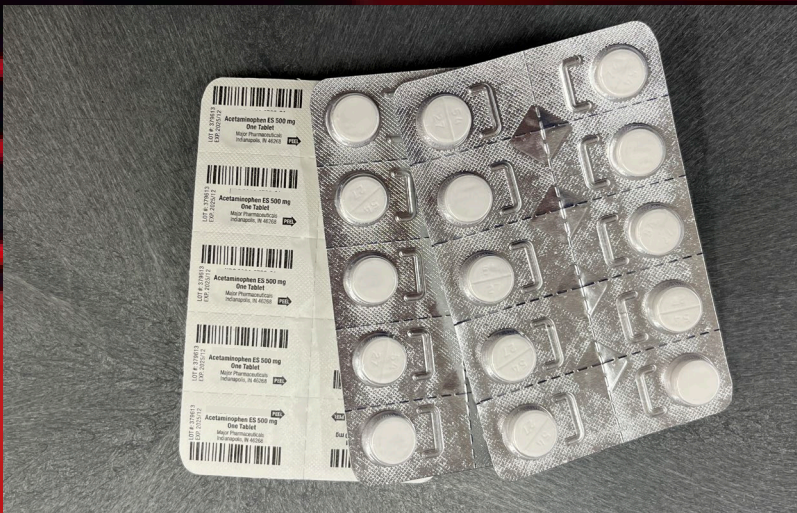
Renee Rassilyer-Bomers, DNP, CMSRN, RN-BC, FAAN

The power of the interdisciplinary team

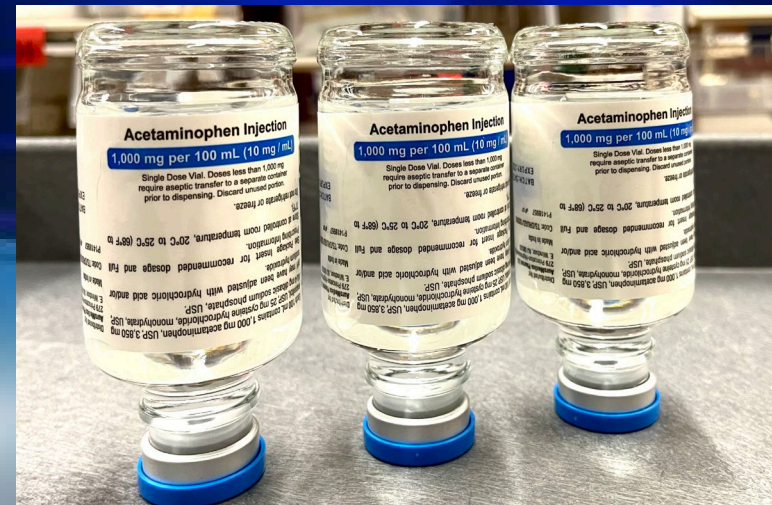


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The Acetaminophen Showdown



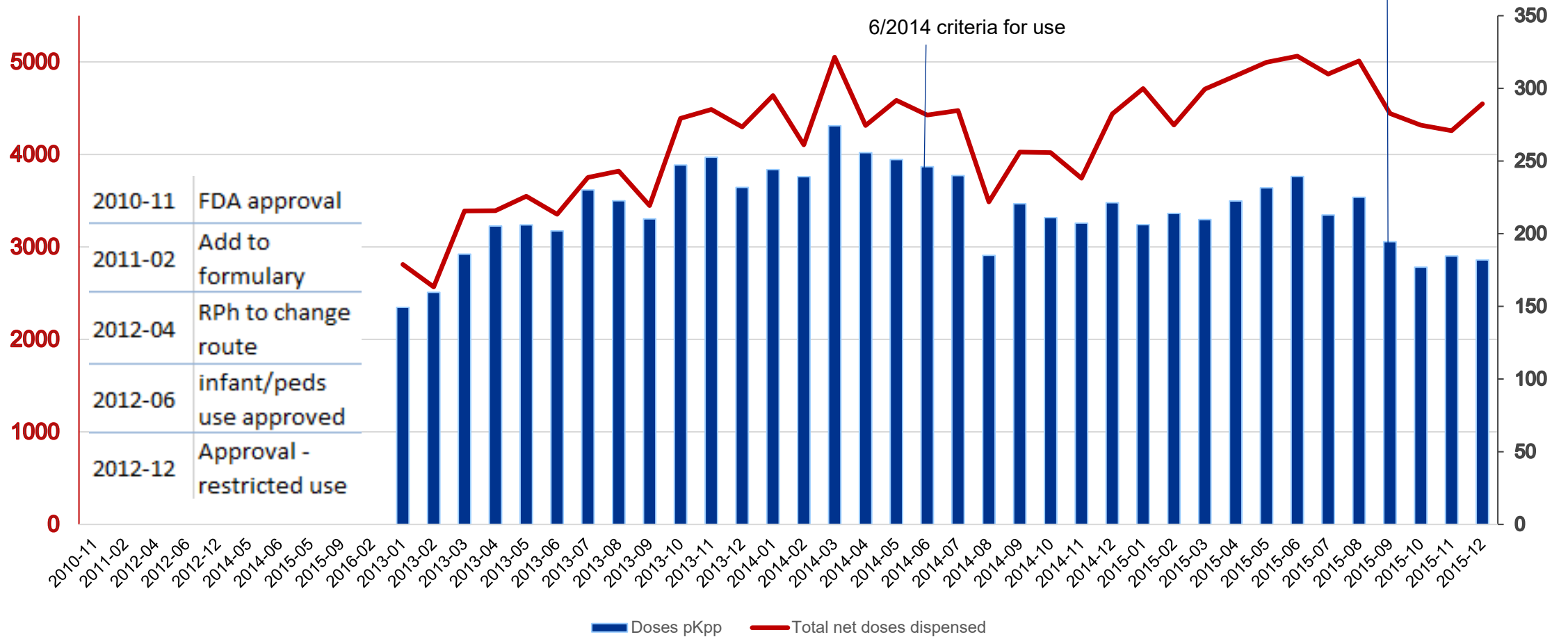
VS



Background image: <https://www.istockphoto.com/vector/boxing-ring-arena-and-spotlight-floodlights-vector-design-gm1454607078-490205916>

Acetaminophen IV Utilization at Swedish

Total net doses dispensed (red), Doses per 1000 IP days (blue)

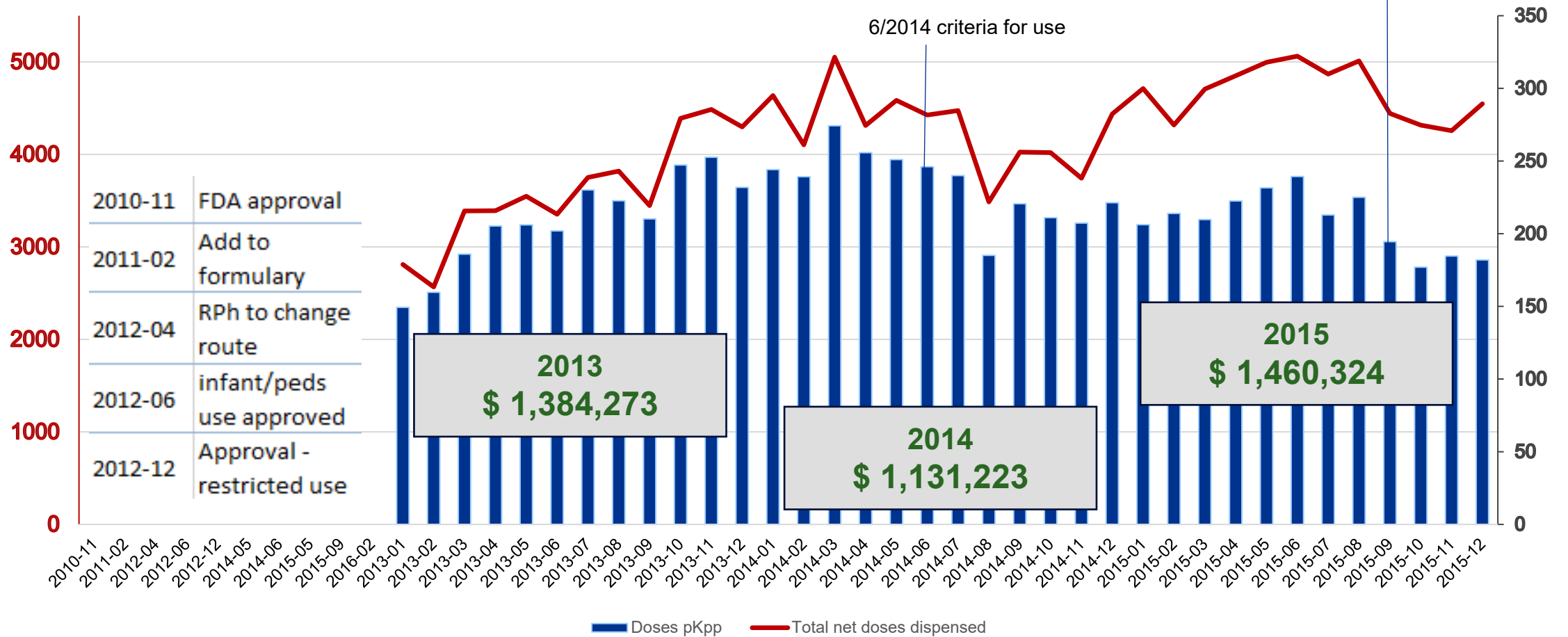


If you do not change the direction,
you might end up where you are going.

- Lao Tzu -

Acetaminophen IV Utilization at Swedish

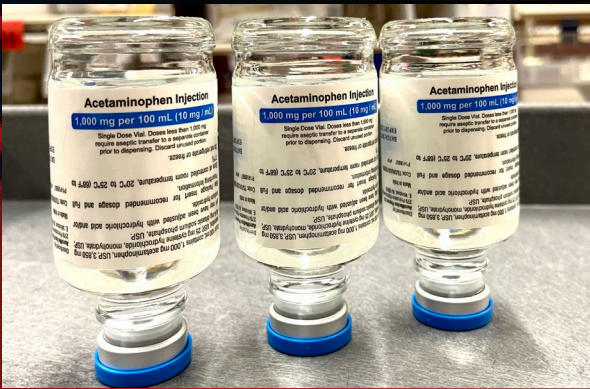
Total net doses dispensed (red), Doses per 1000 IP days (blue)



Acetaminophen PO vs IV



VS



- Safety
- Efficacy
- Evidence of superiority
- Length of hospital stay
- Cost

Mean Plasma Pharmacokinetic Values IV vs Oral Acetaminophen

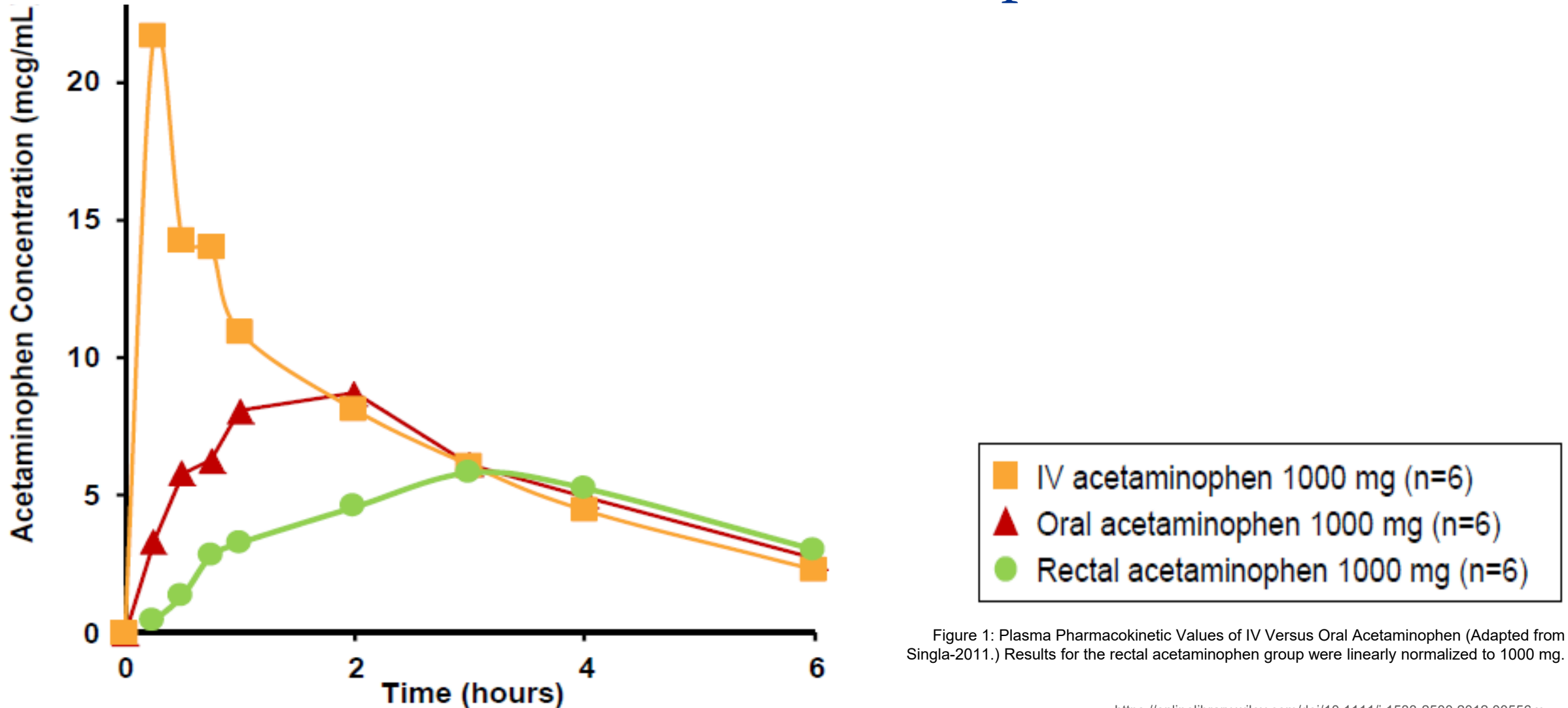


Figure 1: Plasma Pharmacokinetic Values of IV Versus Oral Acetaminophen (Adapted from Singla-2011.) Results for the rectal acetaminophen group were linearly normalized to 1000 mg.

<https://onlinelibrary.wiley.com/doi/10.1111/j.1533-2500.2012.00556.x>

Impact on prescribers

- Use approved for specific indications only
- Removed from 23 order sets
- Epic alert for alternative selection

Epic LMA alert

- Communication tool
- Alert changes
- Inform use restriction
- Offer alternatives

Alternative Selection
acetaminophen intravenous (aka OFIRMEV) 1,000 mg: 1,000 mg, Intravenous, Q6H PRN starting Today at 1024 until Tomorrow at 1023, at 400 mL/hr, Severe pain

IV Acetaminophen is restricted to inpatients and emergency department patients in whom the PO route is contraindicated.

Orders meeting the above criteria are limited to a 24 hour duration. IV Acetaminophen may be reordered every 24 hours in patients still meeting criteria.

Pharmacists may convert patients from IV to PO Acetaminophen anytime after the first IV dose if patients no longer meet criteria.

For further information please click here: [P&T IV Acetaminophen Notice of Action](#)

Web Links
[Micromedex](#)
[SMC Therapeutic Interchange Index](#)

Alternative	Details	Cost
ketorolac (aka TORADOL) 30 mg injection	30 mg	
ketorolac (aka TORADOL) 15 mg injection	15 mg	
acetaminophen (aka TYLENOL) tablet		
acetaminophen (aka TYLENOL) oral suspension		
acetaminophen (aka TYLENOL) suppository		

Accept Alternative Continue With Original Order Cancel

The willingness to change one's mind in the light of new evidence is a sign of rationality not weakness.

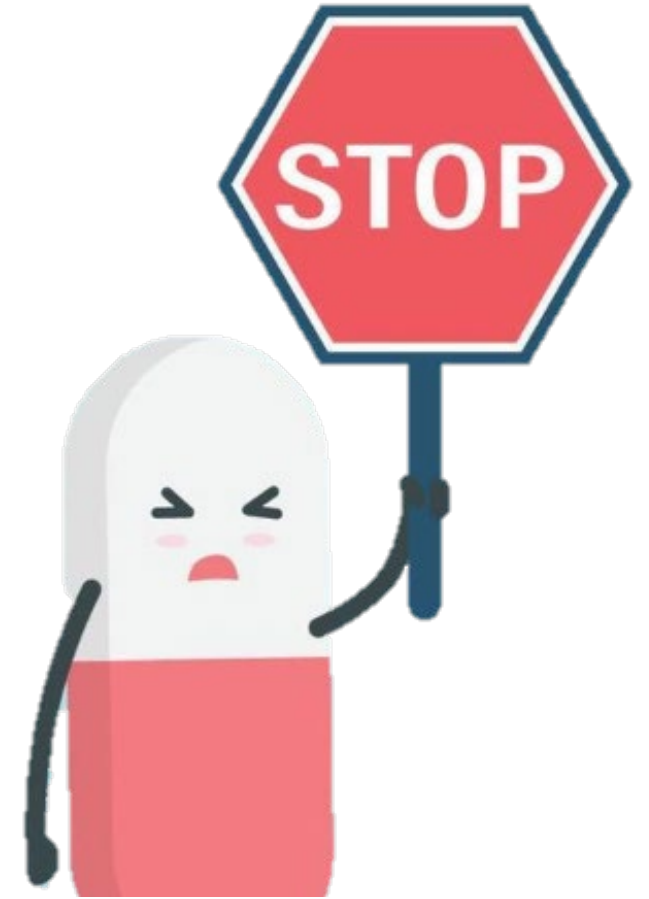
- Stuart Sutherland -

Timeline

Feb 2011	Add Acetaminophen IV to Swedish formulary
April 2012	Restrictions on use of IV formulation submitted as proposal but not voted on. P&T endorses pharmacists to change IV APAP to other routes as appropriate.
June 2012	Pediatric Subcommittee approves use in infants/peds
Sept 2012	P&T approved restriction to patients meeting specific criteria: febrile, critically ill patients, NPO, or as pain management, augmentation to opioids only when NPO, or perioperative and postoperative.
May 2014	Cost comparison of anesthetic agents and cost utilization presented due to high utilization and therefore relatively high cost impact.
June 2014	IV formulation increased from \$ 13.68 to \$ 35.40 per 1g vial
June 2014	IV acetaminophen approved for use in patients: <ul style="list-style-type: none"> • NPO including medications, in patients without a functioning GI tract AND • Rectal administration is not an option OR is ineffective. • May only be ordered as a one-time dose. It may be reordered by an LIP if criteria are still met, total duration is not to exceed 24 hours
April 2015	P&T approved restriction by decreasing upper dose limit in pediatrics
June 2015	Removed from CH Neuro ICU pyxis override medication list
Sept 2015	<ul style="list-style-type: none"> • Epic defaults 24-hour limit on all orders along with language to encourage nurses to contact pharmacy if the patient is taking PO for IV to PO switches • Pharmacists can change to equivalent oral dose after 1st IV dose, if patient doesn't meet criteria
Jan 2016	PHS added IV Acetaminophen to acute formulary with restrictions and removed from existing order sets.
Feb-May 2016	Discussions with stakeholders

Challenges to implementation

- Communication and education
- Ease of ordering
- Drug readily available
- Lack of audit and enforcement
- Change in individual practice
- Support from team



Communication and Education Tools Available

- ✓ Daily safety huddles
- ✓ Department meetings
- ✓ Post notices on the units
- ✓ Pyxis pop up messages
- ✓ Epic alerts during order entry
- ✓ Information in Epic order admin instructions
- ✓ 1:1 education, sharing knowledge through conversation
- ✓ P&T Webpage (new)
- ✓ P&T Newsletter (new)
- ✓ Nurses@Swedish Newsletter
- ✓ Medical Staff Newsletter
- ✓ Pharmacy Clinical Update Newsletter

Implementation Schedule		Target date
1.	Inform stakeholders (medical, nursing and pharmacy staff) via P&T Newsletter and website of the restrictions placed on IV APAP.	4/28/16
2.	Remove IV APAP from all 23 order sets (see Appendix A)	5/5/16
3.	Implement LMA alert on all IV APAP orders. Prescriber must provide justification for use of IV APAP. Provide option to use oral APAP or alternate agent. Warning that IV APAP will be available from pharmacy only starting 5/12/16.	5/5/16
4.	Order restrictions effective a) One dose limit in peri-op areas (OR, PACU) b) 24 hour auto-stop with 4 doses max (already in place 9/2015)	5/5/16
5.	Remove from all pyxis med stations, both profiled and unprofiled, at all campuses (see Appendix B)	5/12/16
6.	Follow up post implementation and report back to P&T.	7/13/16

Do what is right,
Not what is easy nor what is popular.

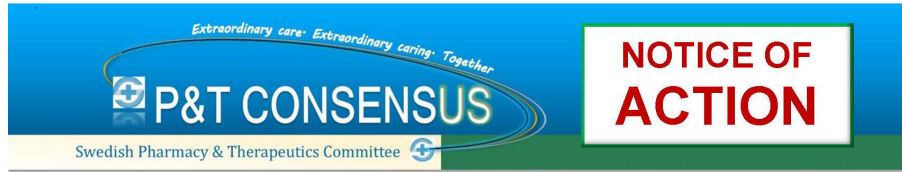
- Roy T. Bennett -

Nursing Partnership



- Provide crucial, direct patient care
- Participation and input are valuable
- Different needs and priorities
- Consistent education and messages
- Work together

<https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.freeimages.com%2Fpremium-clipart%2Fcaregivers-6763653&psig=AOvVaw0zg2wpjSs6auVfWGrE1nLT&ust=1715388157350000&source=images&cd=vfe&opi=89978449&ved=0CBIQjhxqFwoTClih2JbtgYYDFQAAAAAdAAAAABAE>



NOTICE OF ACTION

**IV Acetaminophen is restricted
and will be removed from all Pyxis medication stations
effective Thursday, May 12, 2016**

*The cost of
one dose
of IV acetaminophen
can provide the
equivalent treatment
in tablet form to
386 patients.*

P&T approved criteria for use

- Patients in whom the PO route is contraindicated
- Inpatients and emergency department patients
- Orders are limited to 24 hours; may be reordered by LIP if criteria are met
- Pharmacists have the authority to change to an equivalent oral dose (1:1 interchange) in patients who no longer meet criteria *after* the first IV dose.

There is no clinical evidence that acetaminophen IV is any better than acetaminophen PO in patients able to tolerate oral medications.

IV utilization with a functioning GI tract is becoming increasingly seen as inappropriate.

IV acetaminophen (IV APAP) will be removed from all order sets on 5/5/16 and removed from Pyxis inventory on 5/12/16. Epic will place a LMA alert on all orders for IV APAP and default to a 24 hour stop date. The ordering provider must provide justification for use or select an alternative agent. There is language to encourage nurses to contact pharmacy if the patient is taking PO, for IV to PO switches. All use will be audited and reported back to the Swedish Pharmacy and Therapeutics (P&T) Committee.

If your patient meets the above use criteria and requires a dose, please plan ahead to order and obtain a dose from pharmacy.

Questions? Contact: [Dr. Marc Horton](#), System Executive Director, Advanced Surgical Services; [Dr. Adam Corson](#), Utilization Committee Chair; [Eric Harvey](#), Systems Director of Clinical Pharmacy



*promoting appropriate, safe, and effective
prescribing practices*

P&T Newsletter. DPham. 2016-04-18

Nursing impact

- Access to drug
- IV formulation no longer available in Pyxis, obtained from main pharmacy
- IV access
- Challenges

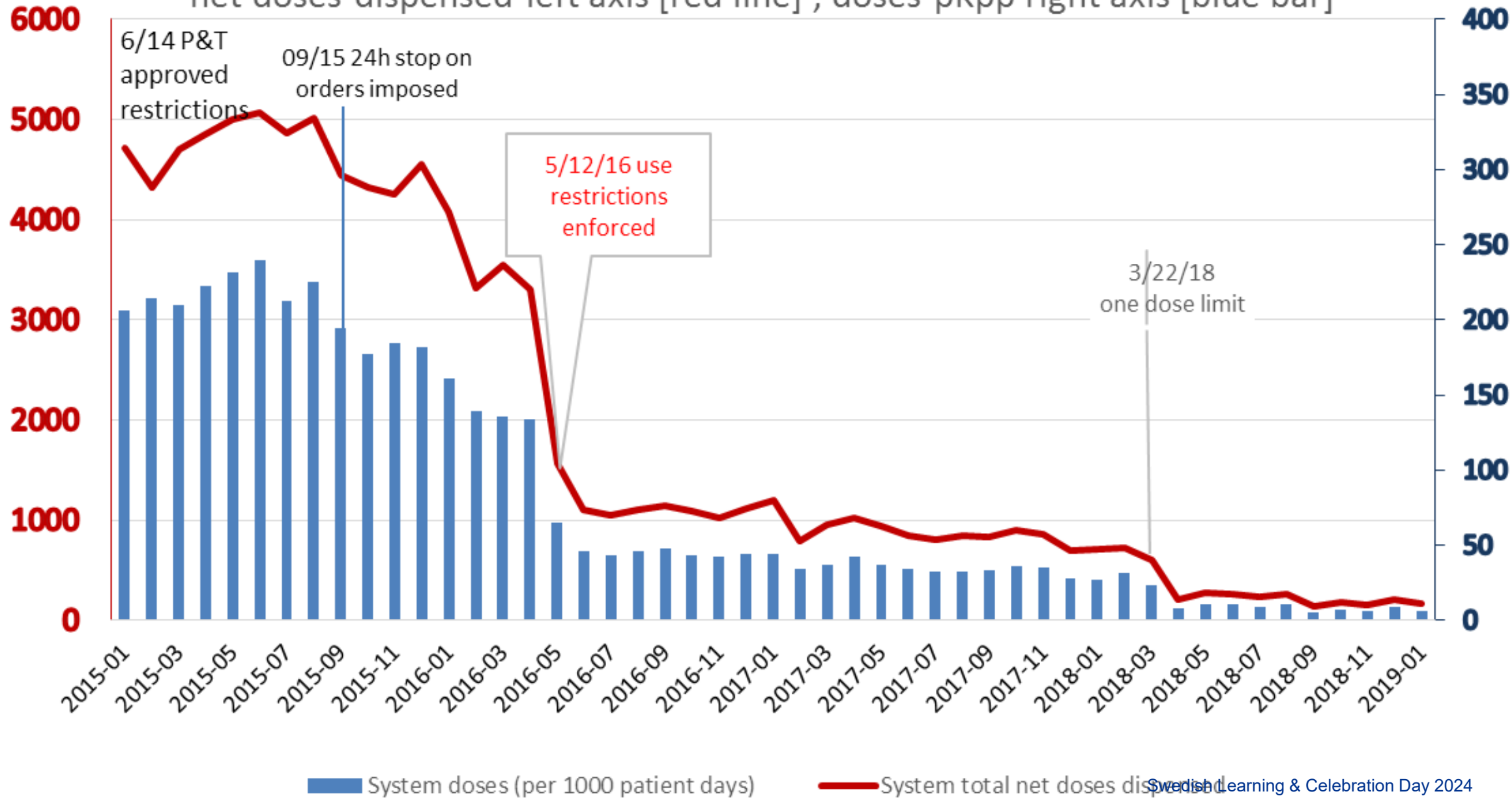
Interdisciplinary Collaboration

1. Strengthen patient care and outcomes
2. Prevent medical errors
3. Expedite treatment
4. Reduce inefficiencies and healthcare costs
5. Improves relationships and job satisfaction

<https://tigerconnect.com/blog/5-benefits-of-interprofessional-collaboration-in-healthcare/>

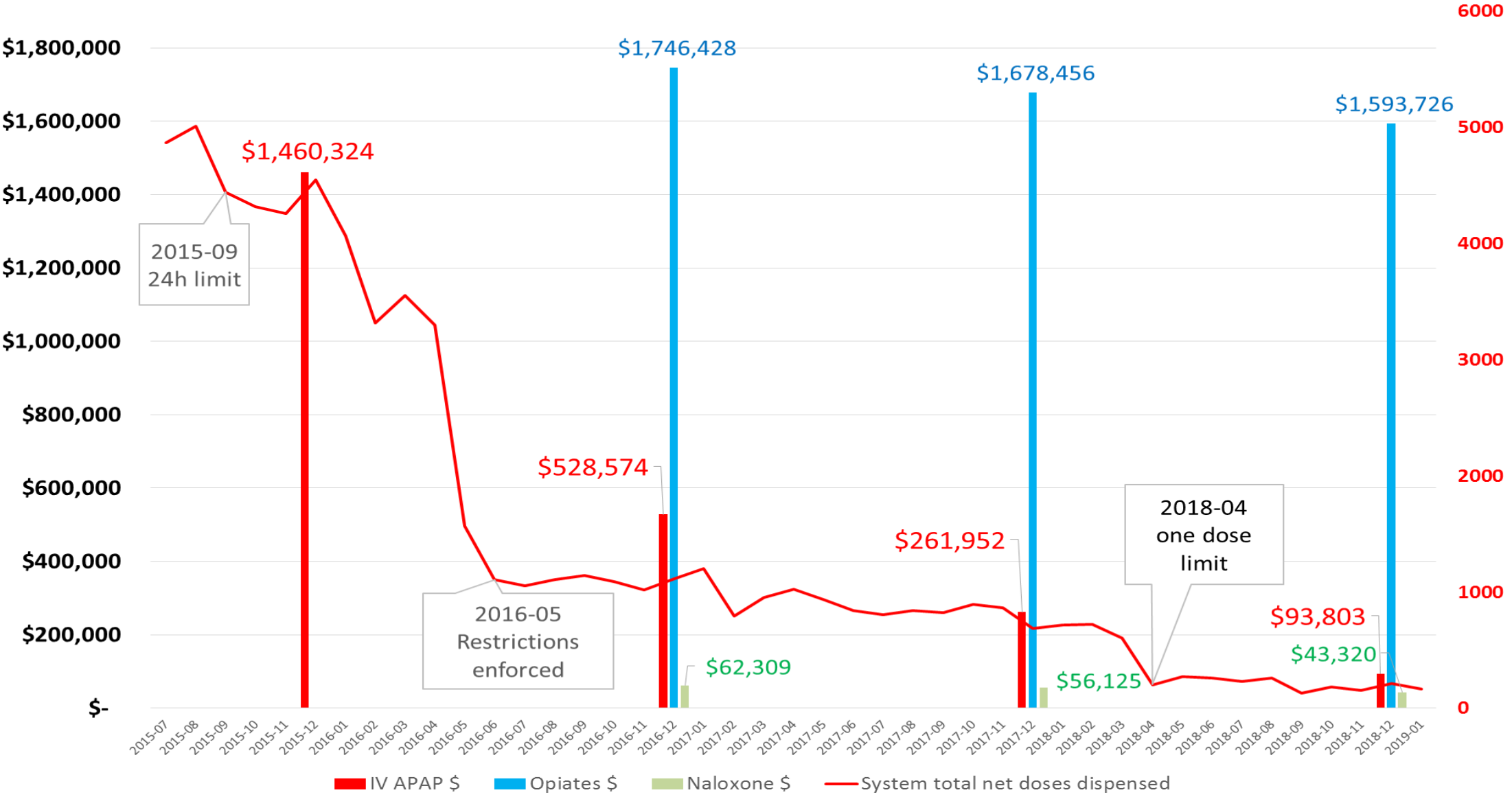
Acetaminophen IV Utilization at Swedish

net doses dispensed left axis [red line] , doses pKpp right axis [blue bar]



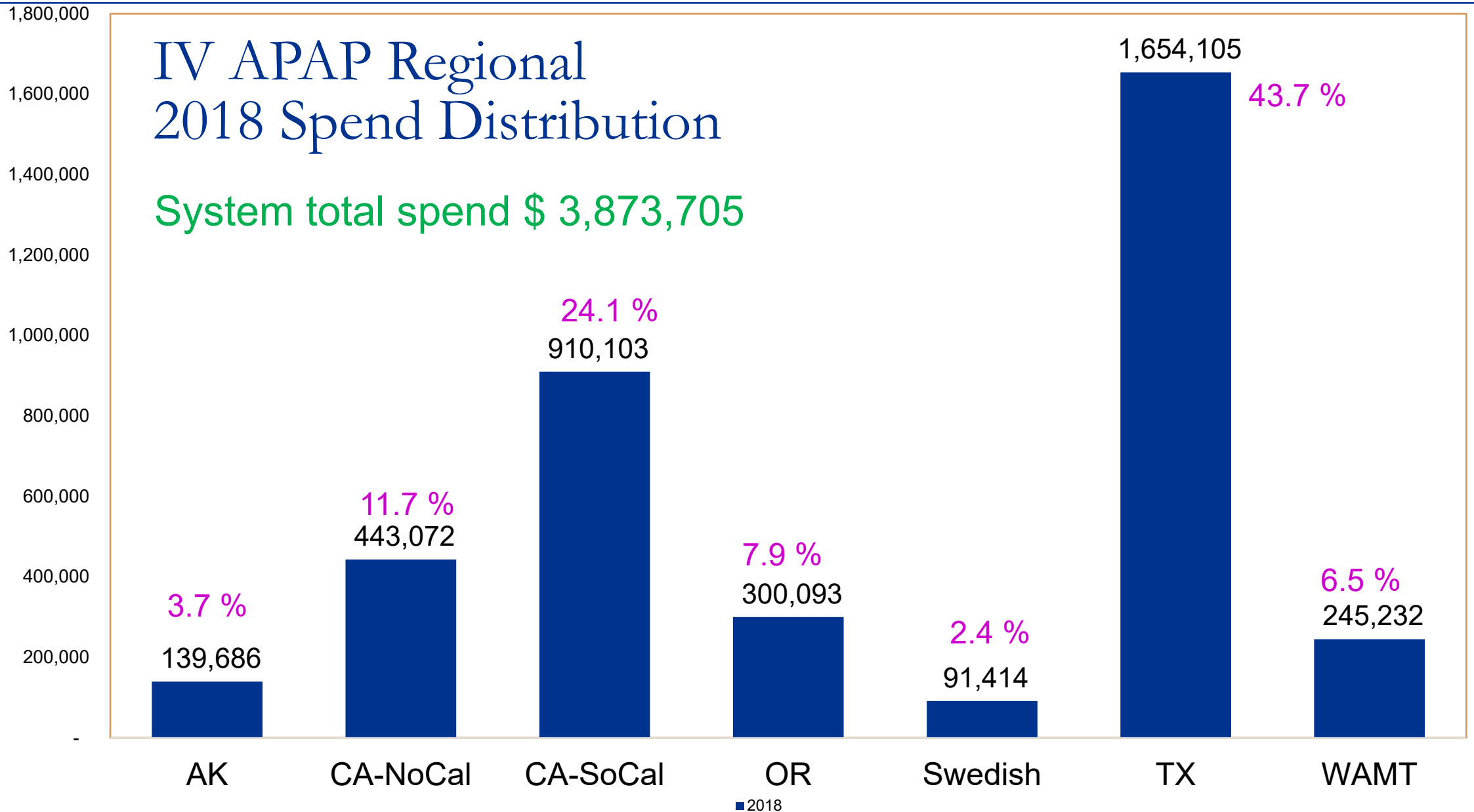
Acetaminophen IV Utilization and Purchases at Swedish

net doses dispensed left axis [red line], purchased \$ right axis [green bar]



IV APAP Regional 2018 Spend Distribution

System total spend \$ 3,873,705

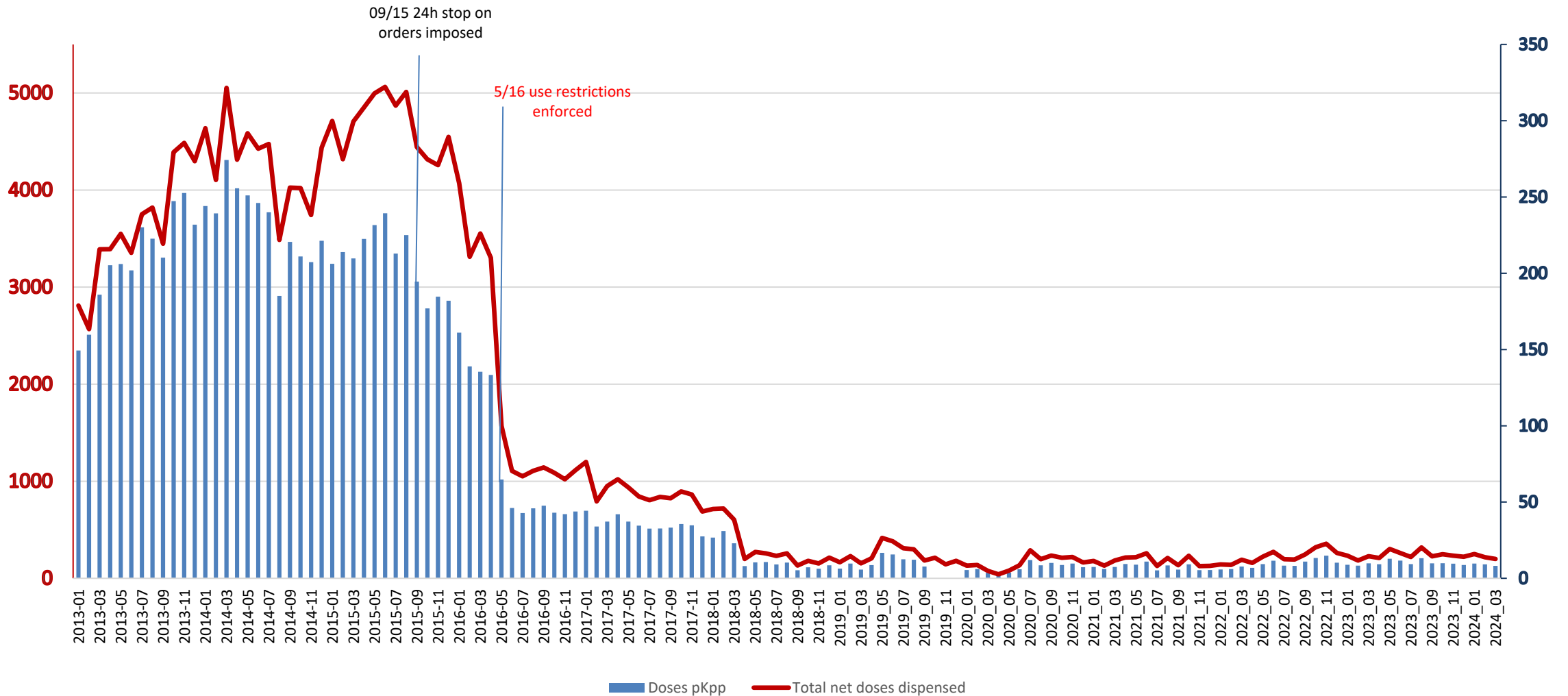


% of total spend

Leadership support

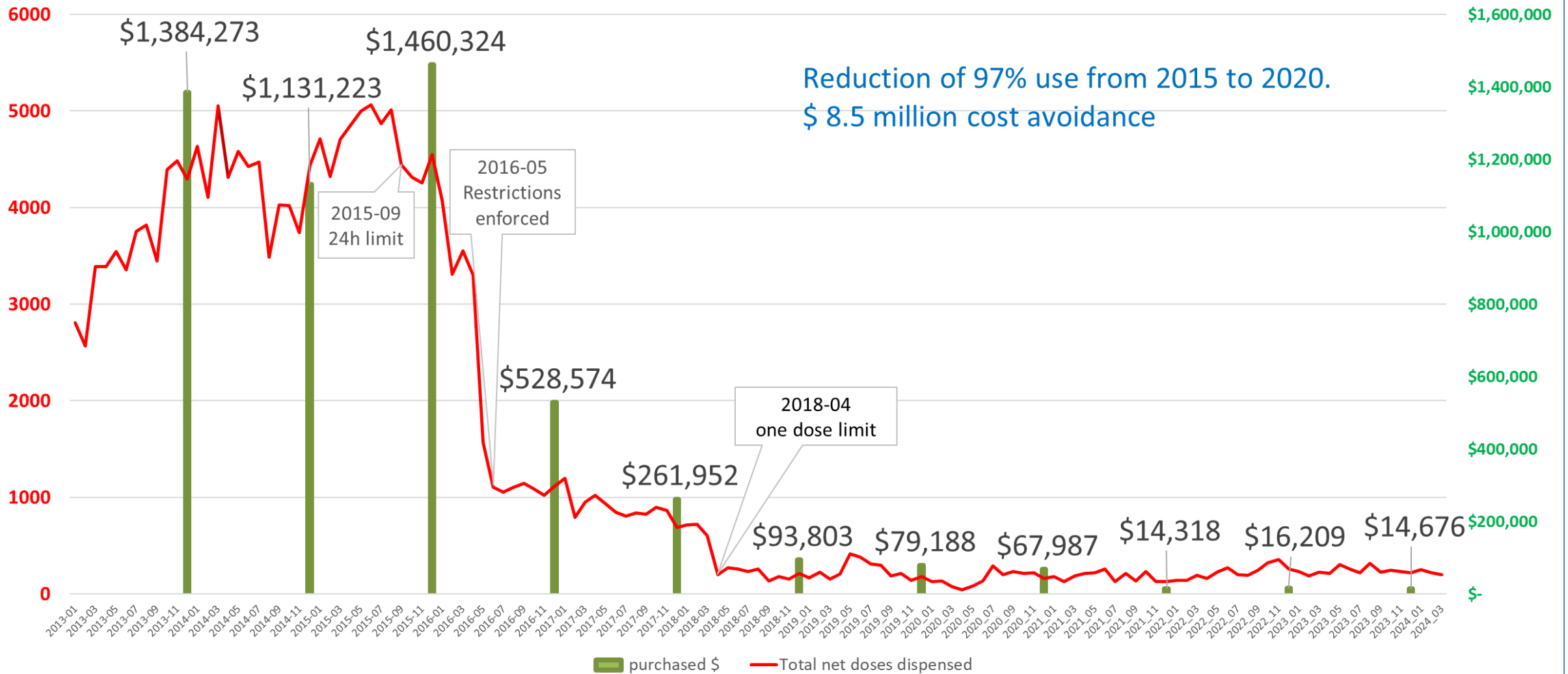
- Importance of having a structure to support review and guide decision making
- Balance of supporting innovation and change with pilots and thoughtful review to appropriateness
- Role to remove barriers and guide process in complexity of stakeholder involvement in a multitude of areas
- Accountability to ensure we are looking the entire quadruple aim: Patient Outcomes, Caregiver Satisfaction, Patient Satisfaction, and Stewardship

How are we doing now?



Acetaminophen IV Utilization and Purchases at Swedish

net doses dispensed left axis [red line], purchased \$ right axis [green bar]



I'm not the smartest fellow in the world,
but I sure can pick smart colleagues.

- Franklin D. Roosevelt -

References

1. O'Connor, W. 5 Benefits of Interprofessional Collaboration in Healthcare. Nov 10, 2023. <https://tigerconnect.com/blog/5-benefits-of-interprofessional-collaboration-in-healthcare/> Accessed 5.9.2024
2. PSJH Pharmacy Clinical Council Meeting Slides 4.4.2019
3. Singla NK, Parulan C, Samson R, et al. Plasma and Cerebrospinal Fluid Pharmacokinetic Parameters After Single-Dose Administration of Intravenous, Oral, or Rectal Acetaminophen. Pain Practice. Vol 12, Issue 7 p.523-532. <https://doi.org/10.1111/j.1533-2500.2012.00556.x>



Together we can

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<https://www.istockphoto.com/vector/medical-professionals-clinic-doctors-nurses-hospital-workers-emergency-technicians-gm1303875338-395202327>