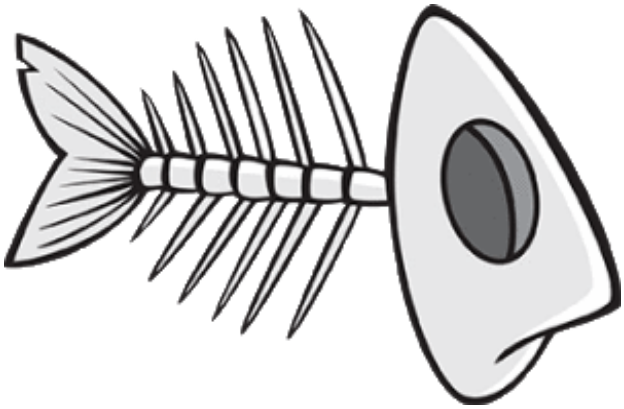


Have you heard the joke about the lab technician that walks into the room to stick you with a 15” needle and draw your blood? Of course you haven’t that’s just not very funny stuff. More than likely you are not as afraid of needles as I am, but I doubt anyone likes being told “I need you to roll up your sleeve.” Seriously do they really have to say out load “This is going to sting a little.” I pretty much guessed ahead of time that a long sharp object inserted into my arm would sting a little.

On a serious note though despite the anxiety I feel I am 100% aware of the very valuable insight that lab results provide physicians about my health so I reluctantly tolerate the “sting” and try not to cry until I’ve left. I tell myself I’m brave because I know that there are scaredy cats out there that don’t even see a physician due to their fear. When you are in the hospital it’s not as easy to hide from them though. The lab techs are generally at your bedside very early in the morning, more than likely waking you up, in order to remove a gallon of your blood, or however much those vials hold.

Your blood is then rushed to the lab where a technician runs the myriad of tests that the physician(s) have requested and then the results are generated. Until someone does something with the results of the lab tests the values are simply like all of the 0’s and 1’s that reside on our disks … useless.

In this post I’m going to discuss how I handled visualizing those lab results for the physicians rounding report I’ve been working on. I began my work on lab results the same way I would anything … “let me see what kind of data and what volume of data I’m dealing with.” LOTS and LOTS. I’m not kidding. It’s almost like every single drop of blood holds 1 MB of data or something. The following is for just the last 3 days of lab results for 1 patient.

Test	Value	Result Ind	LabReference	LabTaken	LabResulted
CBC W DIFF PNL,UNSPECIFIED BLD	ABASO	0.05 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	ABASO	0.06 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	ABASO	0.05 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	AEOS	0.1 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	AEOS	0.27 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	AEOS	0.32 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	AIG	0.11 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	AIG	0.08 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	AIG	0.13 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	ALYMPH	1.35 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	ALYMPH	1.39 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	ALYMPH	2.11 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	AMONO	1.18 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	AMONO	1.13 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	AMONO	1.02 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC (HEMOGRAM) BLD AUTO	ANRBC	0 -	-	1/1/2015 7:53:00 PM	1/1/2015 8:10:00 PM
CBC W DIFF PNL,UNSPECIFIED BLD	ANRBC	0 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	ANRBC	0 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	ANRBC	0 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	ASEG	8.46	High (2.0-8.1) K/uL	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	ASEG	4.32 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	ASEG	5.33 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	BASORE	0 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	BASORE	1 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	BASORE	1 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
BAS METAB 2000 PNL SERPL	BC	40	High (10-24) RATIO	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	BC	32.5	High (10-24) RATIO	1/3/2015 5:21:00 AM	1/3/2015 6:20:00 AM
BAS METAB 2000 PNL SERPL	BC	18.6 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:56:00 AM
BAS METAB 2000 PNL SERPL	BUN	20 -	-	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	BUN	13 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:20:00 AM
BAS METAB 2000 PNL SERPL	BUN	13 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:56:00 AM
BAS METAB 2000 PNL SERPL	CA	7.6	Low (8.4-10.6) MG/DL	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	CA	8.2	Low (8.4-10.6) MG/DL	1/3/2015 5:21:00 AM	1/3/2015 6:20:00 AM
BAS METAB 2000 PNL SERPL	CA	7.9	Low (8.4-10.6) MG/DL	1/2/2015 3:26:00 AM	1/2/2015 3:57:00 AM
BAS METAB 2000 PNL SERPL	CL	116	High (100-110) MMOL/L	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	CL	114	High (100-110) MMOL/L	1/3/2015 5:21:00 AM	1/3/2015 6:20:00 AM
BAS METAB 2000 PNL SERPL	CL	109 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:56:00 AM
BAS METAB 2000 PNL SERPL	CO2	16	Low (21-32) MMOL/L	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	CO2	19	Low (21-32) MMOL/L	1/3/2015 5:21:00 AM	1/3/2015 6:20:00 AM
BAS METAB 2000 PNL SERPL	CO2	25 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:56:00 AM
BAS METAB 2000 PNL SERPL	CREAT	0.5	Low (0.8-1.3) MG/DL	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	CREAT	0.4	Low (0.8-1.3) MG/DL	1/3/2015 5:21:00 AM	1/3/2015 6:20:00 AM
BAS METAB 2000 PNL SERPL	CREAT	0.7	Low (0.8-1.3) MG/DL	1/2/2015 3:26:00 AM	1/2/2015 3:56:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	DTYPE	Automated -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	DTYPE	Automated -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	DTYPE	Automated -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	EOSIRE	1 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	EOSIRE	4 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	EOSIRE	4 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
BAS METAB 2000 PNL SERPL	GFR	>60 -	-	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	GFR	>60 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:20:00 AM
BAS METAB 2000 PNL SERPL	GFR	>60 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:56:00 AM
BAS METAB 2000 PNL SERPL	GFRAF	>60 -	-	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	GFRAF	>60 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:20:00 AM
BAS METAB 2000 PNL SERPL	GFRAF	>60 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:56:00 AM
BAS METAB 2000 PNL SERPL	GLU	87 -	-	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	GLU	79 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:20:00 AM
BAS METAB 2000 PNL SERPL	GLU	104	High (65-99) MG/DL	1/2/2015 3:26:00 AM	1/2/2015 3:56:00 AM
CBC (HEMOGRAM) BLD AUTO	HCT	29	Low (42-52) %	1/1/2015 7:53:00 PM	1/1/2015 8:10:00 PM
CBC W DIFF PNL,UNSPECIFIED BLD	HCT	27.7	Low (42-52) %	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	HCT	27.8	Low (42-52) %	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	HCT	27.4	Low (42-52) %	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
HGB+HCT PNL BLD	HCT	29.2	Low (42-52) %	1/4/2015 2:49:00 PM	1/4/2015 3:10:00 PM
HGB+HCT PNL BLD	HCT	28.9	Low (42-52) %	1/4/2015 8:01:00 AM	1/4/2015 8:39:00 AM
HGB+HCT PNL BLD	HCT	30.5	Low (42-52) %	1/3/2015 11:55:00 PM	1/4/2015 12:22:00 AM
HGB+HCT PNL BLD	HCT	23.1	Low (42-52) %	1/3/2015 5:41:00 PM	1/3/2015 5:58:00 PM
HGB+HCT PNL BLD	HCT	26.9	Low (42-52) %	1/3/2015 11:19:00 AM	1/3/2015 11:59:00 AM
HGB+HCT PNL BLD	HCT	25.6	Low (42-52) %	1/3/2015 12:51:00 AM	1/3/2015 1:00:00 AM
HGB+HCT PNL BLD	HCT	24.6	Low (42-52) %	1/2/2015 8:44:00 PM	1/2/2015 9:01:00 PM
HGB+HCT PNL BLD	HCT	24	Low (42-52) %	1/2/2015 4:33:00 PM	1/2/2015 5:05:00 PM
HGB+HCT PNL BLD	HCT	20.9	Low (42-52) %	1/2/2015 9:41:00 AM	1/2/2015 9:58:00 AM
CBC (HEMOGRAM) BLD AUTO	HGB	10	Low (14-18) GM/DL	1/1/2015 7:53:00 PM	1/1/2015 8:10:00 PM
CBC W DIFF PNL,UNSPECIFIED BLD	HGB	9.7	Low (14-18) GM/DL	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	HGB	9.6	Low (14-18) GM/DL	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	HGB	9.4	Low (14-18) GM/DL	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
HGB+HCT PNL BLD	HGB	10.2	Low (14-18) GM/DL	1/4/2015 2:49:00 PM	1/4/2015 3:10:00 PM
HGB+HCT PNL BLD	HGB	9.7	Low (14-18) GM/DL	1/4/2015 8:01:00 AM	1/4/2015 8:39:00 AM
HGB+HCT PNL BLD	HGB	10.4	Low (14-18) GM/DL	1/3/2015 11:55:00 PM	1/4/2015 12:22:00 AM
HGB+HCT PNL BLD	HGB	7.6	Low (14-18) GM/DL	1/3/2015 5:41:00 PM	1/3/2015 5:58:00 PM
HGB+HCT PNL BLD	HGB	9	Low (14-18) GM/DL	1/3/2015 11:19:00 AM	1/3/2015 11:59:00 AM
HGB+HCT PNL BLD	HGB	8.5	Low (14-18) GM/DL	1/3/2015 12:51:00 AM	1/3/2015 1:00:00 AM
HGB+HCT PNL BLD	HGB	8.5	Low (14-18) GM/DL	1/2/2015 8:44:00 PM	1/2/2015 9:01:00 PM
HGB+HCT PNL BLD	HGB	8.4	Low (14-18) GM/DL	1/2/2015 4:33:00 PM	1/2/2015 5:05:00 PM
HGB+HCT PNL BLD	HGB	7	Low (14-18) GM/DL	1/2/2015 9:41:00 AM	1/2/2015 9:58:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	IG	1 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	IG	1 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	IG	2	High (0.0-1.5) %	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
PT PNL PPP	INR	1.11 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:28:00 AM
BAS METAB 2000 PNL SERPL	K	4.4 -	-	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	K	3.9 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:20:00 AM
BAS METAB 2000 PNL SERPL	K	4.3 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:56:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	LYMPRE	12	Low (16-52) %	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	LYMPRE	19 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	LYMPRE	24 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC (HEMOGRAM) BLD AUTO	MCH	30.8 -	-	1/1/2015 7:53:00 PM	1/1/2015 8:10:00 PM
CBC W DIFF PNL,UNSPECIFIED BLD	MCH	29.8 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MCH	30.3 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MCH	30.7 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC (HEMOGRAM) BLD AUTO	MCHC	34.5 -	-	1/1/2015 7:53:00 PM	1/1/2015 8:10:00 PM
CBC W DIFF PNL,UNSPECIFIED BLD	MCHC	35 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MCHC	34.5 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MCHC	34.3 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC (HEMOGRAM) BLD AUTO	MCV	89.2 -	-	1/1/2015 7:53:00 PM	1/1/2015 8:10:00 PM
CBC W DIFF PNL,UNSPECIFIED BLD	MCV	85.2 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MCV	87.7 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MCV	89.5 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
MAGNESIUM SERPL-MCNC	MG	2.4 -	-	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
MAGNESIUM SERPL-MCNC	MG	1.6 -	-	1/3/2015 11:55:00 PM	1/4/2015 12:43:00 AM
MAGNESIUM SERPL-MCNC	MG	1.5 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:20:00 AM
MAGNESIUM SERPL-MCNC	MG	1.6 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:56:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MONORE	11 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MONORE	16	High (0-11) %	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MONORE	11 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC (HEMOGRAM) BLD AUTO	MPV	9.3	Low (9.5-14.4) fL	1/1/2015 7:53:00 PM	1/1/2015 8:10:00 PM
CBC W DIFF PNL,UNSPECIFIED BLD	MPV	9.9 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MPV	9.3	Low (9.5-14.4) fL	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MPV	9.6 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
BAS METAB 2000 PNL SERPL	NA	144 -	-	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	NA	141 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:20:00 AM
BAS METAB 2000 PNL SERPL	NA	141 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:56:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	NEUTRE	75 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	NEUTRE	59 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	NEUTRE	58 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC (HEMOGRAM) BLD AUTO	NRBCRE	0 -	-	1/1/2015 7:53:00 PM	1/1/2015 8:10:00 PM
CBC W DIFF PNL,UNSPECIFIED BLD	NRBCRE	0 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	NRBCRE	0 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	NRBCRE	0 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC (HEMOGRAM) BLD AUTO	PLT	344 -	-	1/1/2015 7:53:00 PM	1/1/2015 8:10:00 PM
CBC W DIFF PNL,UNSPECIFIED BLD	PLT	212 -	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	PLT	307 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	PLT	311 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
APTT TIME BLD	PTT	28.6 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:30:00 AM
PT PNL PPP	PTX	14.5 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:28:00 AM
CBC (HEMOGRAM) BLD AUTO	RBC	3.25	Low (4.7-6.1) M/uL	1/1/2015 7:53:00 PM	1/1/2015 8:10:00 PM
CBC W DIFF PNL,UNSPECIFIED BLD	RBC	3.25	Low (4.7-6.1) M/uL	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	RBC	3.17	Low (4.7-6.1) M/uL	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	RBC	3.06	Low (4.7-6.1) M/uL	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC (HEMOGRAM) BLD AUTO	RDW	14.9 -	-	1/1/2015 7:53:00 PM	1/1/2015 8:10:00 PM
CBC W DIFF PNL,UNSPECIFIED BLD	RDW	15.9	High (11.5-14.9) %	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	RDW	15.6	High (11.5-14.9) %	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	RDW	15.4	High (11.5-14.9) %	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
CBC (HEMOGRAM) BLD AUTO	RDWSD	47.1	High (35.1-43.9) fL	1/1/2015 7:53:00 PM	1/1/2015 8:10:00 PM
CBC W DIFF PNL,UNSPECIFIED BLD	RDWSD	48.1	High (35.1-43.9) fL	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	RDWSD	48.9	High (35.1-43.9) fL	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	RDWSD	48.7	High (35.1-43.9) fL	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM
GLUCOSE BLDC GLUCOMTR-MCNC	RGLU	121	High (65-99) mg/dL	1/2/2015 2:47:00 AM	1/2/2015 4:06:00 AM
CBC (HEMOGRAM) BLD AUTO	WBC	7.7 -	-	1/1/2015 7:53:00 PM	1/1/2015 8:10:00 PM
CBC W DIFF PNL,UNSPECIFIED BLD	WBC	11.3	High (4.8-10.8) K/uL	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	WBC	7.3 -	-	1/3/2015 5:21:00 AM	1/3/2015 6:03:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	WBC	9 -	-	1/2/2015 3:26:00 AM	1/2/2015 3:36:00 AM

You didn't like having to scroll all the way down here to finish reading did you? It gets worse … I want you to scroll back up and figure out what the most recent lab result value is for HCT. Painful isn't it. Certainly we are not going to deliver that as our lab results visualization.

Let's try a little harder

We can do so much better than just "displaying the data." At minimum we can use the nifty little QlikView function PEEK when we load the data and rank the values by which is most recent, which is second and which is third.

Then we can at least provide a display of just the 'Most Recent" data to save the physicians from trying to figure it out. We might even offer some color coding for values that the lab has indicated are too high or are too low. By doing that we take the 150 values above and pair it down to a much prettier 42 values.

Test	Value	Result	Ind	LabRef	LabTaken	LabResulted
CBC W DIFF PNL,UNSPECIFIED BLD	ABASO	0.05	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	AEOS	0.1	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	AIG	0.11	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	ALYMPH	1.35	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	AMONO	1.18	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	ANRBC	0	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	ASEG	8.46	High	(2.0-8.1) K/uL	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	BASORE	0	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
BAS METAB 2000 PNL SERPL	BC	40	High	(10-24) RATIO	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	BUN	20	-	-	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	CA	7.6	Low	(8.4-10.6) MG/DL	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	CL	116	High	(100-110) MMOL/L	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	CO2	16	Low	(21-32) MMOL/L	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	CREAT	0.5	Low	(0.8-1.3) MG/DL	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	DTYPE	Aut...	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	EOSIRE	1	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
BAS METAB 2000 PNL SERPL	GFR	>60	-	-	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	GFRAF	>60	-	-	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
BAS METAB 2000 PNL SERPL	GLU	87	-	-	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
HGB+HCT PNL BLD	HCT	29.2	Low	(42-52) %	1/4/2015 2:49:00 PM	1/4/2015 3:10:00 PM
HGB+HCT PNL BLD	HGB	10.2	Low	(14-18) GM/DL	1/4/2015 2:49:00 PM	1/4/2015 3:10:00 PM
CBC W DIFF PNL,UNSPECIFIED BLD	IG	1	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
PT PNL PPP	INR	1.11	-	-	1/3/2015 5:21:00 AM	1/3/2015 6:28:00 AM
BAS METAB 2000 PNL SERPL	K	4.4	-	-	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	LYMPRE	12	Low	(16-52) %	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MCH	29.8	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MCHC	35	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MCV	85.2	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
MAGNESIUM SERPL-MCNC	MG	2.4	-	-	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MONORE	11	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	MPV	9.9	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
BAS METAB 2000 PNL SERPL	NA	144	-	-	1/4/2015 4:24:00 AM	1/4/2015 5:07:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	NEUTRE	75	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	NRBCRE	0	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	PLT	212	-	-	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
APTT TIME BLD	PTT	28.6	-	-	1/3/2015 5:21:00 AM	1/3/2015 6:30:00 AM
PT PNL PPP	PTX	14.5	-	-	1/3/2015 5:21:00 AM	1/3/2015 6:28:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	RBC	3.25	Low	(4.7-6.1) M/uL	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	RDW	15.9	High	(11.5-14.9) %	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	RDWSD	48.1	High	(35.1-43.9) fL	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM
GLUCOSE BLDC GLUCOMTR-MCNC	RGLU	121	High	(65-99) mg/dL	1/2/2015 2:47:00 AM	1/2/2015 4:06:00 AM
CBC W DIFF PNL,UNSPECIFIED BLD	WBC	11.3	High	(4.8-10.8) K/uL	1/4/2015 4:24:00 AM	1/4/2015 4:43:00 AM

Gotta tell you it did take some time to convert from a table box to a chart so that I could do the color coding but that's our job. Unfortunately I completely forgot about that whole "context" thing I mentioned in my post on visualizing blood pressure and while making it easier to read and prettier I took away their ability to know how this most recent result compares with the 2 previous results.

Putting some polish on our chart

What the heck … we've got a few more minutes before lunch let's really go out on a limb and

change our straight table into a pivot table. Then the physician will be able to see how the results compare. If you refer to the pivot table below you'll see how important that is for the value "BC" as the physician will clearly be able to see not only that it's out of bounds but will also be able to see that the trend is getting worse not better.

Value	Rank	Most Recent	Previous	2nd Previous
ABASO		0.05	0.06	0.05
AEOS		0.1	0.27	0.32
AIG		0.11	0.08	0.13
ALYMPH		1.35	1.39	2.11
AMONO		1.18	1.13	1.02
ANRBC		0	0	0
ASEG		8.46	4.32	5.33
BASORE		0	1	1
BC		40	32.5	18.6
BUN		20	13	13
CA		7.6	8.2	7.9
CL		116	114	109
CO2		16	19	25
CREAT		0.5	0.4	0.7
DTYPE		Automated	Automated	Automated
EOSIRE		1	4	4
GFR		>60	>60	>60
GFRAF		>60	>60	>60
GLU		87	79	104
HCT		29.2	28.9	-
HGB		10.2	9.7	-
IG		1	1	2
INR		1.11	-	-
K		4.4	3.9	4.3
LYMPRE		12	19	24
MCH		29.8	30.3	-
MCHC		35	34.5	-
MCV		85.2	87.7	-
MG		2.4	1.6	-
MONORE		11	16	11
MPV		9.9	9.3	-
NA		144	141	141
NEUTRE		75	59	58
NRBCRE		0	0	0
PLT		212	307	-
PTT		28.6	-	-
PTX		14.5	-	-
RBC		3.25	3.17	-
RDW		15.9	15.6	-
RDWSD		48.1	48.9	-
RGLU		121	-	-
WBC		11.3	7.3	-

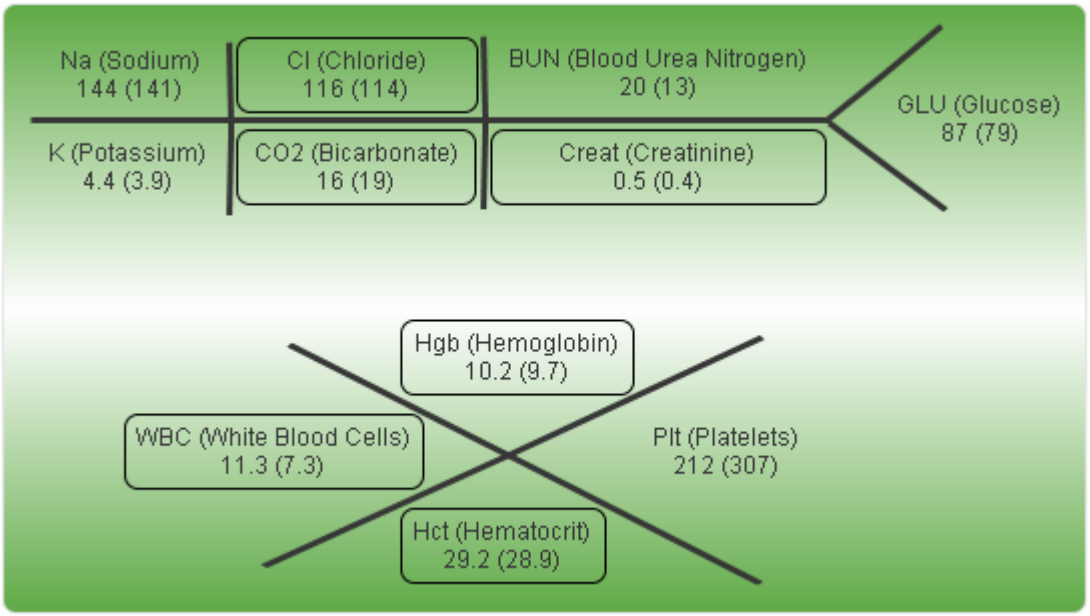
Don't pat yourself on the back just yet my friend … there are still 42 values that a physician would have to sort through. Not to mention the fact that I used green to indicate a low value

and red to indicate a high value. Hello color blindness issues that I forgot all about. But you shouldn't … click here for a really cool color blind simulator that allows you to upload your image and see how those with various forms of color blindness will see it.
Not to mention the fact that green carries a positive connotation and perhaps the peril with a particular value (thus wanting the negative connotation of red) comes with a value below the expected range. As they say "no good deed goes unpunished."
I spoke with our Chief Medical Informatics Officer and expressed my displeasure with the whole process. First I haven't even liked thinking about having blood being drawn and I just couldn't find any really good way to visualize the lab results.
No matter how I sorted it you had to dig.
No matter what format I changed the charts into tradeoffs ended up costing me valuable information.
It just seemed that if I was the physician and was rounding I would want something better when I was standing next to a patient's bed. I would want something that let me immediately look for the values I cared about based on the patient's particular conditions. If I needed to see a particular result or few results I would want a way to immediately see exactly what I wanted without having to scan the other 41 values.

Going Old School

He agreed with me and after some thought walked to his white board. He started with the 5 words he knows really motivate me "you probably can't do this" and continuedas he started drawing "in the old days when we had paper charting we used Fishbone diagrams…" He went on to describe how they used to use drawings that looked like fish bones and different shapes contained certain sets of values. The "key" values from a basic metabolic panel for instance looks very much like a small fish. The values from a complete metabolic panel look like a bigger fish. While the results from a Complete Blood Count (CBC) form a different shape. Imagine that … before we had tons of computing power, had millions of rows of lab results to display in grid form or had access to 18,393 books on data visuzalition they were visualizing lab results in an awesome visual way. Simple. Clean. Immediately recognizable. Below I have just 2 of the several forms of fish bone diagrams so you can see the technique. The numbers on the left are the most recent, while the ones inside parenthesis are the previous value. In the top diagram you'll notice that if either of the values is out of bounds (high or low) I've simply enabled the color of the border around the text box. More subtle than color as it blends into the diagram pretty well if you are looking just for Glucose for instance. But if you are looking for their Chloride level then it immediately hits you that the numbers are out of

bounds. I'm not as thrilled that the same technique doesn't work as well for the other diagram shape. Good thing you can comment and give me suggestions.



Old School Visualization technique + the power of QlikView = AWESOMENESS!
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Using the PEEK function I was able to isolate the most recent three lab results. Combining that with SET ANALYSIS I was able to choose which to add to my old school visualization. Without much effort you can do the same for as many previous results as your physicians might like. Guess I better start spending more time with these old timers that wrote things down on paper.

Alright I gotta run … I've got a whole bunch more 0's and 1's to dump on my rounding report, I mean visualize in a way that will lead to our physicians ability to quickly consume them.