



MASSIVE HEMORRHAGE PROTOCOL (MHP) SURVEY RESULTS

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Outline



Previous studies



Data collection process



All hospitals (n= 132 or n= 133)



Hospitals with an MHP (n= 97)



Summary



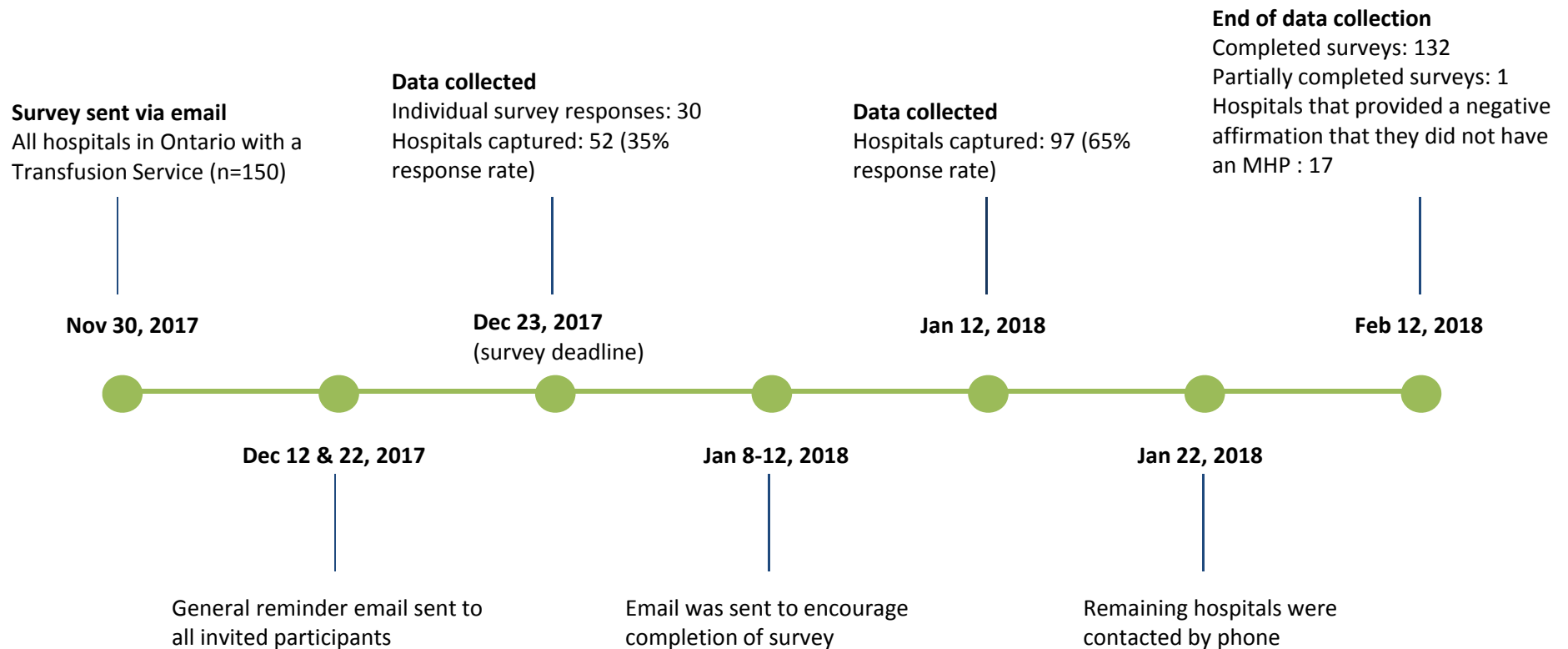
Variability in Previous Surveys

- Activation triggers (e.g. physician discretion, laboratory triggers, vital sign triggers)
- Hemostatic agents (e.g. TXA, rFVIIa, PCC, fibrinogen concentrate)
- Point-of-care testing (e.g. TEG, ROTEM)
- Methods of activation (e.g. telephone order, CPOE, written)
- Transportation of blood products (e.g. cooler, portable refrigerator)
- Person activating the MHP (e.g. blood bank, auto activation, bedside physician)

Camazine MN, et al. J Trauma 2015; 78(6): S48-53
Horst J, et al. Transfusion Medicine 2016; 26(1): 49-56
Tran MH, et al. American journal of clinical pathology 2016; 146(3): 319-323
Trembl AB, et al. Anesthesia & Analgesia 2017; 124(1): 277-281
Schuster KM, et al. Transfusion 2010; 50(7): 1545-1551



Data Collection





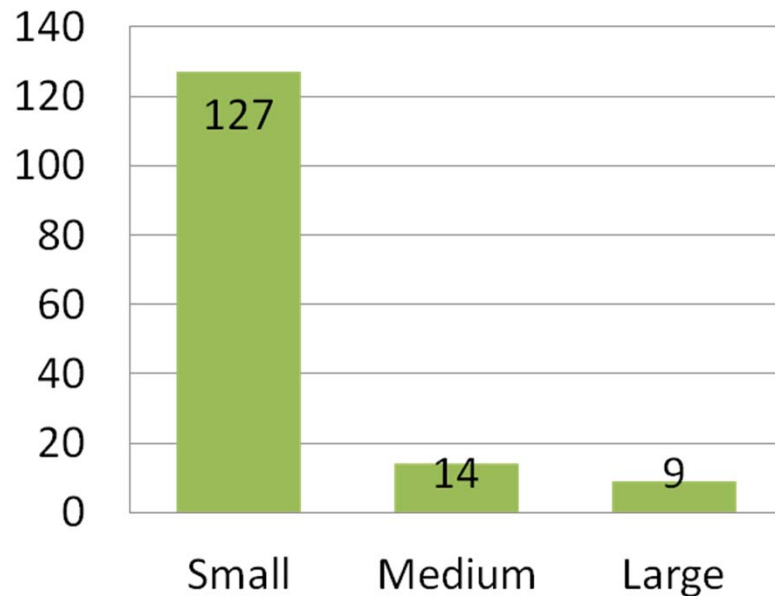
Survey Questions

	Sample Questions
Hospital Demographics	Do you have a hospital approved MHP? What is the year the current policy was approved?
Activation Criteria	Do you have activation criteria? Are the activation criteria the same for all patients? Who is included in the activation roll-out as a team member?
Communication	How are laboratory results communicated to clinical areas? Are ONLY critical laboratory results called?
Blood Work	How often do you draw a set of blood work during an MHP? Which laboratory tests are routinely drawn?
Test Availability	Which test assays are available on site at your hospital? Do you have targeted resuscitation? What is the total number of Lab staff covering all areas at lowest staffing level?
Temperature	Does your protocol require monitoring of patient temperature? What is the temperature target in Degrees Celsius?
Transport Containers	When RBCs, platelets, plasma & cryoprecipitate are required during an MHP, are they transported in a validated container? Which products are routinely stocked on site in the Transfusion Medicine Laboratory?
Transfusion Medicine	During an MHP and when blood group is unknown, what patients receive O Rh negative RBCs? Do you have predefined component packs that are issued during an MHP? What hemostatic agents are included in the protocol?
Quality	Do you track any quality metrics for MHP?

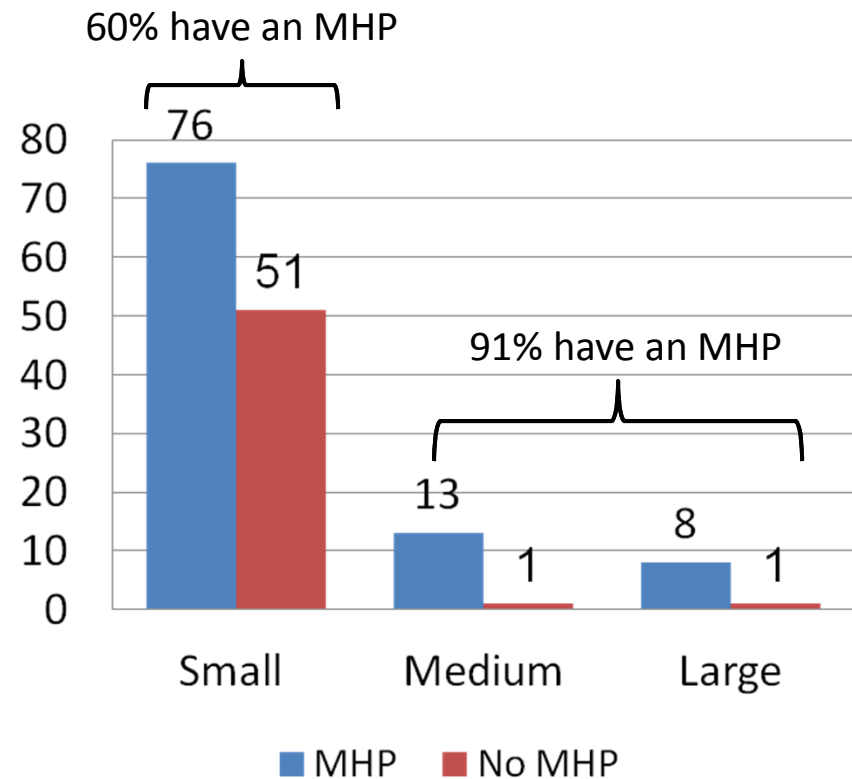


Hospital Demographics (n= 150)

Hospitals with a Transfusion Service



Hospitals with an MHP



Units of RBCs transfused in 2017

Small <5000

Medium 5000-10,000

Large > 10,000

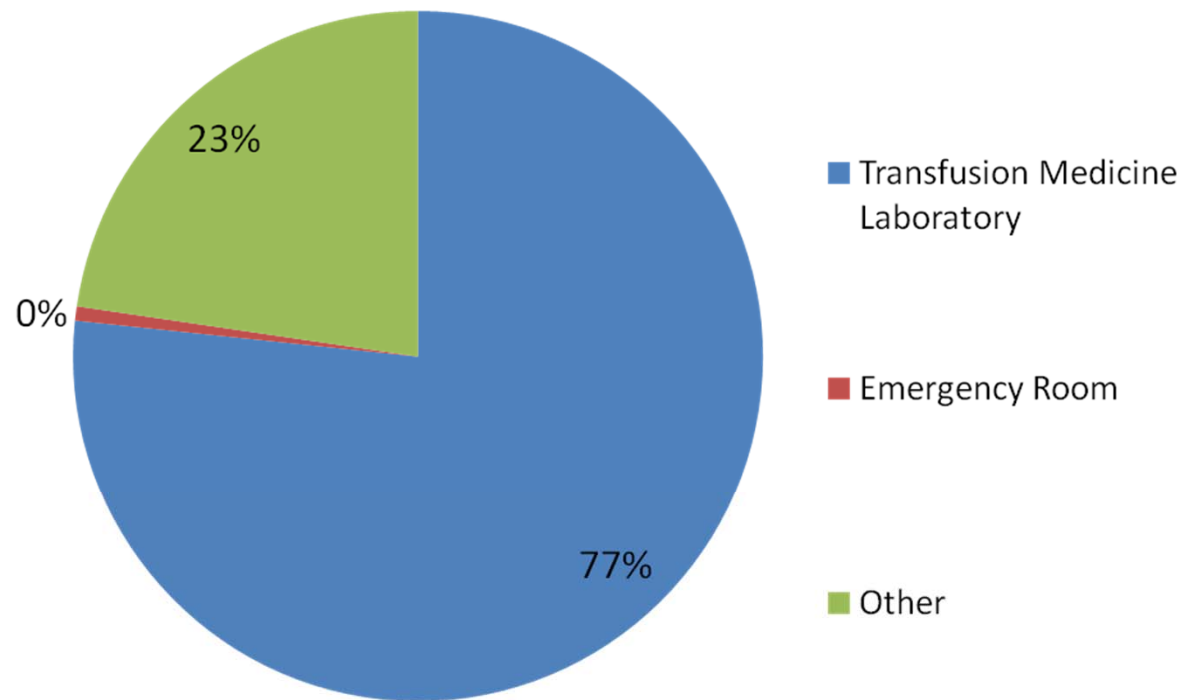


**All reporting hospitals
(n= 132 or n= 133)**



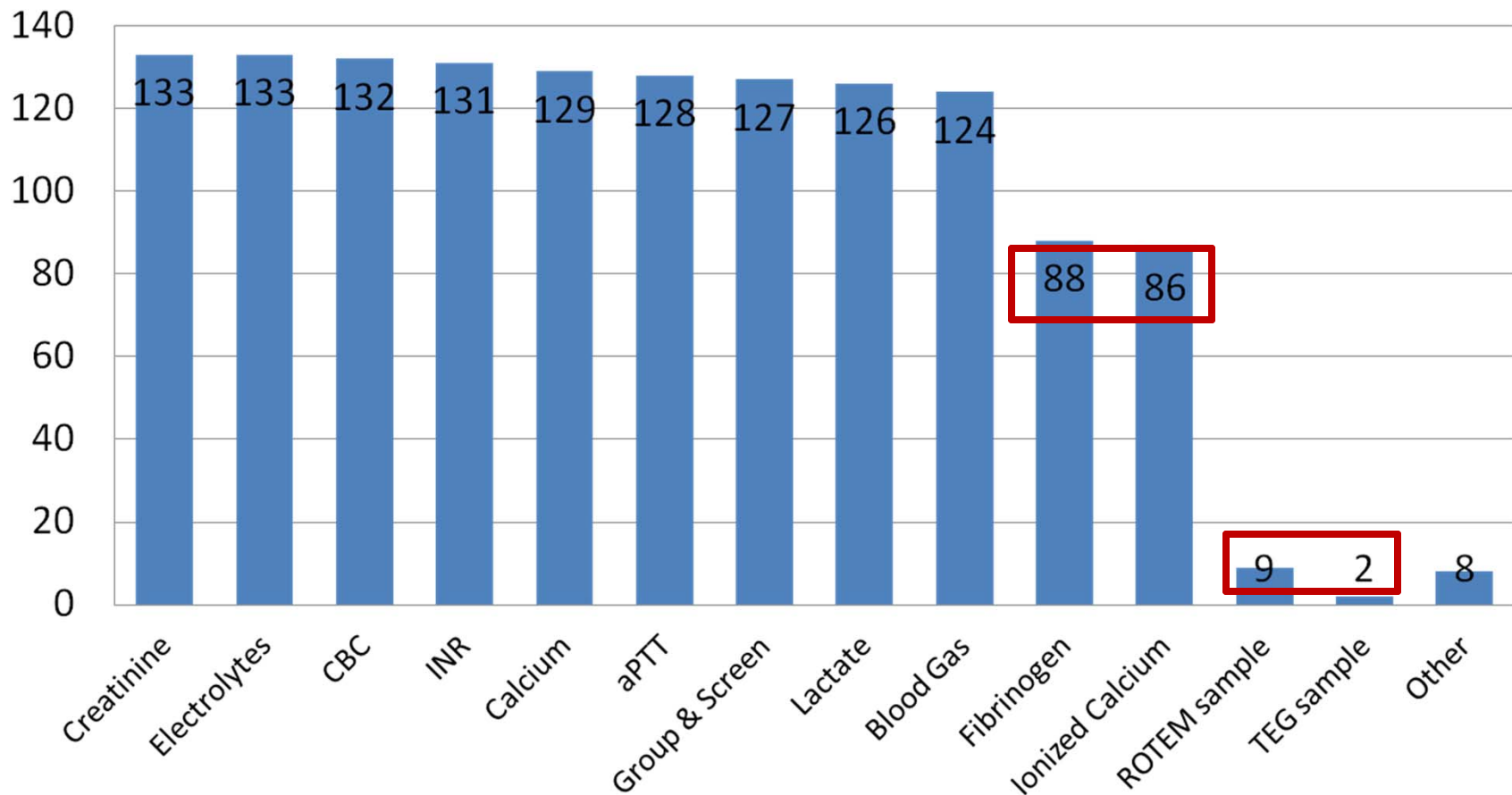
Demographics

Primary Role of Respondent





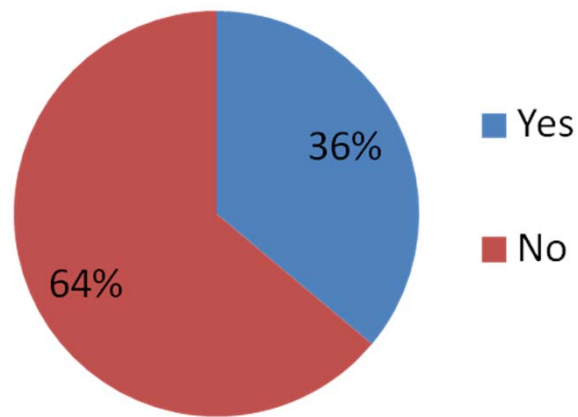
Test Availability



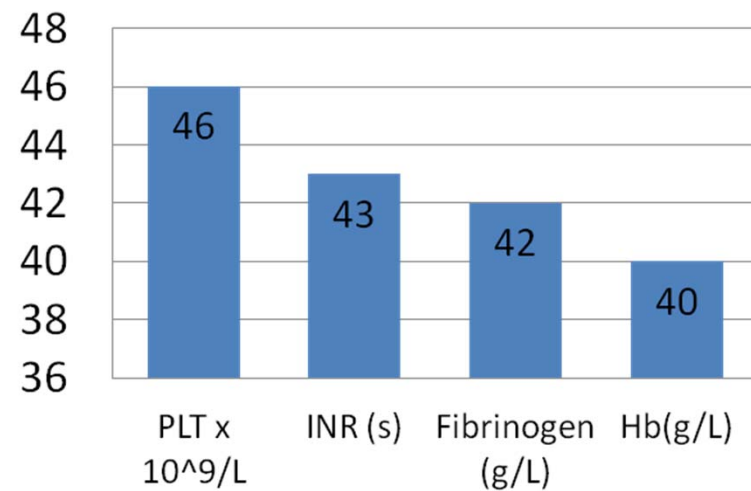


Targeted Resuscitation

Hospitals with Targeted Resuscitation



Targeted Resuscitation

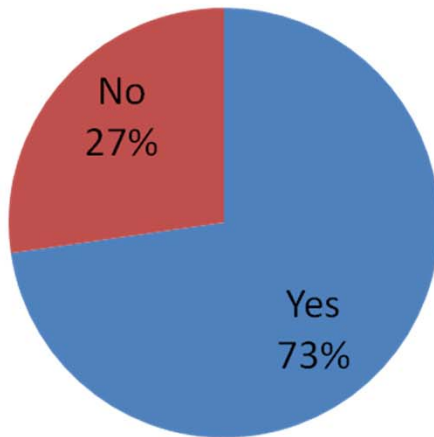


	PLT x 10 ⁹ /L	INR (s)	Fibrinogen (g/L)	Hb (g/L)
Mode	50	1.8	1.5	70
Median	50	1.8	1.5	70
STD	19.51	0.25	0.33	11.65

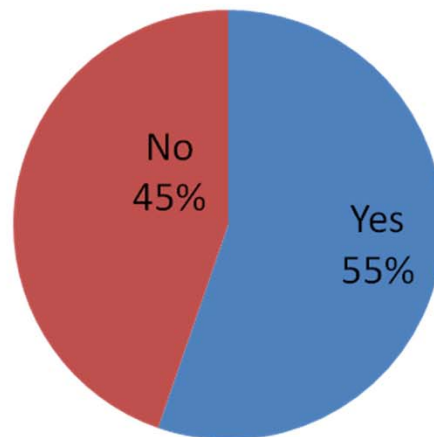


Transport Container

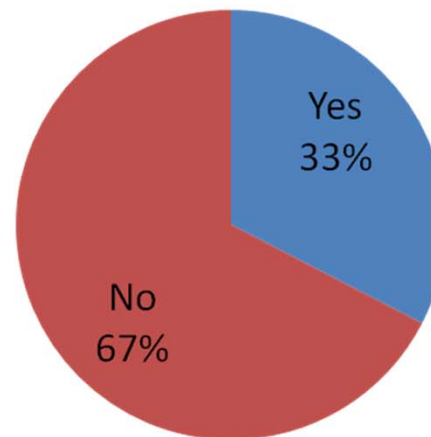
RBC



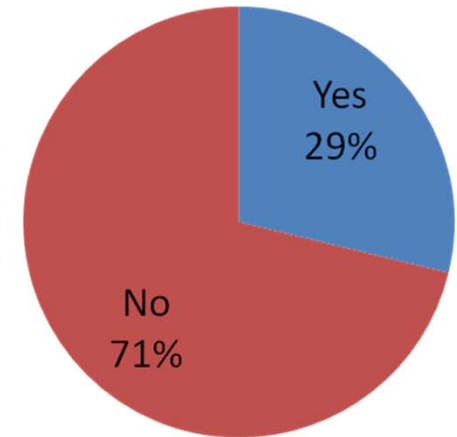
Plasma



Platelets



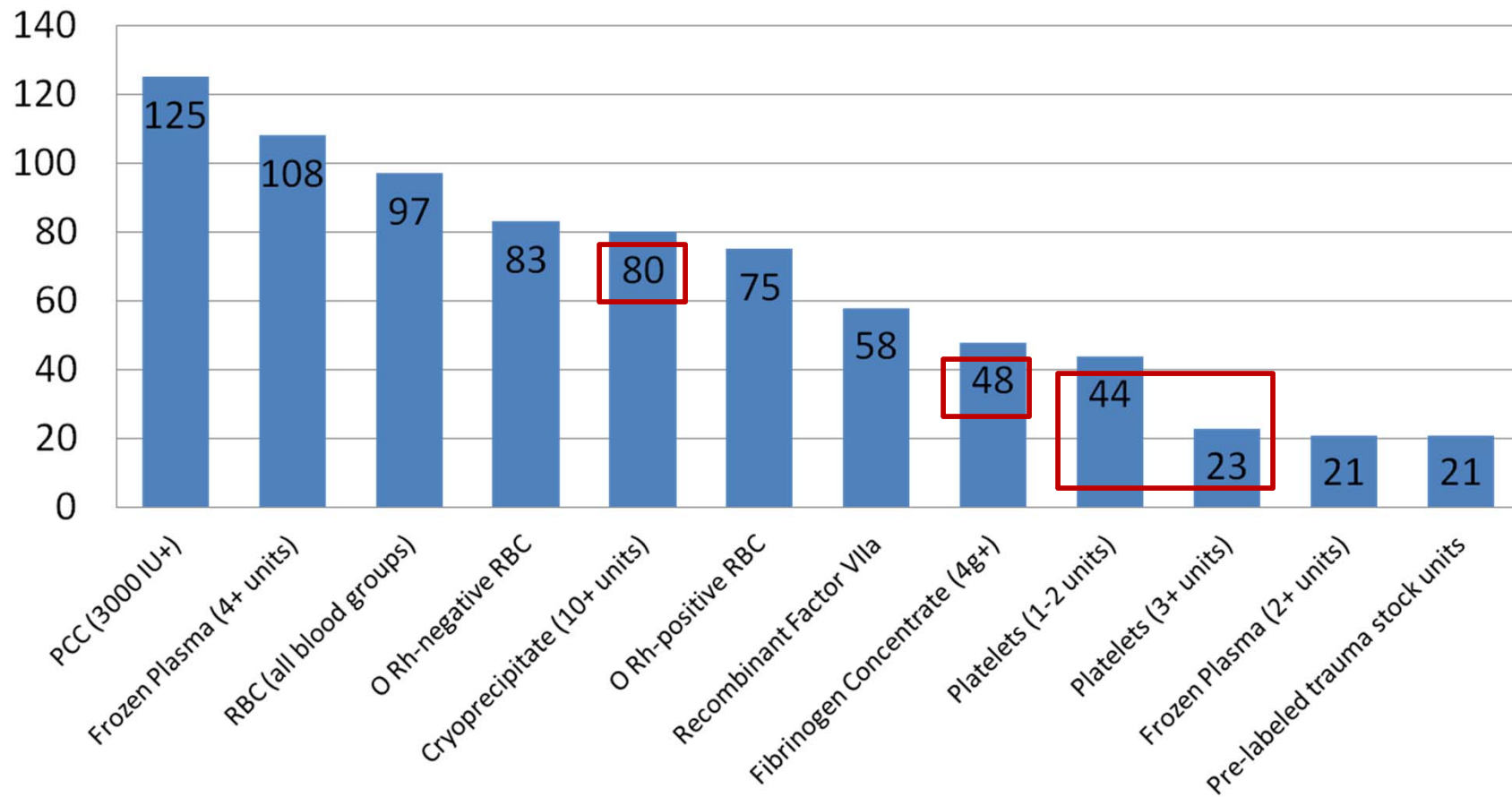
Cryoprecipitate





Products Routinely stocked

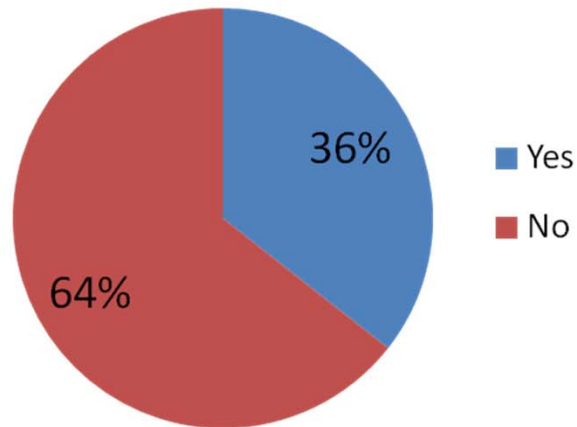
Products Routinely Stocked on Site in the TML





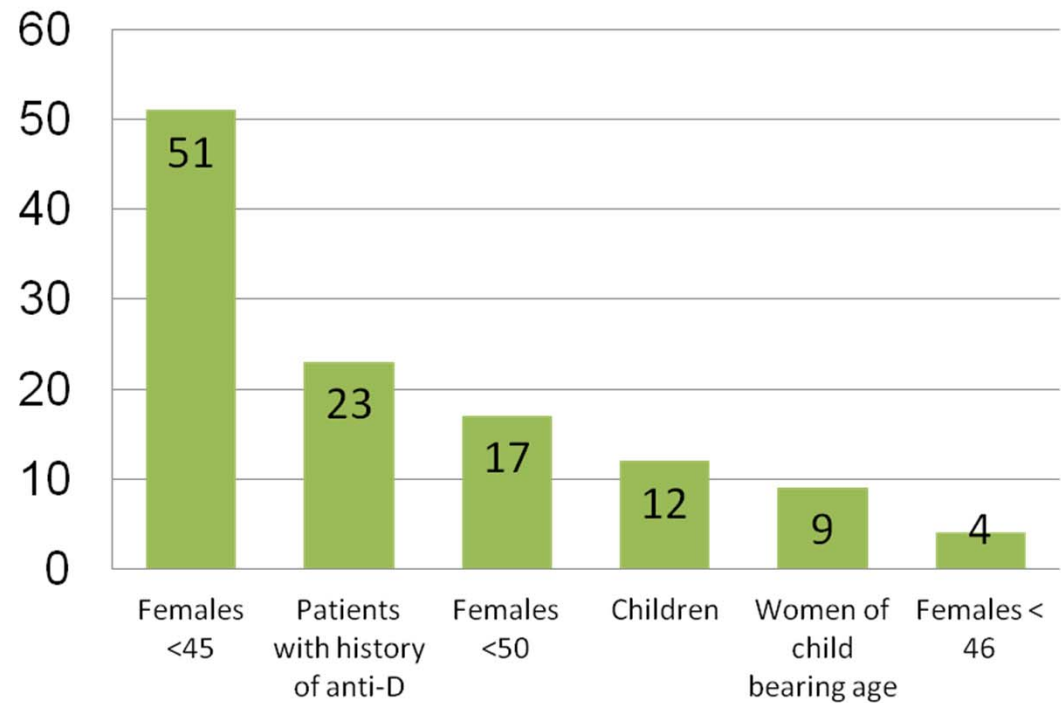
Transfusion Medicine – O Rh-Blood

Patients Receive O Rh-negative when Blood Group is Unknown



47/132 (36%) Yes
85/132 (64%) No

Patients that Receive O Rh-negative RBC





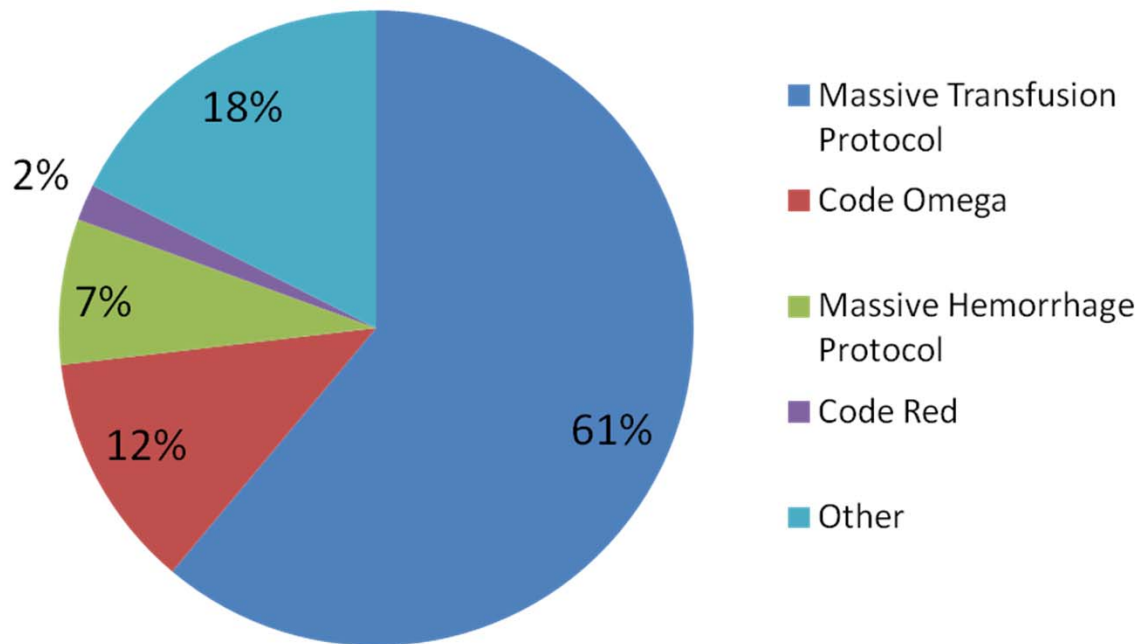
Hospitals with an MHP (n= 97)





MHP Demographics

Protocol Names



Other names:

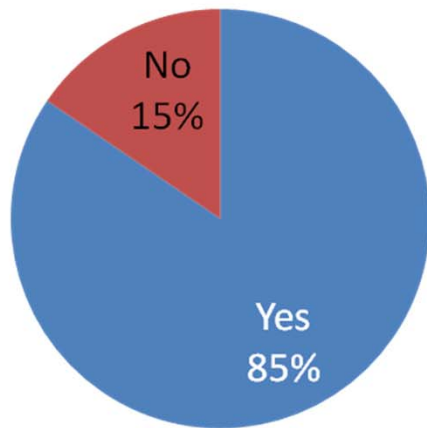
- Adult Life Threatening Hemorrhage P&P
- Massive Bleeding Protocol
- Massive Blood Transfusion
- Massive Hemorrhage Control Protocol (MHCP)
- Massive Transfusion Order Set
- Massive Transfusion & Code Bleed

78% of protocols were implemented or updated in the past 5 years

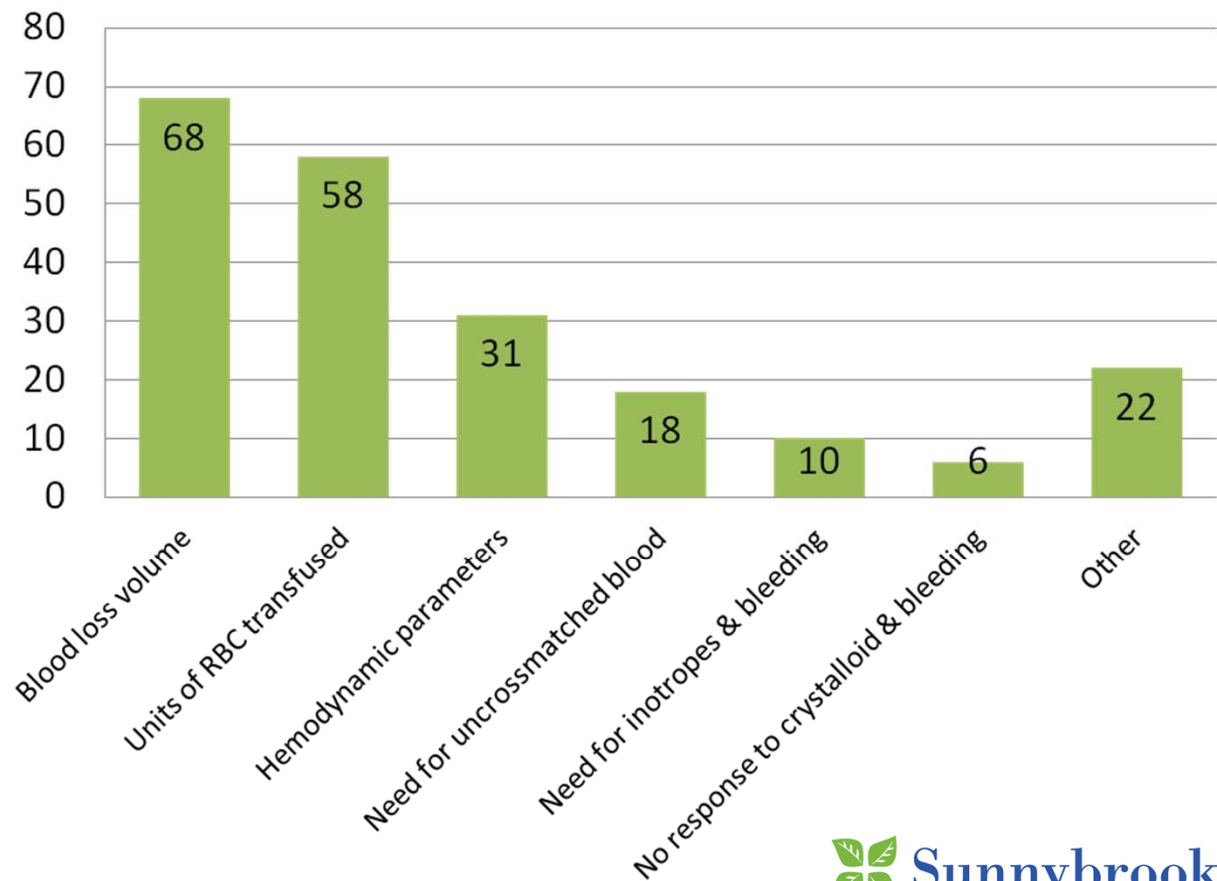


Activation Criteria

Hospitals with Activation Criteria



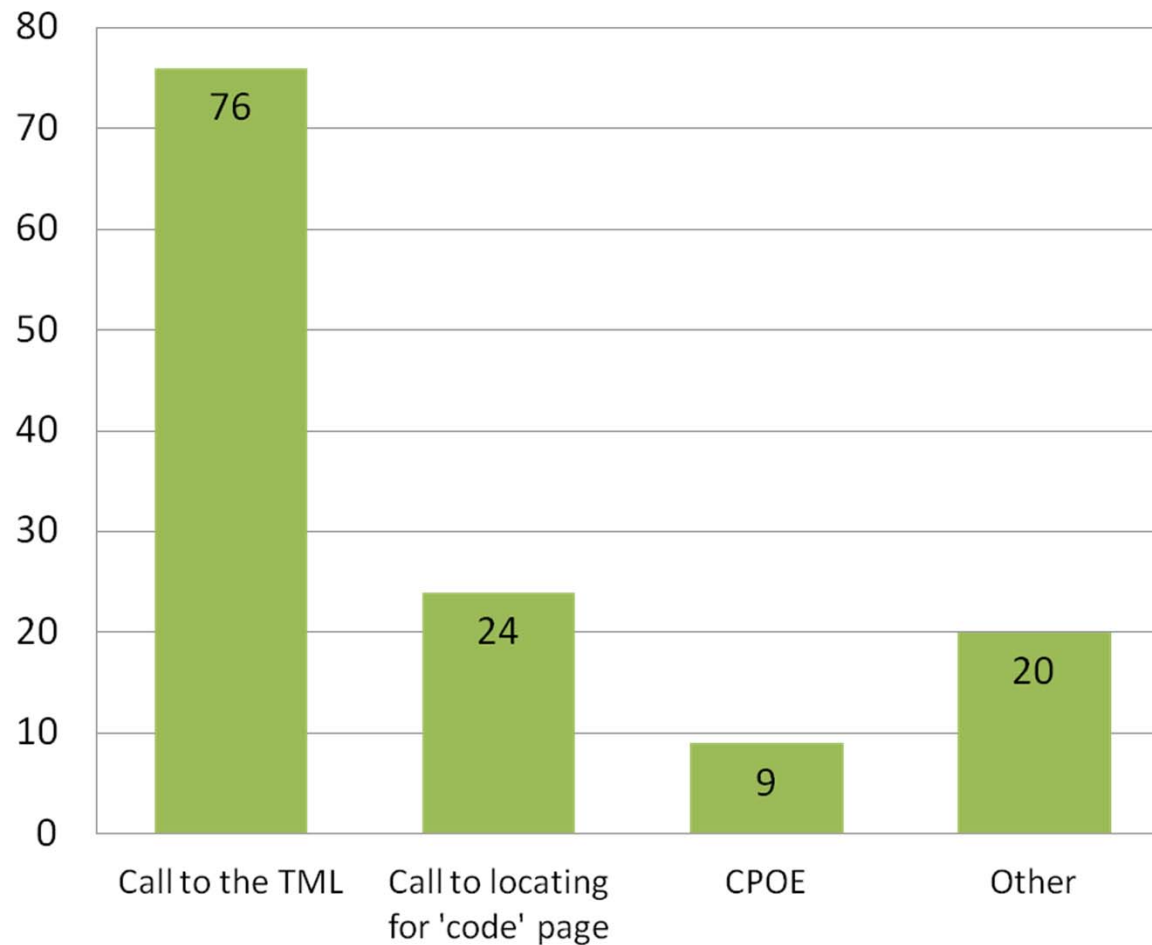
Activation Criteria Included in MHP



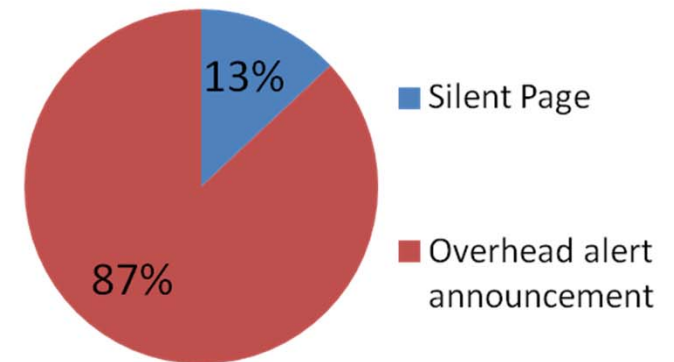


Method of Activation

Method of Activation



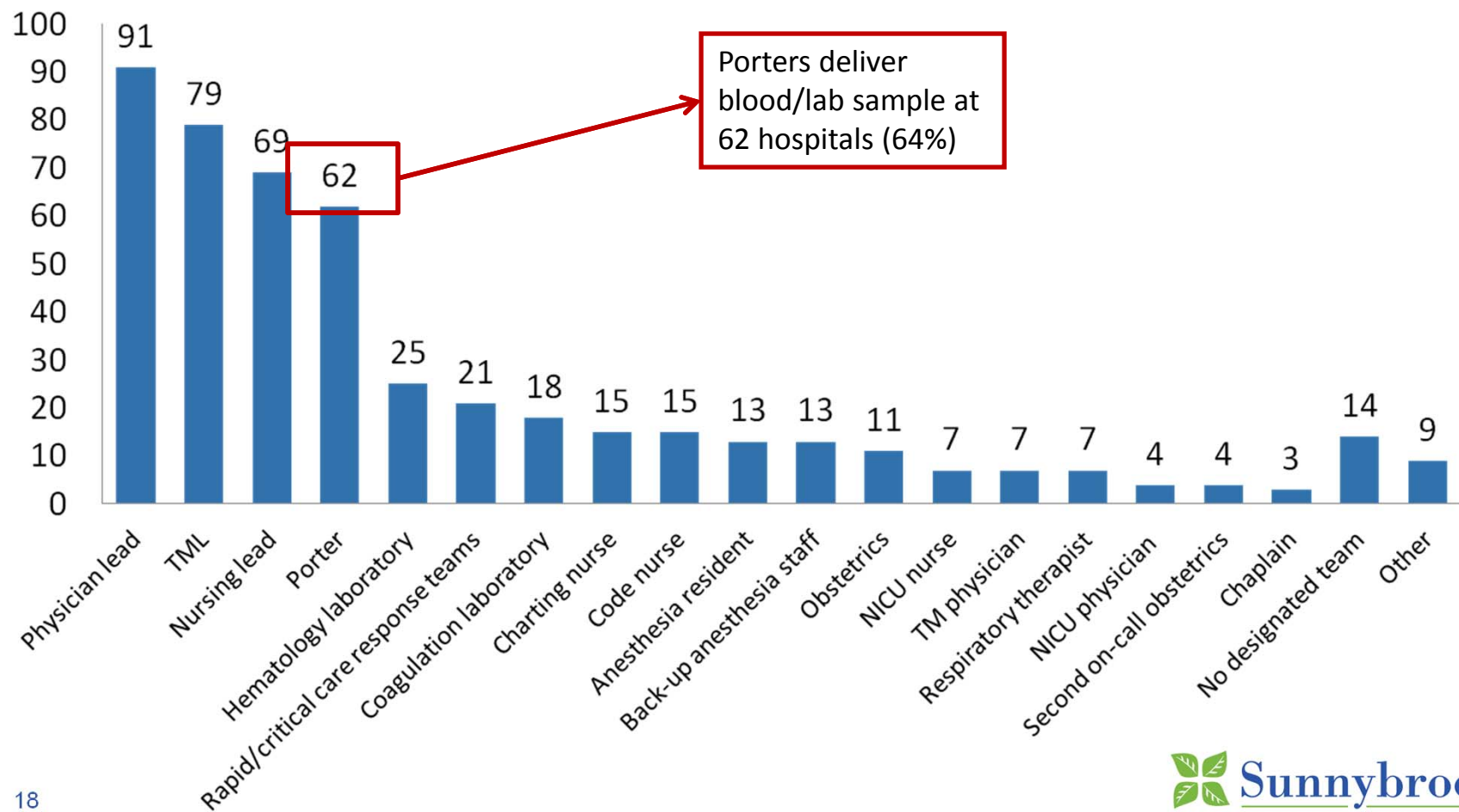
Activation Through Locating



Silent page: 3/24 (13%)
Overhead: 21/24 (87%)

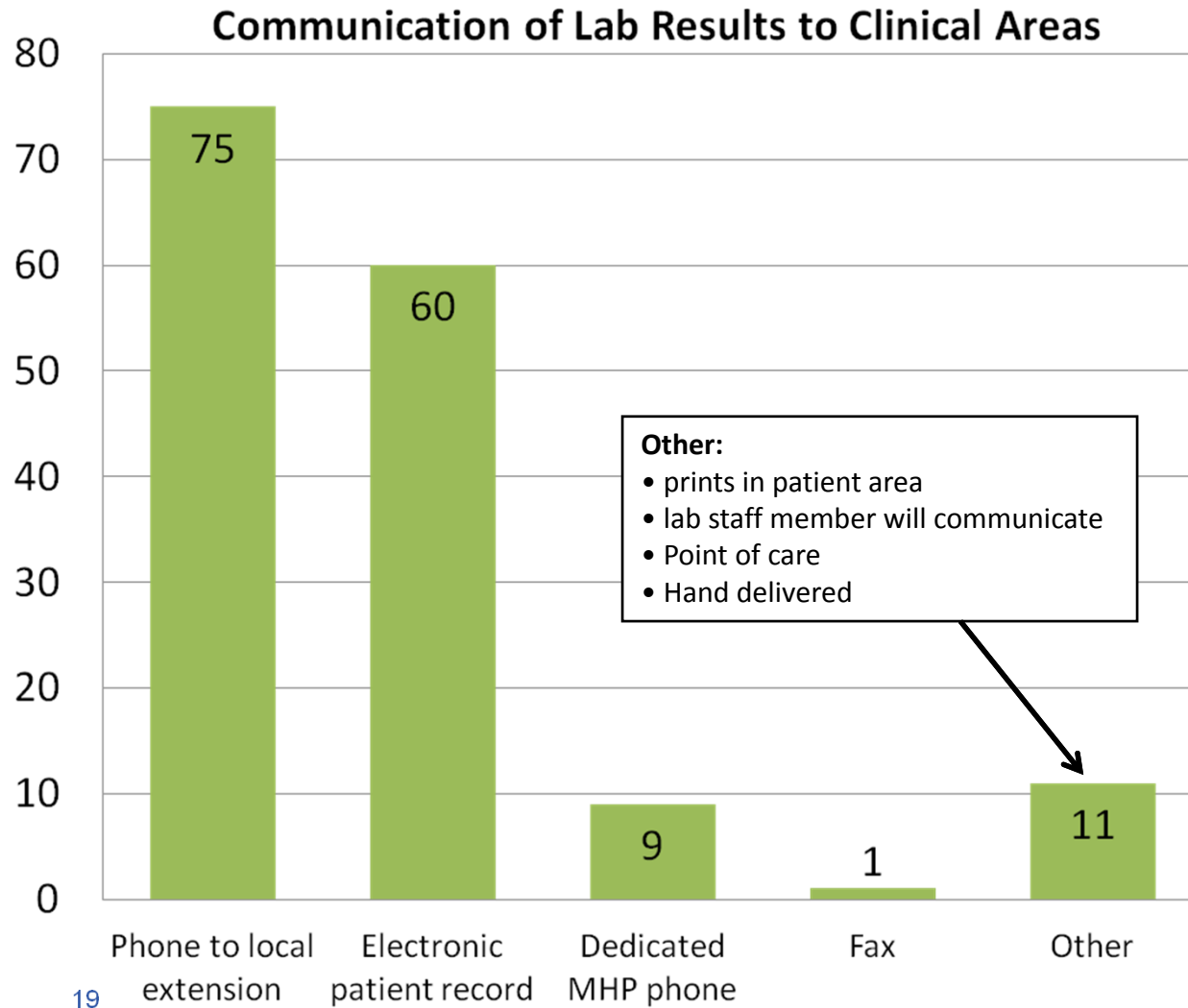


Members of Activation Roll-Out

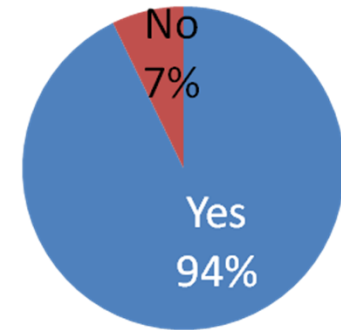




Communication



Only Critical Lab Results are Called

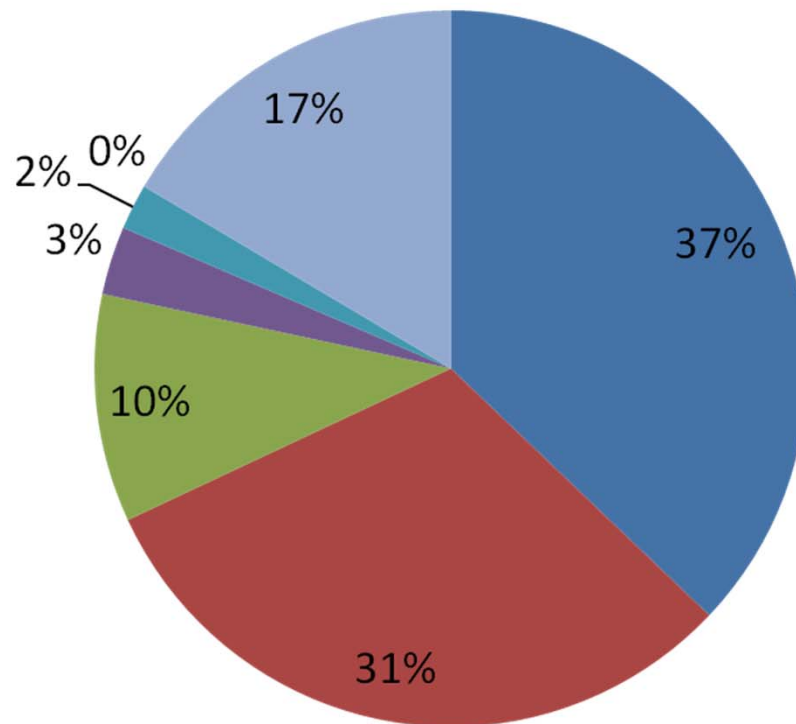


90/97 (93%) Yes
7/97 (7%) No



Blood Work

Blood Work Drawn During an MHP



- At discretion of physician
- At predefined intervals (e.g. hourly)
- Beginning and end of activation and at predefined intervals
- At start of each pack
- Beginning and end of activation
- None, patient receives formula resuscitation



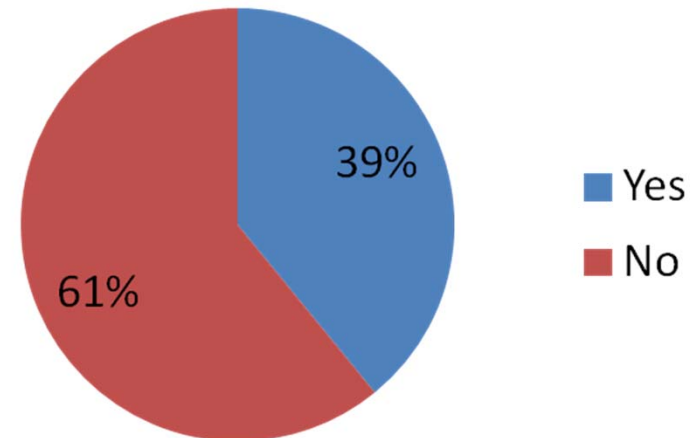
Staffing Level

Laboratory Staff Covering all Areas at Lowest Staffing Level

	Counts
One	37
Two	25
Three	19
Four	8
Six	5
Eight	3
Ten	1

Average: 2.45
Mode: 1
Median: 2

Hospitals with on-call Schedule

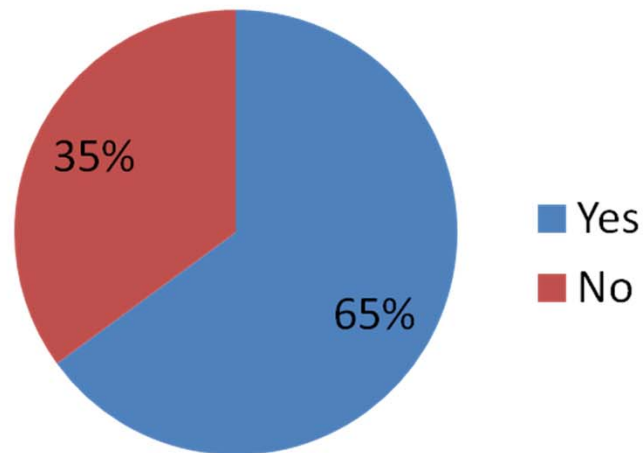


52/133 (39%) Yes
81/133 (61%) No



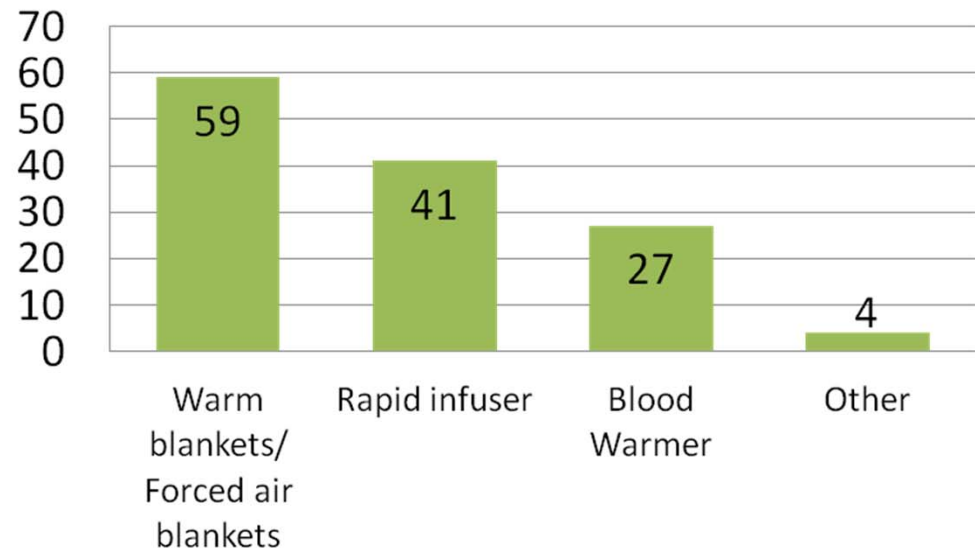
Hypothermia Monitoring and Management

Monitoring of Patient Temperature



Median Target Temperature: 36° C

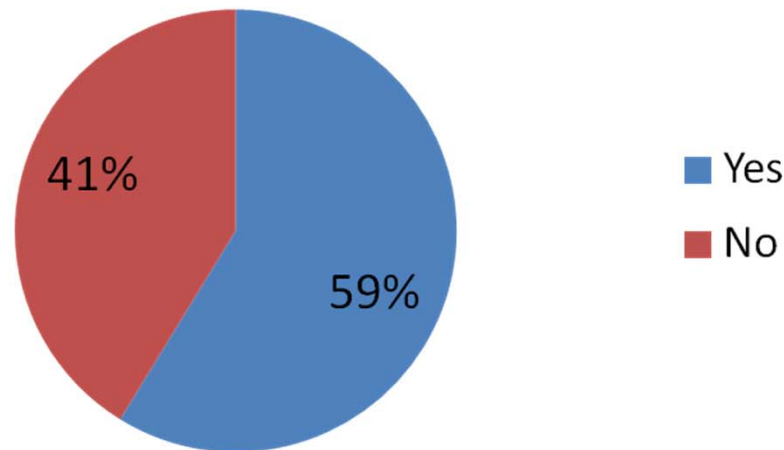
Methods of Increasing Temperature





Transfusion Medicine – Anticoagulant Reversal Plan

Specified Reversal Plan for Patients on Anticoagulant/Antiplatelet Agents

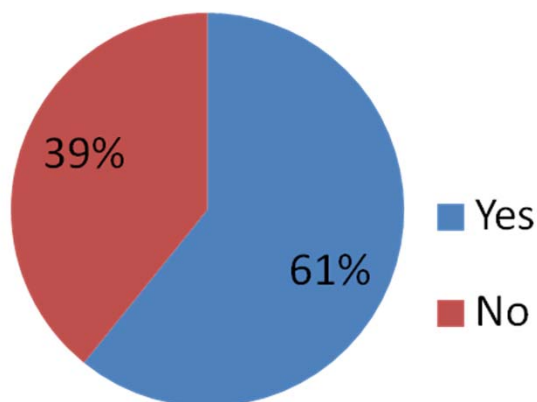


57/97 (59%) Yes
40/97 (41%) No



Transfusion Medicine – Predefined Packs

Predefined Component Packs



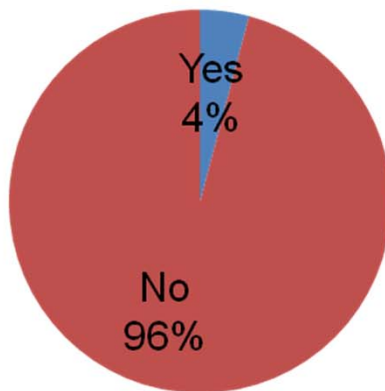
59/97(61%) Yes
38/97(39%) No

Pack	Units of RBC	Units of Plasma	Units of Platelet	Units of Cryoprecipitate
1 (n=58)	Average: 4.16 Mode: 4 Median: 4	Average: 2.26 Mode: 4 Median: 2.5	Average: 0.28 Mode: 0 Median: 0	Average: 0.19 Mode: 0 Median: 0
2 (n=47)	Average: 3.02 Mode: 4 Median: 4	Average: 3.43 Mode: 4 Median: 4	Average: 0.85 Mode: 1 Median: 1	Average: 2.34 Mode: 0 Median: 0
3 (n=38)	Average: 3.68 Mode: 4 Median: 4	Average: 3.24 Mode: 4 Median: 4	Average: 1.18 Mode: 1 Median: 1	Average: 1.32 Mode: 0 Median: 0
4 (n=32)	Average: 3.28 Mode: 4 Median: 4	Average: 2.69 Mode: 4 Median: 2	Average: 0.81 Mode: 1 Median: 1	Average: 2.19 Mode: 0 Median: 0
5 (n=23)	Average: 3.83 Mode: 4 Median: 4	Average: 3 Mode: 4 Median: 4	Average: 0.78 Mode: 1 Median: 1	Average: 0.87 Mode: 0 Median: 0

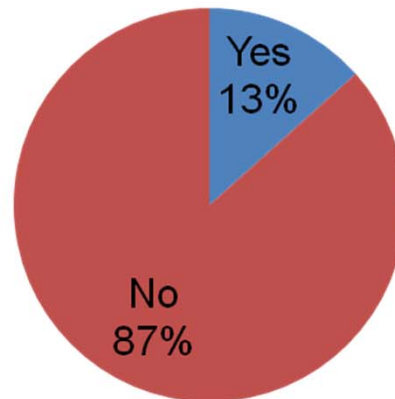


Hemostatic Agents

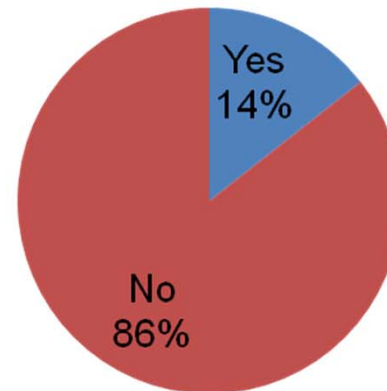
rFVIIa



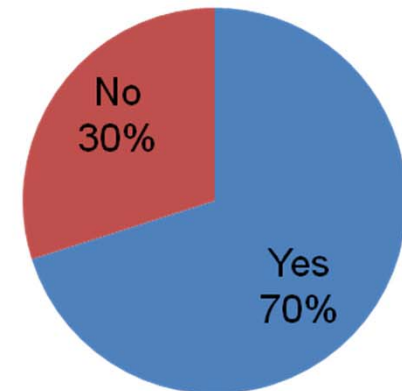
Fibrinogen Concentrate



PCC



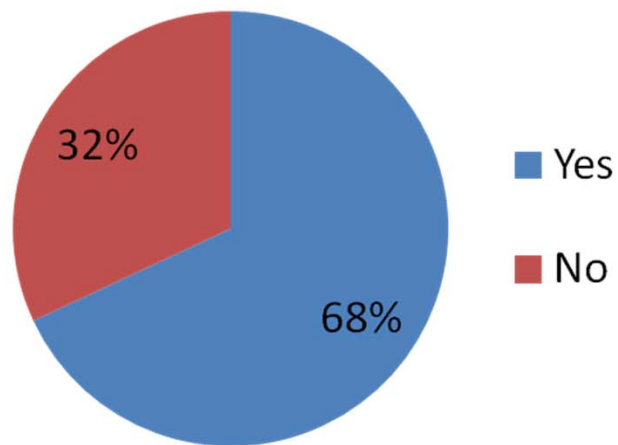
Tranexamic acid





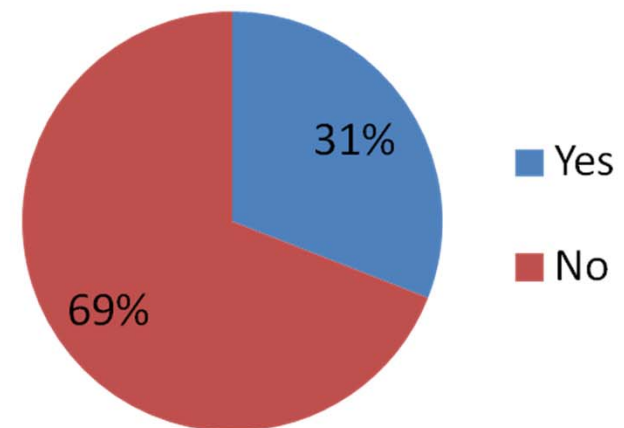
Quality Metrics Tracked

Hospitals that Perform Multidisciplinary Reviews of MHPs



66/97 (68%) Yes
31/97 (32%) No

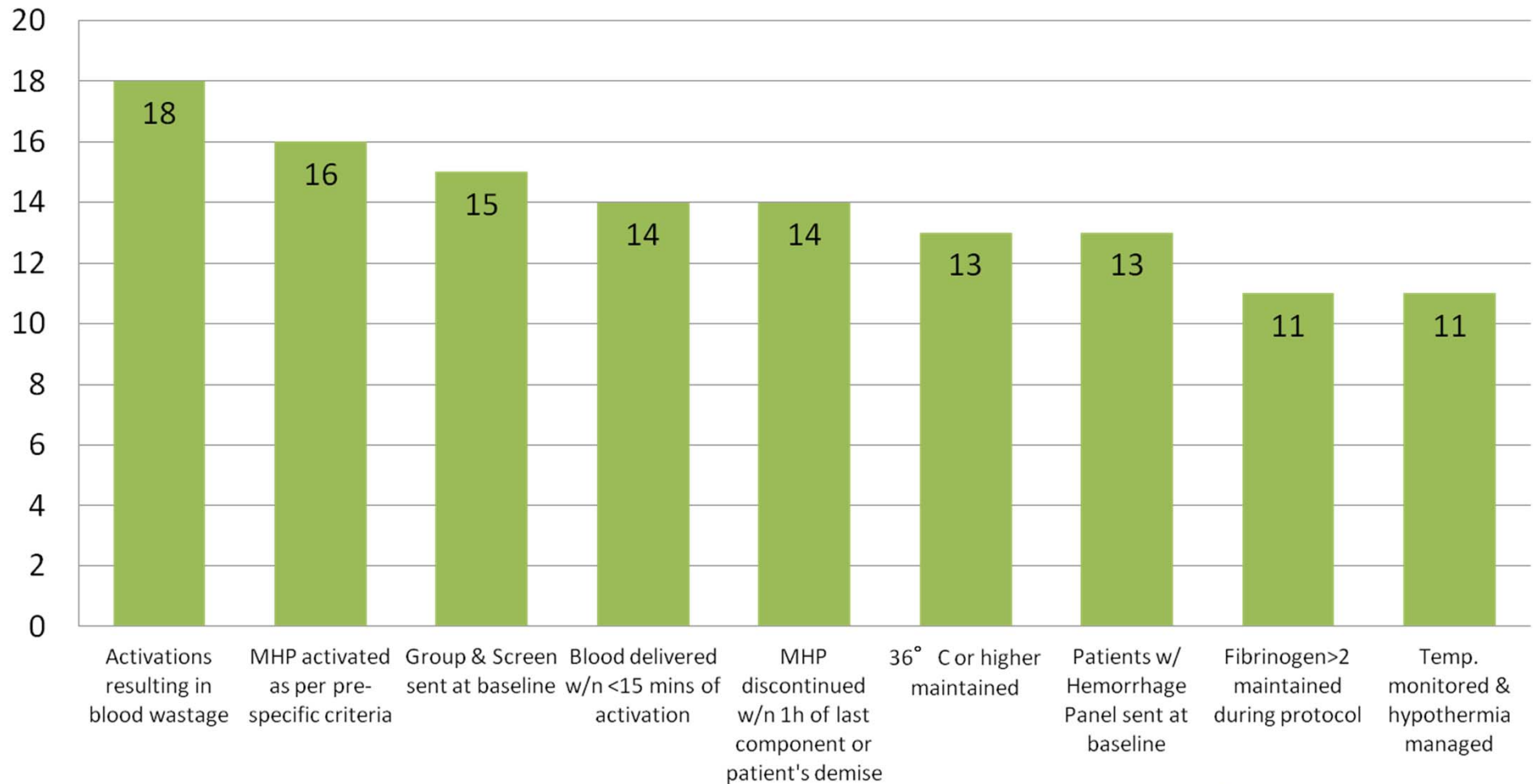
Hospitals that Track Quality Metrics for MHP



30/97 (31%) Yes
67/97 (69%) No



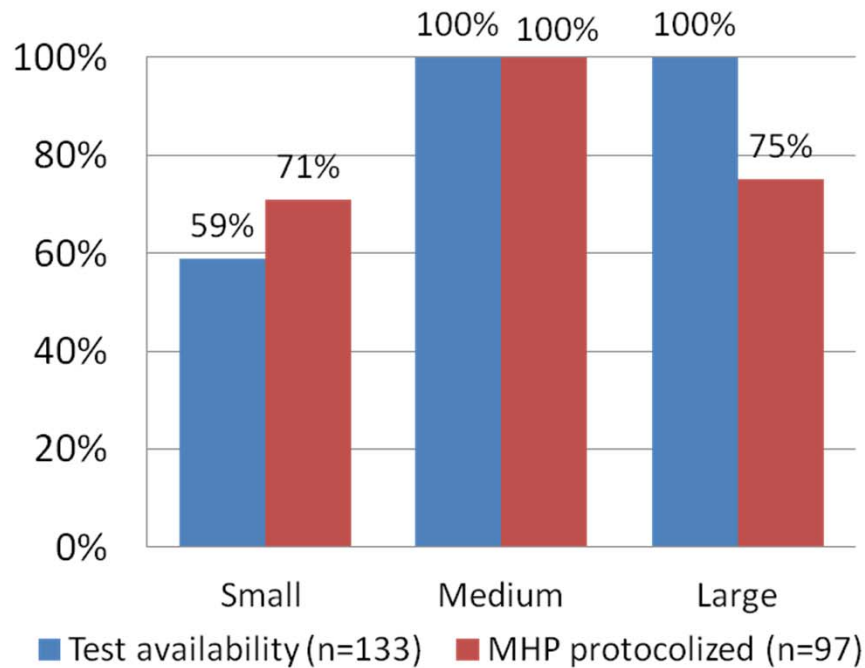
Quality Metrics Tracked



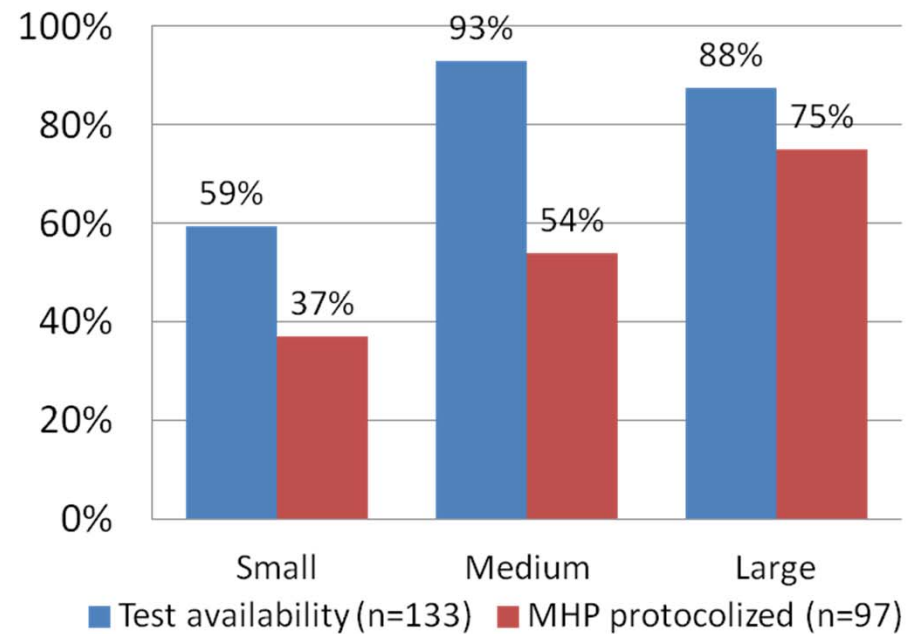


Additional Subanalysis

Fibrinogen Testing



Ionized Calcium





Limitations

- Responses were submitted by multi-disciplinary individuals based on their knowledge of the protocol
- Survey evaluates policies in place and may not reflect actual practice
- Questions pertained to MHPs in place, therefore some products may not be protocolized yet still be in use during a massive hemorrhage



Summary

- MHPs have not been implemented in a third of transfusion services
- Variability in all aspects of protocols across the province
- Data provides evidence that there is significant heterogeneity in MHPs which could be addressed by a standardized province-wide protocol tailored to the size of each hospital