American Red Cross

Challenges and Opportunities With Prehospital Blood Products : Availability and Cost

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Agenda

- Prehospital Growth for American Red Cross
- Modeling methods and assumptions
- Implications for policy and funding
  - David Wood
  - Drs. Levy, Holcomb and Jenkins

- Conclusions

Prehospital Growth

Early success of DC Fire and EMS Whole Blood program saves lives

September 26, 2024 Iain Hoey

DC Whole Blood program achieves 91.8% survival rate for non-cardiac arrest patients

'It's going to save lives' | Grady EMS now performing blood transfusions in the field

Grady EMS Quick Response Vehicles started carrying donor blood on March 17.

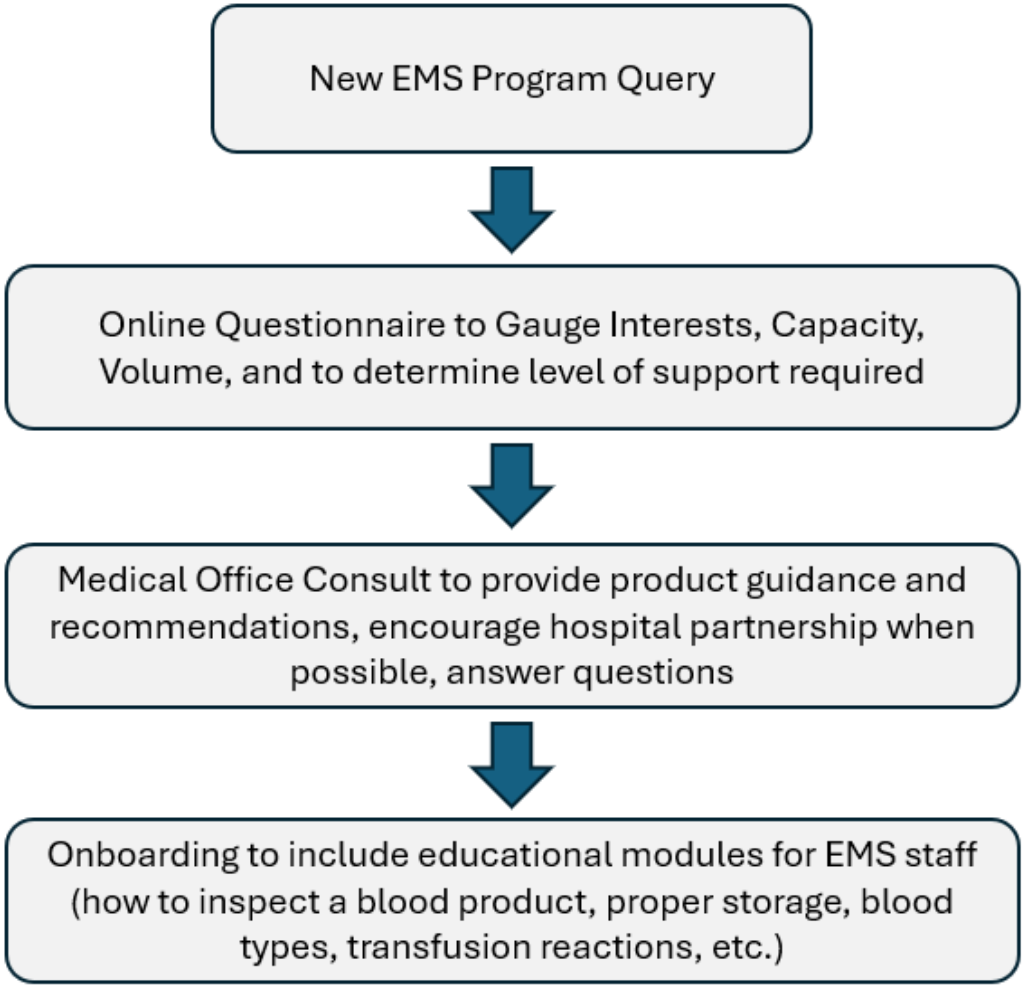
https://fireandsafetyjournalamericas.com/early-success-of-dc-fire-and-ems-whole-blood-program-saves-lives/
https://www.11alive.com/article/news/local/grady-ems-now-performing-blood-transfusions-in-the-field/85-f8be7e72-539c-4ced-8f77-e4d1df611009

Pre-Hospital Observations

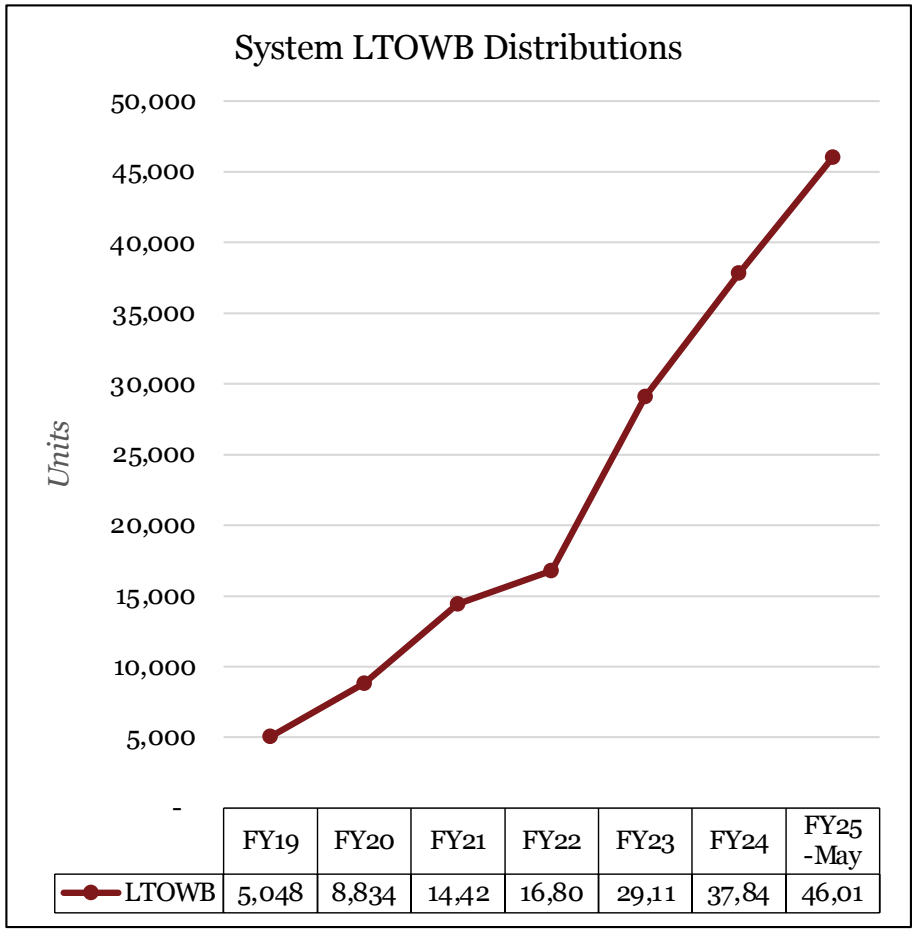
- EMS programs may require more educational support than hospital blood banks
  - Variability between EMS services
  - Staff may have hesitancy to onboard due to level of support required
- Universal group LTOWB products are in primary demand—sustainability moving forward
  - Only supply O positive RBC/LTOWB for direct EMS customers
  - Encourage evaluation of their internal data to determine which vehicles are most likely to transport patients that will need blood
  - Encourage partnership with a local hospital willing to accept transfer of unused units
- Need for increased awareness of utility of other blood products: Liquid plasma, dried plasma, pRBCs, CSP

New Prehospital Program

- MD consultation for new programs
- Module-based onboarding curriculum to address FAQs
- Will standardize the process and give both the blood center and EMS program greater confidence to build in a safe and sustainable way



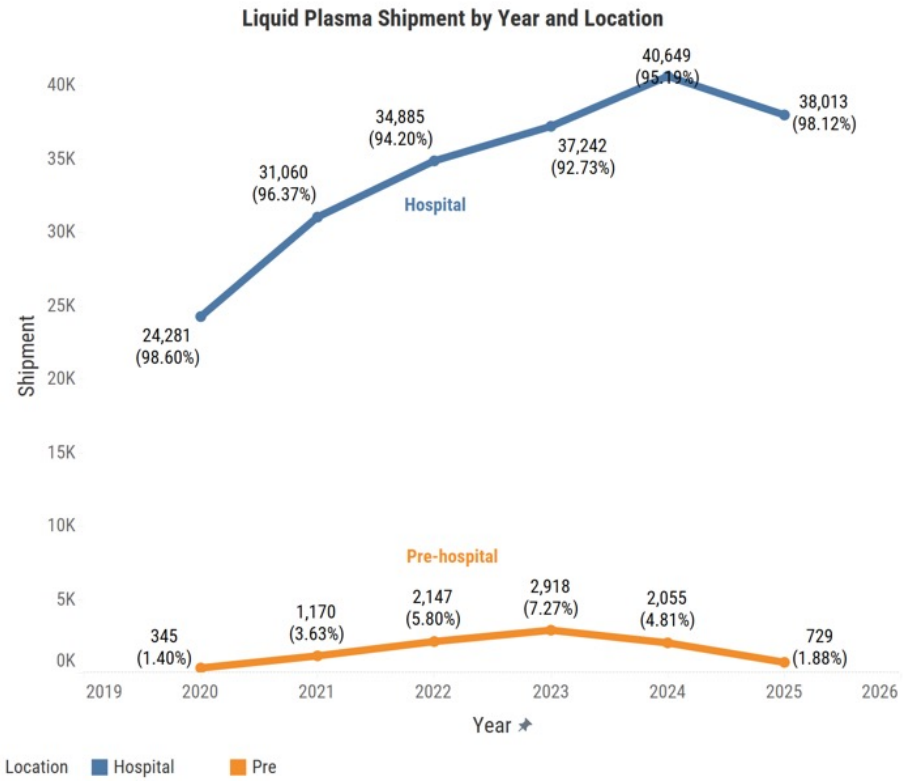
Growth of LTOWB



	FY19	FY20	FY21	FY22	FY23	FY24	FY25 -May
LTOWB	5,048	8,834	14,42	16,80	29,11	37,84	46,01

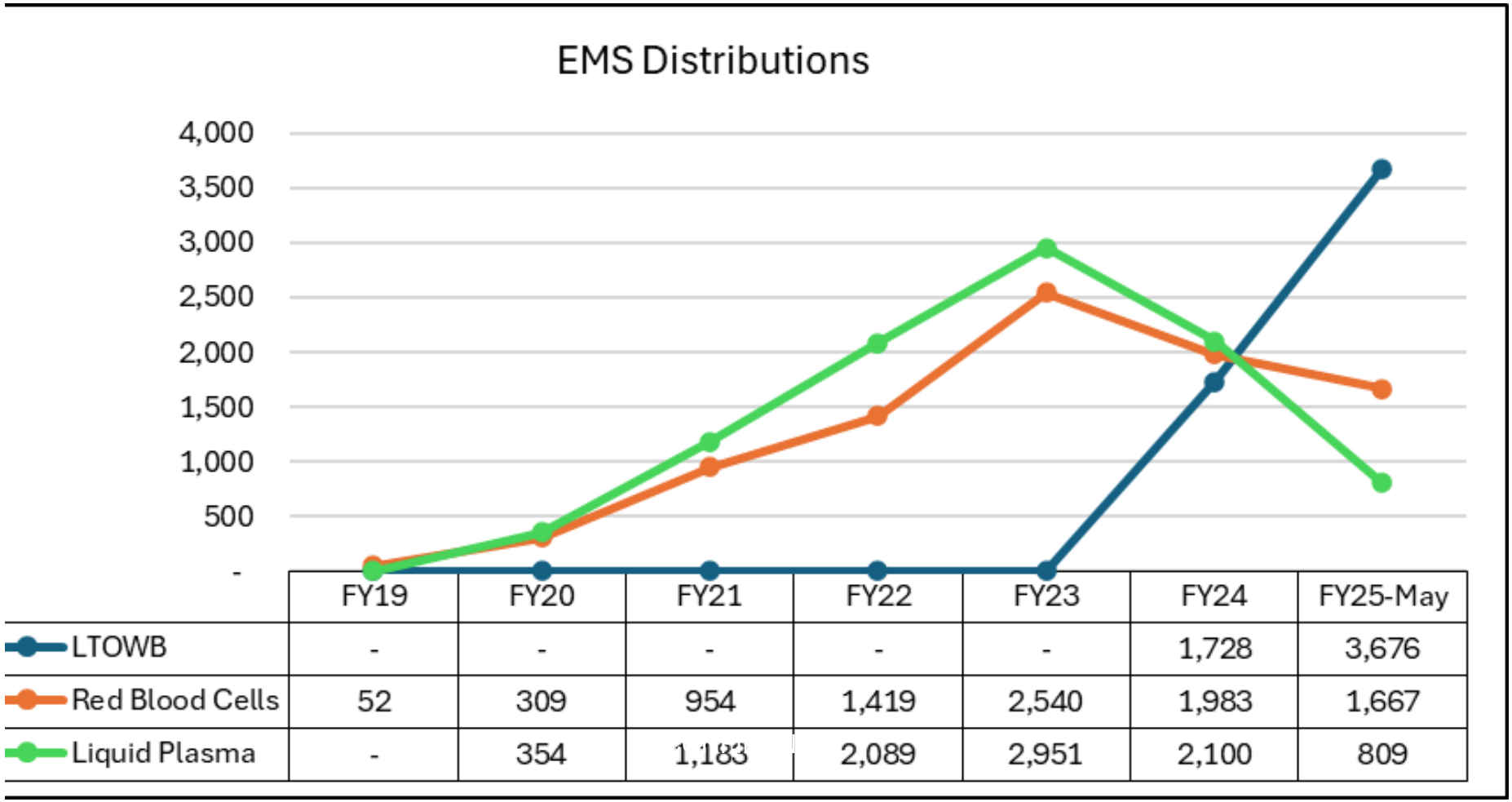
- Convenience & Improved Efficiency
  - Balanced transfusion of all components at once
  - Rapid and easy administration in one bag
- Positive outcomes from past research
- On-going in-hospital studies
  - MATIC-2 Pediatric Trial
  - TROOP Adult Trial
- On-going Pre-hospital studies
  - TOWAR - Adult Trial
  - SWIFT – Adult Trial

Liquid Plasma



- Clinical value: address coagulopathy in urgent bleeding cases
  - Effective in Prehospital (NEJM, 2018; PAMPER Trial)
- Operational Value: Rapid availability and extended shelf life of 26 d
- Financial value—inexpensive, good availability

Red Cross Pre-hospital Customer Distributions

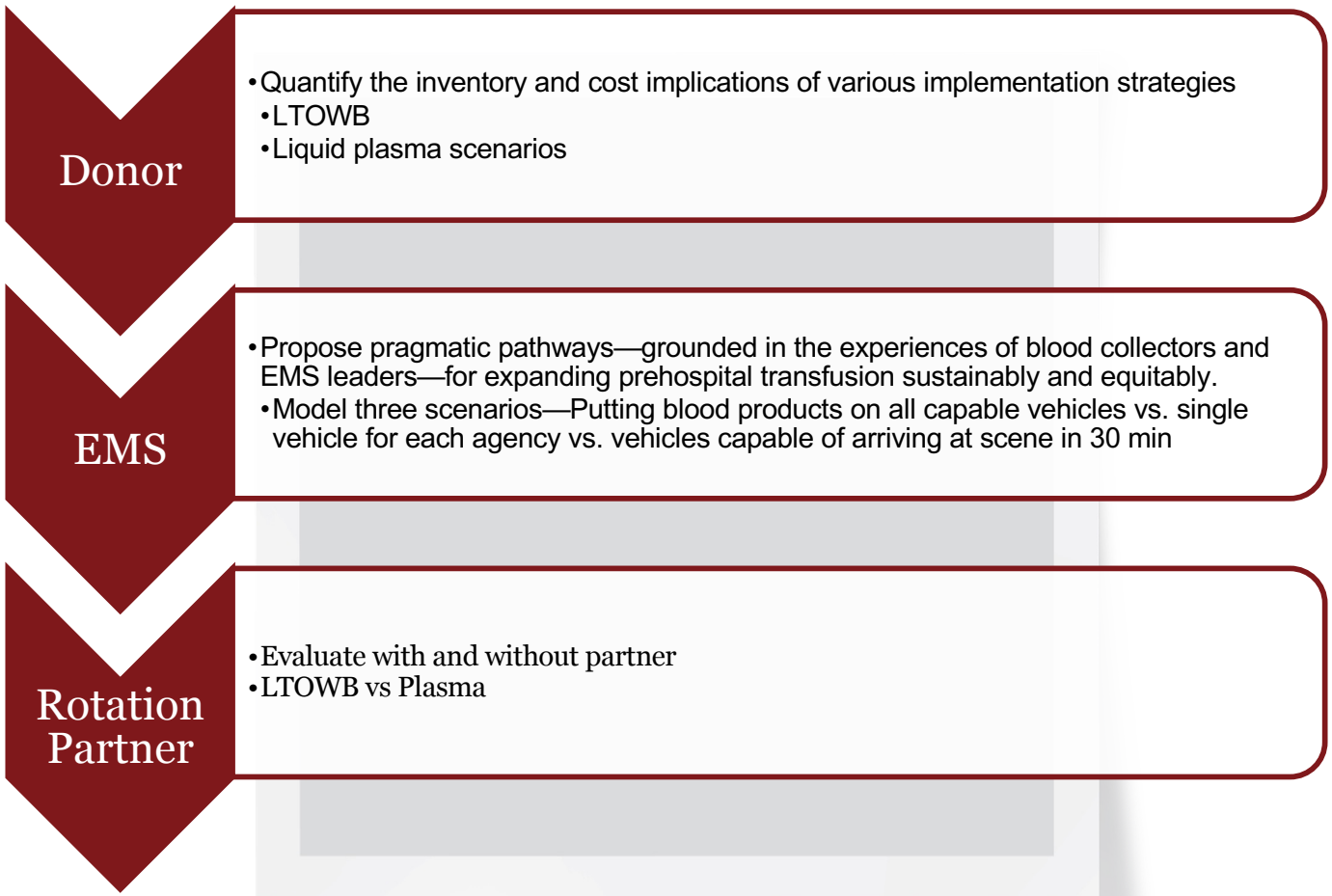


	FY19	FY20	FY21	FY22	FY23	FY24	FY25-May
LTOWB	-	-	-	-	-	1,728	3,676
Red Blood Cells	52	309	954	1,419	2,540	1,983	1,667
Liquid Plasma	-	354	1,183	2,089	2,951	2,100	809

Goal of Modeling Exercise

- Quantify the inventory and cost implications of various implementation strategies
  - LTOWB
  - Liquid plasma scenarios
- Propose pragmatic pathways—grounded in the experiences of blood collectors and EMS leaders—for expanding prehospital transfusion sustainably and equitably.
  - Model three scenarios—Putting blood products on all capable vehicles vs. vehicles capable of arriving at scene in 30 min
  - Model EMS with established partnerships for rotations vs. allowing outdate on vehicles

Modeling Framework and Considerations

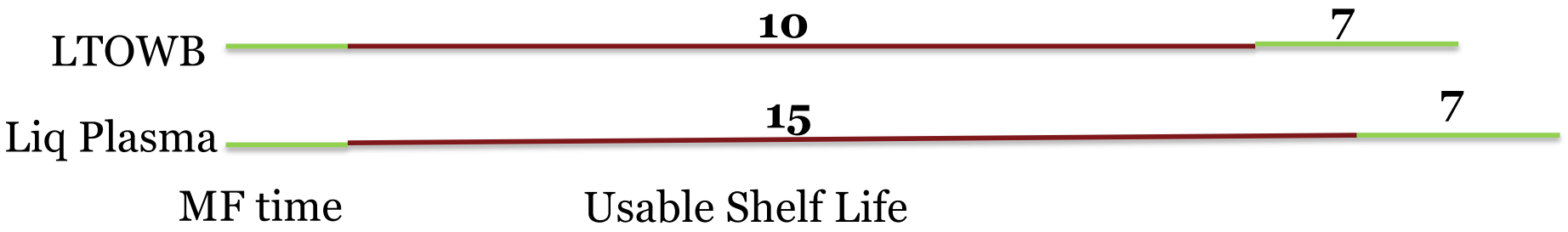


EMS System Assumptions

	Assumption	Value	Rationale
EMS Systems Assumptions	Trauma Annual Prehospital Transfusions	300,000	Based on 2025 study estimating volume of prehospital transfusions for traumatic injuries(ref)
	Non-Trauma Prehospital Annual Transfusions	150,000	Based on 2024 study evaluating transfusion use in non-trauma prehospital settings (e.g., GI bleeds, obstetric emergencies)(ref)
	Total number of EMS Agencies (2020)	11,450	Source: 2020 National EMS Assessment
	Capable 911 Response (Scene) with Transport	25,000	Estimated number of EMS vehicles capable of both scene response and patient transport
	Vehicles within 30 minutes to a scene w/blood	5,800	Number of ambulances capable of reaching patients within 30 minutes of dispatch (expert estimate)
	% Vehicles that can Rotate Units	75%	Proportion of EMS vehicles with protocols and capacity for blood unit rotation
	Average Units Used per Transfusion	1	Average number of units transfused per patient in prehospital settings
	# Units Needed in Vehicle	2	While many EMS systems currently carry only 1 unit, carrying 2 units improves response capability and mitigates resupply delays
	EMS Rotation Loss Rate	3%	Estimated percentage of blood products lost in EMS rotation due to expiration or breakage
	Transfusion Rate	36%	Weighted average of use across urban/suburban (42%) and rural/wilderness (25%) EMS deployments

Blood Collector Assumptions

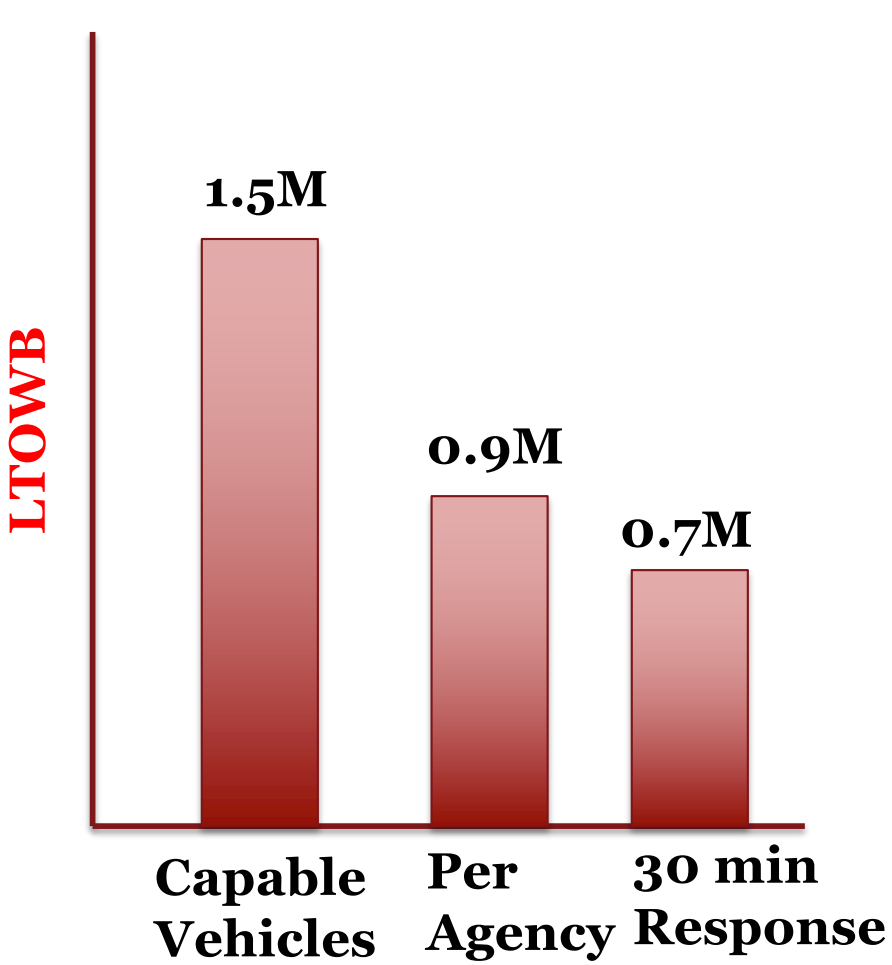
Blood Collector Assumptions	LTOWB Hospital Rotation Shelf Life (Days)	10	Accounts for hospital receiving lead time (typically 7 days) and remaining usable shelf life
	LP Hospital Rotation Shelf Life (Days)	15	Usable inventory time at hospital after accounting for typical lead times
	LP Non-Hospital Rotation Shelf Life (Days)	21	Reflects product shelf life post-manufacture, inclusive of 5-day production window prior to distribution
	LTOWB Non-Hospital Rotation Shelf Life (Days)	16	Includes 5-day manufacturing window before product can be distributed; remaining days reflect usable time for EMS rotation to hospital partner or blood collector
	LTOWB Collect to Ship Rate	112%	Accounts for manufacturing losses and inventory buffer required to meet shipping demand
	LP Collect to Ship Rate	102%	Includes margin for product loss during processing and delivery
	LTOWB Unit Cost	$550	Estimated cost per unit based on current market rates for low-titer group O whole blood
	LP Unit Cost	$65	Based of market rate

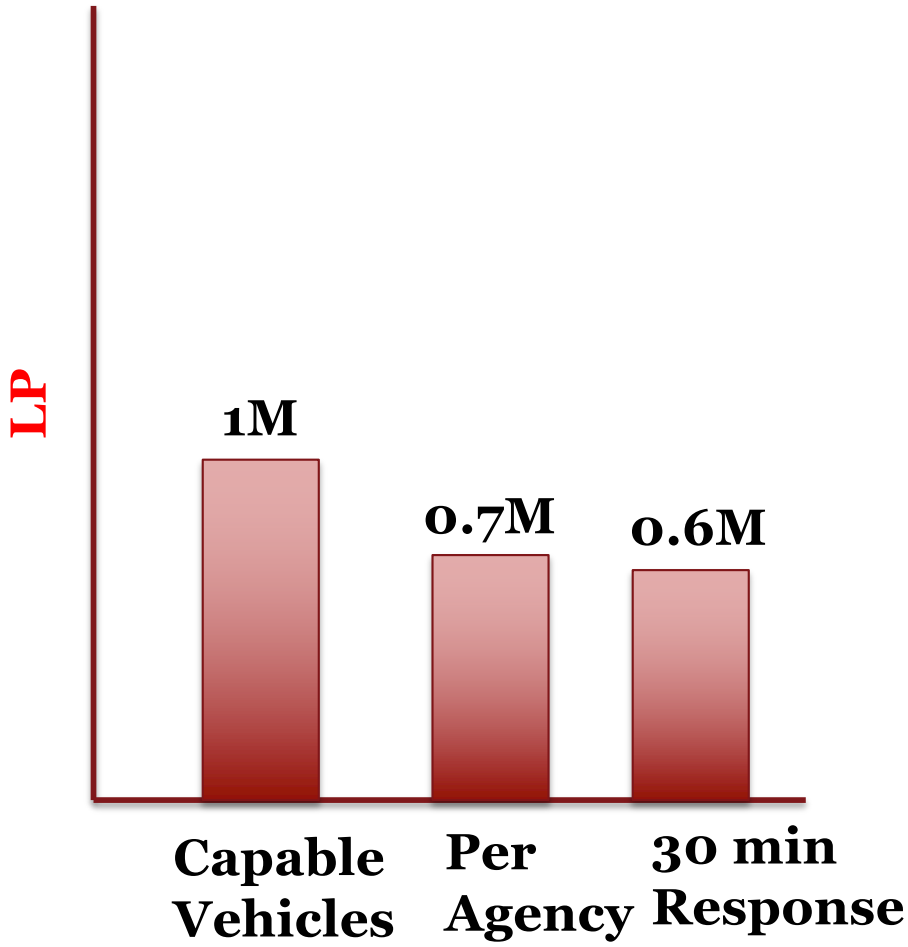


Demand Model

	LTOWB					LP				
EMS Measure	Routine # of LTOWB Units Shipped	Trauma & Medical LTOWB Units Shipped & Transfused	**Total # LTOWB Units Shipped**	LTOWB Rotated	Total # LTOWB Units Collected	Routine # of LP Units Shipped	Trauma & Medical LP Units Shipped & Transfused	**Total # LP Units Shipped**	LP Rotated	Total # LP Units Collected
Capable Response Vehicles	861,560	450,000	1,311,560	626,785	1,468,947	570,054	450,000	1,020,054	414,715	1,040,456
Total Response Agencies	394,594	450,000	844,594	287,067	945,946	261,085	450,000	711,085	189,939	725,307
30 Minute Response	199,882	450,000	649,882	145,414	727,868	132,253	450,000	582,253	96,214	593,898

Total Volume Collected

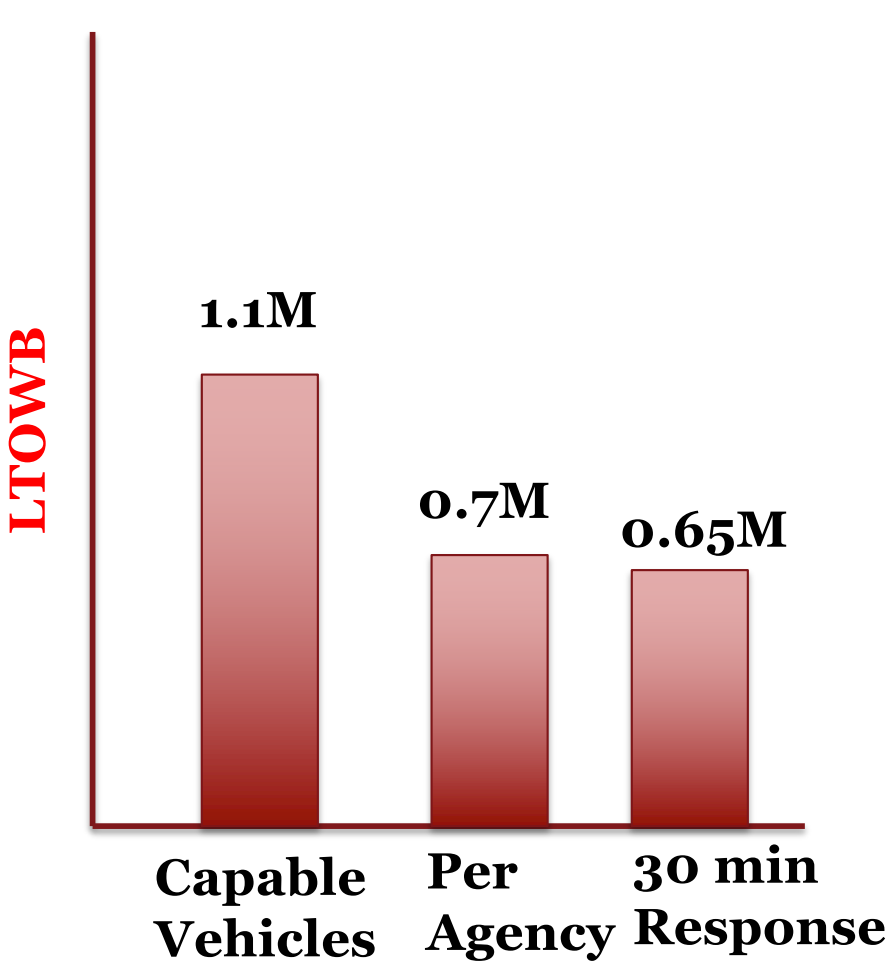


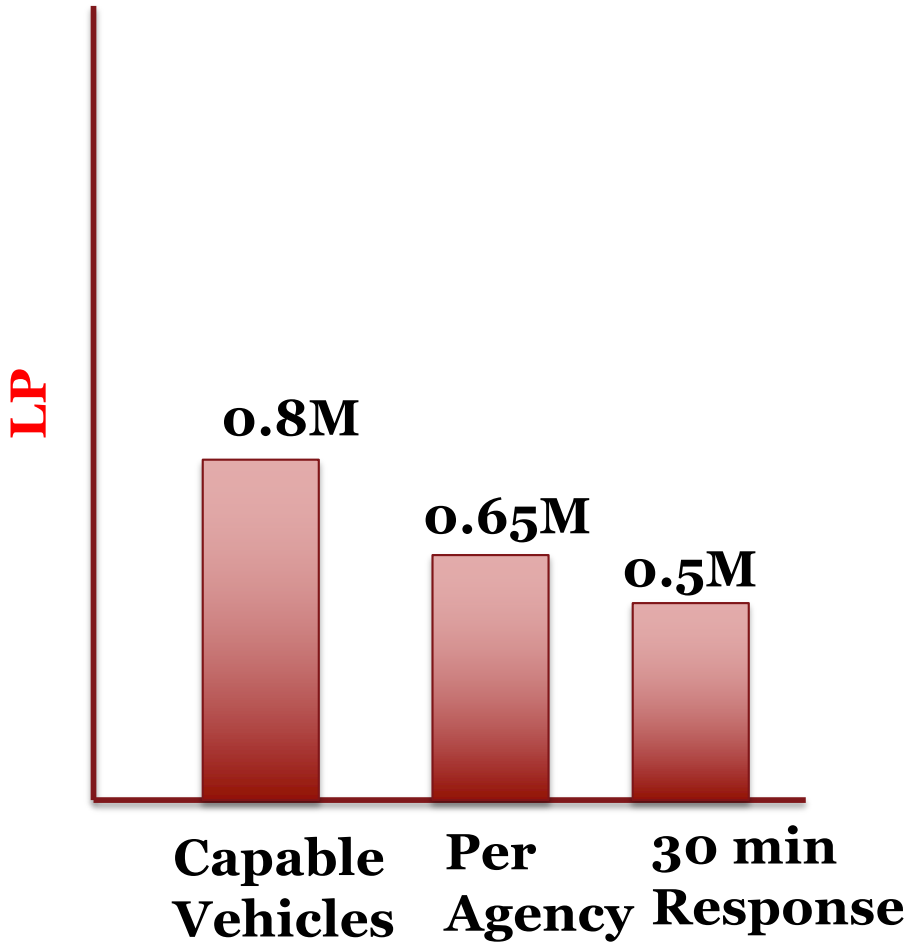


Model Without Rotation Partners

	LTOWB					LP				
EMS Measure	Routine # of LTOWB Units Shipped	Trauma & Medical LTOWB Units Shipped & Transfused	**Total # LTOWB Units Shipped**	LTOWB Rotated	Total # LTOWB Units Collected	Routine # of LP Units Shipped	Trauma & Medical LP Units Shipped & Transfused	**Total # LP Units Shipped**	LP Rotated	Total # LP Units Collected
Capable Response Vehicles	544,143	450,000	994,143	0	1,113,440	414,585	450,000	864,585	0	881,877
Total Response Agencies	249,217	450,000	699,217	0	783,124	189,880	450,000	639,880	0	652,678
30 Minute Response	126,241	450,000	576,241	0	645,390	96,184	450,000	546,184	0	557,107

Total Volume Collected Reduced by ~10% But With Greater Discards





Cost

EMS Measure	Cost			
	Total Cost (100% LTOWB)	Total Cost (100% LP)	Total Cost LTOWB (Rural): LP (Sub/Urban)	Total Cost LTOWB (Sub/Urban): LP (Rural)
Capable Respon Vehicles (High)	$721,357,785	$66,303,541	$282,471,442	$498,639,342
Total Response Agencies (Low)	$464,526,866	$46,220,522	$184,261,615	$322,302,709
30 Minute Response	$357,435,006	$37,846,422	$143,310,654	$248,774,887

Summary

- Even conservative rollout ≈ 0.6-0.65 M units/yr,
- Rotation partnerships essential, particularly for use of LTOWB
- Federal funds needed to scale.

Strategic Scale Up Roadmap

- Pilot Expansion to refine understanding of actual usage
- Regional Integration to understand rotation models
- Adopt regional shared inventory dashboards

Thank You

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