



PAUSE THE DRAWS

A toolkit for reducing repetitive routine blood draws in hospitals

In the inpatient setting, don't order repeated CBC and chemistry testing in the face of clinical and lab stability.

Canadian Society of Internal Medicine,
Choosing Wisely Canada recommendation #4

Avoid standing orders for repeat complete blood count (CBC) on inpatients who are clinically/laboratorily stable.

Canadian Association of Pathologists,
Choosing Wisely Canada Recommendation #4

Don't order investigations that will not change your patient's management plan.

Don't order repeat laboratory investigations on inpatients who are clinically stable.

Don't order non-urgent investigations or procedures that will delay discharge of hospital inpatients.

Resident Doctors of Canada,
Choosing Wisely Canada recommendations #1, 2, 4



Inspiration for this toolkit

Repetitive, “routine” blood tests are associated with hospital acquired and/or worsening anemia, which is in turn associated with an increased risk of dying. Choosing Wisely Canada recommends against repetitive testing in hospitalized patients. St. Michael’s Hospital, in Toronto, documented high rates of repetitive routine blood testing and confirmed an association with worsening anemia. A goal was set to reduce repetitive routine blood tests across the hospital by 15%. The change strategy involved increasing awareness of local repetitive routine blood test rates, educating clinicians around the harms of repetitive routine blood tests, and revising order sets to remove unnecessary tests and open-ended routine blood test orders.

Prior to the intervention, the average volume of blood collected for routine blood tests per patient-day-admitted was 7.27, 9.03 and 12.07 mL/inpatient-day on the General Internal Medicine (GIM), Hematology/Oncology (Hem/Onc), and cardiovascular/vascular surgery (CVS/PVS) services, respectively. Following an education and awareness effort, these rates decreased to 6.10, 8.19 and 11.43 mL/inpatient-day, respectively. After order set changes were introduced, the rates decreased further to 5.30, 6.98 and 10.00mL/inpatient-day, representing total decreases of 27%, 23% and 17%, respectively, from the baseline period. No significant change in balance measures (length of stay and proportion of tests sent stat) was observed.

This toolkit was authored by Lisa Hicks, Patrick O’Brien, and Avery Longmore. Many nurses, physicians, trainees, laboratory personnel, data support and IT staff assisted with this initiative, including but not limited to the following individuals: Michelle Sholzberg, Laura Walker, Hina Chaudhry, Drake Yip, Michael Fralick, Marnie Wilson, Bertha Hughes, Dory Abosh, Vivian Ng, Nirmal Summan, and Mostafa Abdi.



Introduction

This toolkit was created to support interventions aimed at reducing unnecessary repetitive “routine” blood testing in the hospital setting. For the purposes of this toolkit, routine blood test refers to complete blood count (CBC), electrolytes (lytes), creatinine (Cr), liver enzymes (AST, ALT, ALP) and PT/aPTT. Clinicians across hospital settings often have a sense that repetitive “routine” blood testing is a problem at their facility, but it can be a difficult issue to tackle. A growing body of literature suggests that repetitive blood testing is very common, and that it can be harmful. Repetitive blood-draws are associated with hospital-acquired anemia, which in turn is associated with an increased risk of dying. The content in this toolkit can be used by organizations to help develop an approach towards reducing routine blood work.



Make sure this toolkit is right for you

This toolkit is well suited for any facility that is concerned it may be over utilizing “routine” blood testing on its inpatients. A good place to start in terms of understanding the potential problem at your organization is connecting with ordering clinicians on a high-volume clinical service to obtain their feedback. Do your colleagues think blood tests are being ordered routinely? Do they think it impacts decision making for patients? It might be worthwhile pulling some initial data to help quantify the issue, and establish if there is a problem of over drawing blood. If it seems like you have a problem it is time to put together a project team to look at your data and ordering practices. This toolkit can be used to assess and address repetitive blood work on a particular unit or units, or to develop a hospital-wide strategy.



Key ingredients of this intervention:

If you think your organization may have an issue with repetitive “routine” blood testing, then the following steps should help in confirming that there is a problem and addressing it.

- 1) Understand the problem
- 2) Define your metrics
- 3) Obtain leadership buy-in and support
- 4) Develop and implement your change strategy

1. Understand the problem

a. What do my colleagues and other stakeholders think?

If over testing is common at your facility, it likely spans multiple services. A good place to start would be services with high patient volumes and longer patient stays (e.g. General Internal Medicine). Reach out to key multidisciplinary stakeholders (hospitalists, nurse practitioners, etc.) who are involved in ordering blood work for inpatients. Also reach out to your colleagues in laboratory (lab) medicine. Identify one or two collaborators in the lab (lab directors, lab managers, and lab informatics staff are terrific partners) plus two or more clinical partners. This group may evolve into a core working group moving forward.

Start with a few questions regarding ordering practices to help understand the basic signals of over testing:

- Do the clinicians think it would be possible to decrease the amount of blood tests being done without negatively impacting patient care?
- Are blood tests ever ordered habitually rather than to answer a specific clinical question?
- On admission, are blood test orders typically entered for a defined period of time (e.g. CBC daily x 2 days) or are they open-ended standing orders?
- How common is it for blood work to be ordered for a time period beyond 3 days? How about 5 days? Is it ever ordered without a clear stop date?
- Are there any work-arounds used by yourself or your colleagues to make ordering lab work easier?

Assuming the answers you receive align with signals of over testing, it is time to analyze some data. Keeping this group engaged with the project will be very helpful as you move forward.

b. What is repetitive “routine” blood work? How much “routine” blood testing is being done at your hospital? Just how repetitive is it? Is it inappropriate?

Consider how you define “routine” blood testing. At our site we considered CBC, lytes, Cr, liver enzymes and PT/aPTT as routine tests. However, depending on what data you have access to and the extent of testing at your site, you may want to expand or trim the definition.

There are no validated criteria for what constitutes inappropriate testing – and due to diverse patient populations and reasons for hospitalization it is unlikely that this will be developed for routine in-patient blood work (RBW). Thus, it may not be feasible to determine definitively whether or not the testing done at your site is appropriate versus inappropriate. However, there are surrogate markers that you can use to give clues as to whether there is excessive testing at your site. You will need to partner with your colleagues in laboratory medicine to

get access to this data. Consider looking at the following metrics:

- Total number of routine tests performed per inpatient-day
- Total volume of blood processed for routine tests per inpatient-day
- Proportion of inpatients receiving RBW for greater than 3 consecutive days
- Proportion of all CBCs (Cr, lytes, etc.) that are run after 3 consecutive normal and/or stable values

2. Define Your Metrics

Determine the time period:

When will your intervention begin and how long will you track your defined metrics?

Outcome Measures:

Define your outcome measures. The ideal, patient-centered outcome for an initiative on repetitive routine blood work would be new or worsening hospital-acquired anemia. However, it can be challenging to obtain this type of outcome data efficiently in near real-time in many hospital systems. A surrogate outcome measure which is often much more readily available is the total volume of blood collected for RBW per in-patient-day. Metrics measuring the number of tests (addressed below) can be used to estimate costs. Metrics focused on the volume of blood collected are more strongly associated with the harms of repetitive blood draws (anemia). Note that one blood collection tube typically contains 4 to 4.5ml of whole blood (though this can vary depending on the test and the supplier of your organization's tubes).

Analyze preliminary data to see if a high volume of RBW is ordered to determine the extent of the problem at your facility.

Define outcome measures related to the aims of your initiative to help track your progress and determine whether your implemented changes are working. These outcome measures should be analyzed prior to implementing any changes to establish baseline (pre-intervention) levels, and then continuously collected and analyzed over the course of your project to help determine whether the change is effective.

Suggested primary outcome measure:

- Total volume of blood collected for RBW per in-patient-day (ml/pt-day)

Suggested secondary outcome measures:

- Total volume of blood sent for RBW on all patients admitted to a target unit in one month interval (L/mth)

- The total volume measure is useful as it can help your audience process the sheer volume of blood being drawn from the patients at your facility. Creating visual aids illustrating what 40 L of blood (or the relevant volume for your centre) can be a valuable addition to your change strategy

Why focus on tubes (or blood volume)?

There are several tests included in each tube of blood, so while reducing the number of tests may result in some cost-savings, you need to measure total number of tubes drawn in order to know the amount of blood removed from patients, and it's the blood volume that is associated with the main harm of repetitive blood draws – anemia.

Reflect this data back to the working group you previously established. What do they think of the data you are presenting them? Does the volume of blood seem high to them? Use your initial data to increase interest in and support for your intervention at your institution.

Process Measures:

It is important to define process measures prior to initiating your intervention. Process measures are surrogates for outcome measures.

Potential process measures to consider:

- Average number of CBCs/Cr, lytes/ALT, etc. sent per in-patient-day
 - These metrics will help in determining which tests are being ordered most frequently and will also help you estimate costs and potentially cost-savings
- Proportion of admitted patients receiving CBC, Cr, lytes, etc. for at least three consecutive days*
 - *Eligible patients = those with length of stay (LOS) of at least three days (patients with length of stay less than three days can be excluded from this measure as blood work every day for a one or two day admission is less likely to reflect inappropriate testing)
- Proportion of patients receiving RBW on every day of their admission
 - *Eligible patients = those with LOS of at least three days

Balancing Measures:

It is important to define balancing measures prior to initiating your intervention. These measures help to monitor your intervention and determine whether it is causing any unintended negative consequences.

Potential balancing measures to consider:

- 1) Proportion of targeted blood tests requested as STAT blood draws requested before vs. after change strategy implementation on target units

- What proportion of CBC, Lytes, Cr, etc. are sent as STAT orders prior to implementing change?
- If you see a substantial increase in STAT orders after implementation, this may indicate that the change strategy has over impacted routine blood work orders, and clinicians are using STAT orders to get the tests they need for their patients. This may indicate that the change strategy needs to be re-evaluated and potentially scaled back.
- If you do not see an impact on STAT blood work you can reassure your partners and stakeholders that it is unlikely that this will change.

2) Patient length of stay (LOS)

- What is the average or median LOS prior to implementing change?
- After implementing change, do you see any alteration in patient LOS for the services you have been working with?
- It is unlikely that the changes you introduce will impact LOS in either a positive or negative direction, nonetheless it is important that this metric is tracked and shared with your partners and stakeholders.

3. Obtain Leadership Buy-In and Support

Leadership support is essential. It may be effective to present your change strategy to the hospital's Utilization Committee, Medical Affairs Committee, or another group of leading administrators. Obtaining the input and support from this group will be critical to the success of your project. Having leadership support is extremely helpful to prioritize your work within the hospital. You will need assistance from labs, IT and data support, and visible support from leadership helps facilitate these partnerships.

Engage These Stakeholders:

- Connect with laboratory medicine – seek a clinical partner as well as a lab information specialist;
- Connect with clinicians – seek clinical partners who are working in the spaces where your changes will be implemented;
- Connect with decision support to collect data regarding blood work orders;
- Connect with information technology (IT) for assistance in altering order sets;
- Access to communications departments will help with the design/adaptation of educational and promotional materials; and
- Assistance from a project manager, if available, is very helpful and will help keep the project moving forward.

4. Develop and Implement Your Change Strategy

Consider using the Model for Improvement and using plan-do-study-act (PDSA) cycles ([page 14](#)) to guide your implementation efforts.

Create an Aim Statement:

First, outline the aims of your intervention. Make your aim statement as specific as possible with regard to what you want to achieve, and by when. You may want to focus on one pilot service at the beginning and add on additional services as you progress, or maybe you have identified multiple areas that would benefit from an intervention and will launch the intervention across more than one services. It is often helpful to begin with a unit that is highly engaged and committed to the work.

Example Aim Statement:

To reduce the volume of blood collected for routine testing per-inpatient-day on the general internal medicine service by 20%, by July 1, 20XX. **Consider putting a goal of 1-2 years.*

The above aim statement offers a specific goal in a specific timeframe which is important; however, you want to make sure that your goal is achievable. If you don't have a strong sense of what opportunity there is for reduction, try starting with a small initial goal and continue to build from there. Achieving an early target can be a great way to gain support for an initiative moving forward.

Develop Your Interventions:

Use your project working group, staffed with members of the clinical services (IT, labs, etc.) to create the interventions. Interventions typically take on these forms:

1. Education:

Awareness and education initiatives aiming to increase understanding of the harms of repetitive blood draws and of the amount of repetitive testing occurring at your hospital, targeting clinicians including, nurses, nurse practitioners, physicians, physician assistants, and trainees (if present). Tips for developing your education interventions:

- a. Tailor your educational initiatives to the specific area where change is occurring. For example, when clinicians told us they were unclear of the uses for PT and aPTT respectively, our team developed educational pocket guides on coagulation testing.
- b. Collaborate with all of the clinicians involved in ordering lab tests on the target unit. Get their input on the type of educational interventions which are more likely to be successful on their unit. Some units already use posters, presentations or email blasts.

- c. Engage front-line providers. One of the ways we did this was by having residents come up with the top 5 reasons not to perform routine blood work.

To see examples of education materials used at St Michael's Hospital please see:

- Routine Blood Testing Infographic ([Appendix 1](#))
- General Internal Medicine Blood Draws Infographic ([Appendix 2](#))
- Inpatient Nursing Infographic ([Appendix 3](#))
- Inpatient Physician Infographic ([Appendix 4](#))

2. Order Set Modification:

This intervention includes order set, or order design, changes that discourage habitual, over-testing. Some important considerations when revising inpatient blood work order sets include:

- a. How does your institution order blood work? Paper based or computerized? Both systems have opportunities and challenges. Sometimes it is easier to change a paper-based order set, but it can be challenging to remove outdated order sets. Computerized order sets allow you to change order sets without the problem of outdated order sets continuing in circulation. However, this requires close collaboration with IT, and may involve multiple approvals.
- b. Do you think order set design is leading to over testing? For instance, are “daily labs” an option on your order sets? If yes, consider changing order sets to remove all daily lab options, and ensure that all lab orders have a reasonable terminus.
- c. Embed education and guidance (decision support) into order sets where possible. For instance we embedded education regarding when a PT is helpful.
- d. When reviewing order sets consider if tests should be bundled together or separated. Tests are often bundled for convenience but there are different clinical indications as to when each is necessary. Make sure you are separating tests where appropriate.
- e. Obtain data regarding your hospital's order sets utilization. An intervention strategy that focuses on order set modification requires active use of order sets.

For an example of the order set changes made at St Michael's Hospital see [Appendix 5](#).

3. Audit-and-Feedback*:

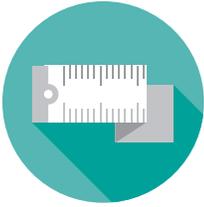
Consider providing unit level, or even individual-level feedback on testing patterns. Some important considerations when designing a feedback intervention include:

- a. Are you able to collect physician or unit-level data on RBW ordering practices, if yes do you notice different patterns of testing among physicians or units with similar patient populations?
- b. Consider employing an audit-and-feedback process whereby individual physicians, nurse practitioners and/or individual units are provided information on their own testing patterns and compared to that of their colleagues. If this strategy is pursued it is important to anonymize the comparative data. Also, be careful to maintain a positive tone. When feeding back data acknowledge that comparisons may be limited due to differences in patient populations and potentially due to small sample size, and that the information is provided to trigger reflection.

* Note – this is a strategy that St. Michael’s hospital has considered but has not yet employed

Awareness and education need to begin before other strategies are pursued. This helps ensure clinicians understand why changes are being made and have an opportunity to provide input before changes go live. Use the information collected from the baseline analysis of local administrative lab data to inform your partners and colleagues about the amount of RBW that is being done at your institution. Reflect on what members of each of the target services have to say about repetitive testing. How did they think change could benefit their service? What would be reasonable within the constraints of the system?

In addition to collaborating with clinicians to develop educational material, it is important to develop continual reminders of the initiative and its goals. At St. Michael’s Hospital, it was effective to incorporate reminders about decreasing repetitive blood draws into pre-existing biweekly email blasts from the chief resident. These biweekly emails usually contain announcements for the week as well as teaching schedules, and are sent to all residents and medical students currently on a medical rotation. In close collaboration with the GIM team, brief reminders regarding the purpose of the initiative were inserted into the emails in the hopes of reminding the resident teams about the top five reasons why not to habitually order blood tests. You may have a different communication infrastructure at your hospital. Whatever it is, find out about it, and build it into your change strategy.



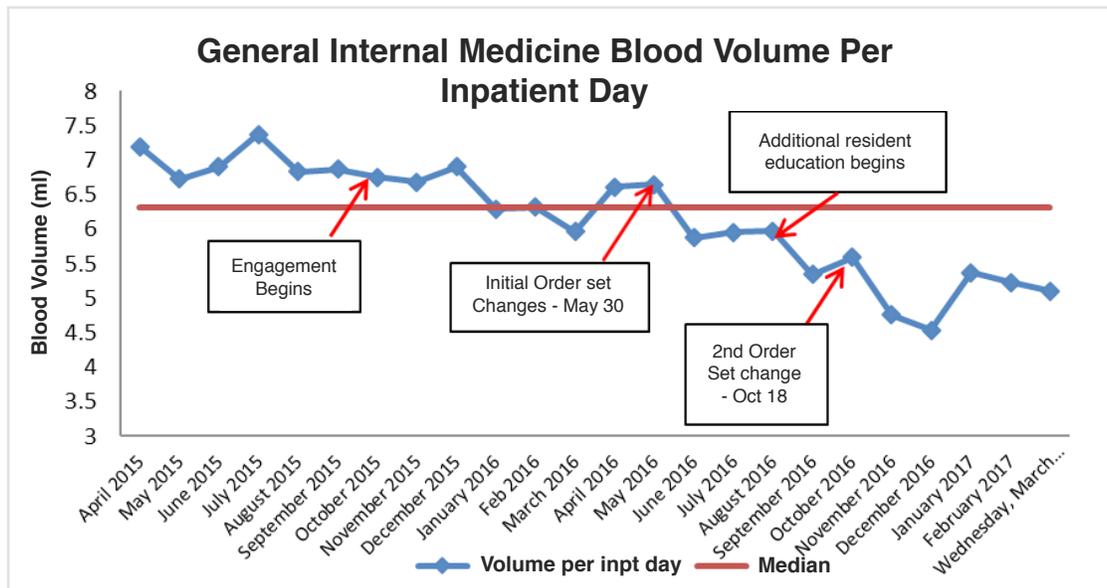
Measuring your performance

Key metrics to track were previously outlined in this toolkit. Having an easy to use summary file (dashboard) will help you track your data. Below is an example of how one might consider setting up their data tracking sheet.

Time Period	Encounters	RBW Orders	Total Tubes	Total Volumes	Inpatient Days	Volume per inpatient day
April 2015	256	1835	3479	15655.5	2176	7.194623162
May 2015	254	1905	3341	15034.5	2235	6.726845638
June 2015	250	1770	3128	14076	2039	6.903384012

Additional measures (such as percentage of stat orders, volume by tube, LOS etc.) can be included in subsequent columns, but this layout should provide a strong starting point. It will also assist in developing run charts to display data to key stakeholders.

Sample Run Chart



Seek Feedback

A run chart like the one displayed above can help inform how the change strategy is working. Connect with the working group to get their feedback on initial changes.

- What has worked well?
- What hasn't worked well?

- How have the changes impacted their day-to-day work?
- Are the changes feasible?
- What would they suggest for improvement?

Feedback could be sought in the form of small focus groups or interviews with members of the team, and/or requesting team members to complete satisfaction surveys.

Make Adjustments

Continuous monitoring of your data throughout your intervention is important to guide iterative changes. By monitoring the impact of your intervention, you can determine how to adjust your strategy to improve during the next cycle. It is also important to combine the data you have collected with the feedback you have received regarding your changes. Together, these can inform the next steps. Make sure you keep track of when you introduce new changes as you will need to annotate your run chart with these dates.

To help sustain your intervention, it is important to share the results of your change strategy, and the adjustments you have made based on the initial results. Sharing your data with the services performing the intervention can provide opportunities for a discussion of what is working well so far, and dialogue regarding where improvements to the intervention could be made. This may also provide an opportunity to demonstrate the positive effects of the change strategy for this service, and how their efforts have contributed to these effects.

Presenting data to larger audiences can help build interest in and support for your initiative – all of which contributes to sustainability. By presenting at grand rounds, division meetings, local rounds, quality improvement forums, etc. you have the opportunity to highlight what you have done so far, and engage potential new partners moving forward.



Sustaining Early Successes

After you have implemented your change strategy to reduce repetitive blood draws, and have made iterative changes based on early data collection and feedback from stakeholders, consider implementing further strategies to sustain the success of your intervention:

- 1) Regularly review the data collected on all of your defined outcome, process and balance measures;
- 2) Outline additional services or areas where you believe repetitive blood draws may be an issue, and engage with them through educational sessions, focus groups, and stakeholder meetings;
- 3) Continue to review order sets and assess patterns of blood testing;
- 4) Continue to widely distribute educational materials, and adjust educational materials based on the key audience/service;

- 5) Liaise with the order set committee (or similar group) at your hospital and try to make sure that new order sets deter repetitive blood testing, rather than facilitating it;
- 6) Share your data!



References

- 1) Branco BC, Inaba K, Doughty R, et al. The increasing burden of phlebotomy in the development of anaemia and need for blood transfusion amongst trauma patients. *Injury*. 2012;43(1):78-83.
- 2) Lyon AW, Chin AC, Slotsve GA, Lyon ME. Simulation of repetitive diagnostic blood loss and onset of iatrogenic anemia in critical care patients with a mathematical model. *Comput Biol Med*. 2013;43(2):84-90.
- 3) Salisbury AC, Reid KJ, Alexander KP, et al. Appendix 1: Diagnostic blood loss from phlebotomy and hospital-acquired anemia during acute myocardial infarction. *Arch Intern Med*. 2011;171(18):1646-1653.
- 4) Salisbury AC, Reid KJ, Amin AP, Spertus JA, Kosiborod M. Variation in the incidence of hospital-acquired anemia during hospitalization with acute myocardial infarction (data from 57 US hospitals). *Am J Cardiol*. 2014;113(7):1130-1136.
- 5) Thavendiranathan P, Bagai A, Ebidia A, Detsky AS, Choudhry NK. Do blood tests cause anemia in hospitalized patients? The effect of diagnostic phlebotomy on hemoglobin and hematocrit levels. *J Gen Intern Med*. 2005;20(6):520-524.
- 6) Chant C, Wilson G, Friedrich JO. Anemia, transfusion, and phlebotomy practices in critically ill patients with prolonged ICU length of stay: a cohort study. *Critical Care*. 2006;10:R140.



Resources

Quality Improvement Resources

- 1) Health Quality Ontario, QI Tools & Resources
<https://quorum.hqontario.ca/en/Home/QI-Tools-Resources/QI-Essentials>
- 2) Institute for Healthcare Improvement, Model for Improvement
<http://www.ihl.org/resources/Pages/HowtoImprove/default.aspx>

Routine blood testing at St. Michael's*

The average General Internal Medicine patient has **7** millilitres of blood collected per day for routine testing alone.



Routine blood testing amounts to **15** litres of blood drawn per month on the General Internal Medicine service, which is the equivalent of **50** units of blood.



That's **36** human blood volumes in one year.



5 reasons NOT to do routine blood testing:

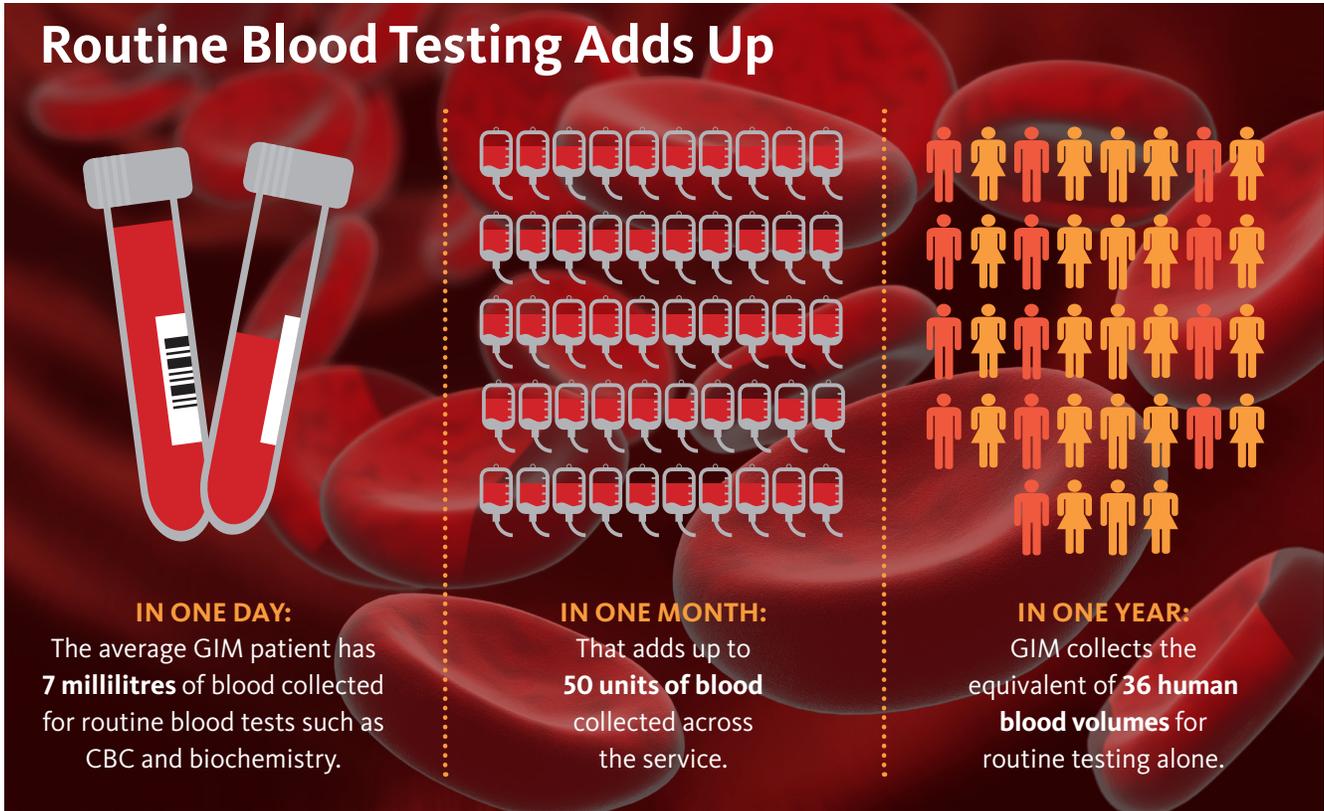
1. Repetitive blood testing can contribute to anemia.
2. The people we test repeatedly are often those who have difficulty making new red cells, increasing their risk of anemia.
3. Repetitive testing is resource intensive.
4. Venipuncture hurts – especially when it's done over and over again.
5. Reflexive repetitive test results often do not inform clinical decisions.

**CBC, routine biochemistry and PT/PTT*

Let's switch from "just-in-case"
to knowledge-based testing!



St. Michael's
Inspired Care.
Inspiring Science.



Appendix 3: Inpatient Nursing Inforgraphic

WHEN TO ORDER COAGULATION TESTS

(PT/INR & aPTT)

St. Michael's
Inspired Care.
Inspiring Science.

PT = Prothrombin Time
INR = International Normalized Ratio
aPTT = Activated Partial Thromboplastin Time

TOP 5 REASONS NOT to ORDER PT/INR or aPTT

1. As routine blood work.
2. As a routine pre-op screen in a patient without a personal/family bleeding history.
3. For monitoring of direct oral anticoagulant (DOAC) therapy (e.g. dabigatran, rivaroxaban, apixaban).
4. For monitoring of low molecular weight heparin (LMWH) therapy (e.g. dalteparin, enoxaparin, tinzaparin, fondaparinux).
5. For monitoring of thromboprophylaxis (e.g. heparin 5000 U SC BID; dalteparin 5000 U SC QD).

ORDER OF DRAW

Tube Closure Color	Collection Tube	Mix by Inverting	Min. Clot Time
	Blood Cultures – SPS	8 to 10 times	N/A
	Citrate Tube (Light Blue)	3 to 4 times	N/A
	Serum Separator Tubes (Gold and Tiger)	5 times	30 minutes
	Serum Tube (Red)	5 times (plastic) None (glass)	60 minutes
	Rapid Serum Tube (Orange)	5 to 6 times	5 minutes
	Plasma Separator Tube	8 to 10 times	N/A
	Heparin Tube (Green)	8 to 10 times	N/A
	EDTA Tube (Lavender)	8 to 10 times	N/A
	PPT Separator Tube (Pearl)	8 to 10 times	N/A
	Fluoride Tube (Gray)	8 to 10 times	N/A

BLOOD DRAW REMINDERS

1. Draw a discard tube first.
2. Fill the entire tube.
3. Invert the tube several times.
4. DO NOT draw from a peripheral IV.

<http://www.bd.com/resource.aspx?IDX=1157>

Appendix 4: Inpatient Physician Infographic

WHEN TO ORDER COAGULATION TESTS

(PT/INR & aPTT)

St. Michael's
Inspired Care.
Inspiring Science.

PT = Prothrombin Time
INR = International Normalized Ratio
aPTT = Activated Partial Thromboplastin Time

- Warfarin Therapy
 - Liver Disease
 - Risk factor for vitamin K deficiency (e.g. malnutrition, fat soluble vitamin malabsorption, cholestasis, prolonged antibiotics)
- CONSIDER PT/INR

- IV Heparin monitoring
 - IV Argatroban monitoring
 - Suspected Hemophilia A/B, Factor XI deficiency, severe von Willebrand disease
- CONSIDER aPTT

- Bleeding patient
- CONSIDER BOTH
PT/INR & aPTT

- TOP 5 REASONS NOT to
ORDER PT/INR or aPTT
1. As routine blood work.
 2. As a routine pre-op screen in a patient without a personal/family bleeding history.
 3. For monitoring of direct oral anticoagulant (DOAC) therapy (e.g. dabigatran, rivaroxaban, apixaban).
 4. For monitoring of low molecular weight heparin (LMWH) therapy (e.g. dalteparin, enoxaparin, tinzaparin, fondaparinux).
 5. For monitoring of thromboprophylaxis (e.g. heparin 5000 U SC BID; dalteparin 5000 U SC QD).

Appendix 5: Order Set Revisions

Laboratory

On Admission (If Not Already Done in Emergency):

CBC x 1 Times Priority = Next Collection

Lytes (NA, K, CO2, CL), Creatine x 1 Times Priority = Next Collection

Liver Function Panel (AST, ALT, ALP, Tot Bill, Alb) x Times Priority = Next Collection

Calcium Panel (Ca, PO4, Mg, Alb) x 1 Times Priority = Next Collection

Total Protein Serum x 1 Times Priority = Next Collection

***Note: NT-proBNP is Processed at End of Day - May Take 24 Hours

NT-proBNP x 1 Times Priority = Next Collection

TSH x 1 Times Priority = Next Collection

Digoxin Level x 1 Times Priority = Next Collection

INR/PT, aPTT x Times Priority = Next Collection

Troponin 1 Serum Priority = Stat

Routine Blood Work:

CBC Daily Priority = AM Collection

CBC Mon, Wed, Fri Priority = AM Collection

CBC Mon & Thurs Priority = AM Collection

Lytes (NA, K, CO2, CL), Creatine, Urea Daily Priority = AM Collection

*Acute Decompensated Heart Failure GIM Admission Order Set

Laboratory

On Admission (if not already done in Emergency Dept or in clinic)

CBC, Lytes (NA, K, CO2, CL), Cr Next Collect

Liver Function Panel (AST, ALT, ALP, Tot Bill, Alb) x 1 Times Priority = Next Collection

Calcium Panel (Ca, PO4, Mg, Alb) x 1 Times Priority = Next Collection

Total Protein Serum x 1 Times Priority = Next Collection

***Note: NT-proBNP is Processed at End of Day - May Take 24 Hours

NT-proBNP x 1 Times Priority = Next Collection

TSH x 1 Times Priority = Next Collection

Digoxin Level x 1 Times Priority = Next Collection

Troponin I Serum Priority = Stat

MD INSTRUCTIONS:

***PT/INR is not routinely indicated, consider if patient is on warfarin, has liver disease, or if there is a possibility of vitamin K deficiency

PT INR Daily x 1 Times Priority = AM Collection

Recurring Blood Work

CBC Daily x3, then Mon, Wed and Fri x1

Lytes (NA, K, CO2, CL), Cr, Urea Daily 5, then every 48h x3

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