



Radiology Service Excellence

Embedding Improvement

Tim Winstone
18th October 2016



Radiology: The Patient Journey

Did You Know?

Radiology receives 800 referrals per day. These come from GPs, ADHB clinicians and other District Health Boards

Total referral breakdown:

- 60% by Inpatients/ Emergency
- 31% by Outpatients
- 1% by Other DHBs
- 8% by GPs

62 % of these referrals are received electronically

There are 4 specialist Radiology Departments serving the central Auckland region:

- Auckland City Hospital
- Starship
- Greenlane Clinical Centre
- National Women's Health

We have a total of 350 staff in Radiology including nurses, doctors, MRT's and clerical staff

Radiology operates a 24hr, 7 day service at Auckland City and Starship Hospitals

40 terabytes of Imaging data is stored in the Radiology Image Archive - 9 years of patient data



Referral/Booking

- From:
- General Practitioners
 - Emergency Department
 - Clinics
 - Surgical
 - Medical (Wards)
 - Other DHBs



Patient Preparation/ Transit

Patients are scheduled and prepared for examination. They are transported to Radiology by orderlies and transit nurses or arrive as out-patients



Pre-care

Some examinations require tests such as blood pressure readings, blood tests and informed consent prior to the examination commencing



Imaging

Images are obtained using techniques and equipment appropriate for the clinical information and condition(s) being queried.

The range of imaging modalities offered are Mobile and General Radiography, Angiography, CT, Ultrasound, Nuclear Medicine, MRI and Medical Photography



This is our process, this is our Team



Diagnosis

Referring GP or clinician uses the image and the report to diagnose the condition and then treat the patient



Reporting

Dictation of the Radiologists findings takes place and a report is typed and sent to the referring GP or clinician



Post-care

Complex examinations often require post-procedure care in day-stay or a ward

Below: Reconstructed CT scan of the Head and Neck



Medical Radiation Technologists (MRT) use x-ray and other imaging equipment to take images of people's injuries and possible diseases

Radiologists diagnose diseases of the human body using procedures such as x-rays, ultrasound, MRI, CT, and nuclear medicine

Every year, the Radiology Department trains 40 Registrars to become Radiologists and 48 MRT students to become MRT's

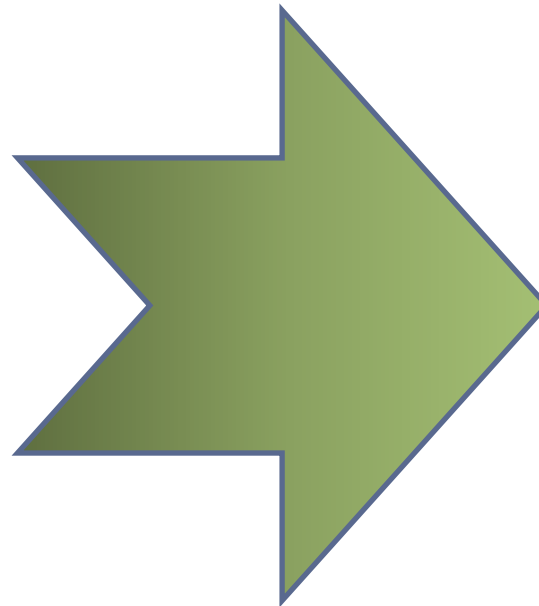
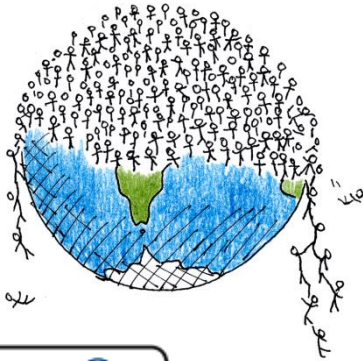
We are strongly associated with the School of Medicine and have within our staff:

- 2 Associate Professors
- 7 Lecturers

We produce and report around 800 radiology procedures, approximately 50,000 images per day



Some context....



The impact this had....

	July 2012			July 2012			July 2012		
	Angiography less than 3 months	Total Angiography	% Coronary Angiography less than 90 days	CT Scan less than 6 weeks	Total CT Scan	% CT Scan less than 6 weeks	MRI Scan less than 6 weeks	Total MRI Scan	% MRI Scan less than 6 weeks
Auckland	51	51	0%	619	730	85%	589	1,894	31%
Bay of Plenty	51	53	96%	328	644	51%	137	478	29%
Canterbury	110	150	73%	717	755	95%	327	513	64%
Capital and Coast	117	125	94%	498	630	79%	166	231	72%
Counties Manukau	-	-	0%	692	826	84%	422	698	60%
Hawkes Bay	56	80	70%	283	408	69%	192	447	43%
Hutt Valley	-	-	-	314	318	99%	209	242	86%
Lakes	-	-	-	192	272	71%	180	226	80%
MidCentral	16	18	89%	381	418	91%	191	191	100%
Nelson Marlborough	127	148	86%	292	358	82%	64	236	27%
Northland	-	-	-	213	382	56%	174	475	37%
South Canterbury	-	-	-	119	149	80%	66	90	73%
Southern	43	45	96%	1,060	620	171%	668	616	108%
Tairāwhiti	-	-	-	47	212	22%	20	167	12%
Taranaki	84	92	91%	-	-	0%	-	-	0%
Waikato	114	183	62%	475	574	83%	426	1,746	24%
Wairarapa	-	-	-	157	170	92%	43	67	64%
Waitemata	56	58	97%	740	948	78%	454	891	51%
West Coast	-	-	-	130	130	100%	0	0	0%
Whanganui	-	-	-	219	229	96%	145	247	59%
	825	1,003	78%	7,357	8,624	85%	4,407	9,365	47%



A national focus formed....



Beyond the Image

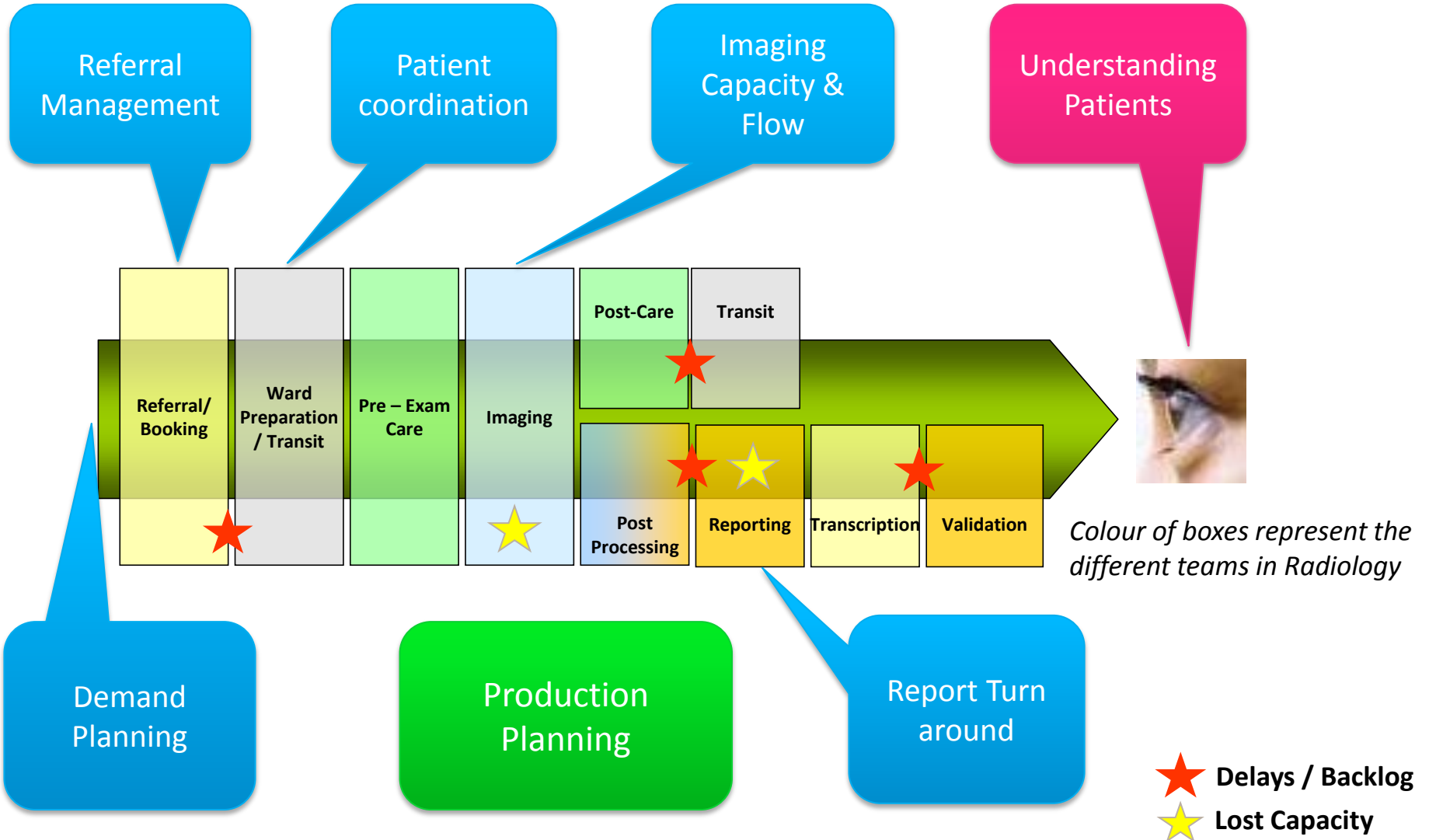
NATIONAL RADIOLOGY SERVICE IMPROVEMENT



START

FINISH

Our previous focus....



Our new focuses...

- 1 Demand Management
- 2 Improving Acute Diagnostic Flow
- 3 Imaging Throughput /Patient Flow Improvement
- 4 Improved Reporting and Visibility of performance

Afterhours Ultrasound...



A Pilot Study on Afterhours Ultrasound

S Gerrie, T Winstone, L Modahl, J Metcalfe, D Milne, C Bagnall
Auckland City Hospital, New Zealand



Introduction

Auckland City Hospital provides a weekday in hours service for acute ultrasound. Afterhours cover is provided by the radiology registrar and on-call sonographers. Afterhours demand has grown and as a result, patient diagnosis has been delayed, alternative imaging used, or patients had to come back for their exam.

The afterhours pilot study aimed to improve acute diagnostic workflow at Auckland City Hospital with a view to develop a permanent after hours ultrasound service should the pilot prove successful.

Methods

The pilot study compared preliminary data from four patient groups, obtained retrospectively prior to commencement of the afterhours ultrasound service, with retrospective data obtained during a four month sonographer-lead afterhours ultrasound service.

The audit focused on the mean time from referral to ultrasound exam, the percentage of patients imaged within the target 6 hours and the mean number of days between ultrasound referral and discharge.

Qualitative Feedback

"I was the Surgeon on Call this past weekend. I was very impressed by the service." - Surgeon

"The patients had timely ultrasound scans and decisions were able to make regarding their surgical care." - Surgeon

"The pilot had a positive impact on both US and CT, as I was able to focus on providing quality of service." - Radiology Registrar

Conclusion

Despite low numbers of patients, this preliminary data shows that there is a clear early indication of improvement in patient safety and ability to provide effective and efficient care. Our recommendation is to use this data to provide the basis for the development of a permanent sonographer-lead afterhours ultrasound service at Auckland City Hospital.

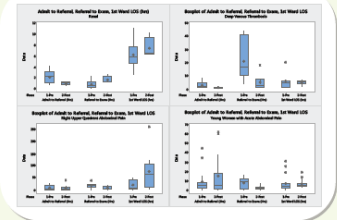
Analysis of Time from Scan to Ward Discharge

The number of patients who had ultrasound scans and reports on weekends was analysed to see the impact of patients who may be discharged earlier from wards. This was split between all patient discharges including Acute areas (AED and APU) and Ward discharges.

The number of patients scanned during this time increased by 2.5 from 99 in the three months from July-Sept 2014, to 251 in the period from March-May 2015 (Figure 2).

There were also more patients being discharged from both Acute and Inpatient wards between these two periods.

Figure 1 - Box plots for all patient groups for both the pre-intervention and post-intervention audits.



Results and Discussion

There were 47 patients in the pre-intervention audit and 35 in the post-intervention audit.

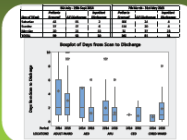
Results show a statistically significant decrease in the mean referral to exam time for three of the four patient groups. No statistical difference was seen in the Trenal colic group thought due to differences in referral patterns between the pre-intervention (CT only) and post-intervention groups (US and CT) (Figure 1 / Table 1).

Analysis of the average number of days between weekend afterhours ultrasound scans and discharge indicated a statistically significant decrease in the number of days to discharge in the post-intervention group of 1.15 days (p=0.05) compared to the pre-intervention group.

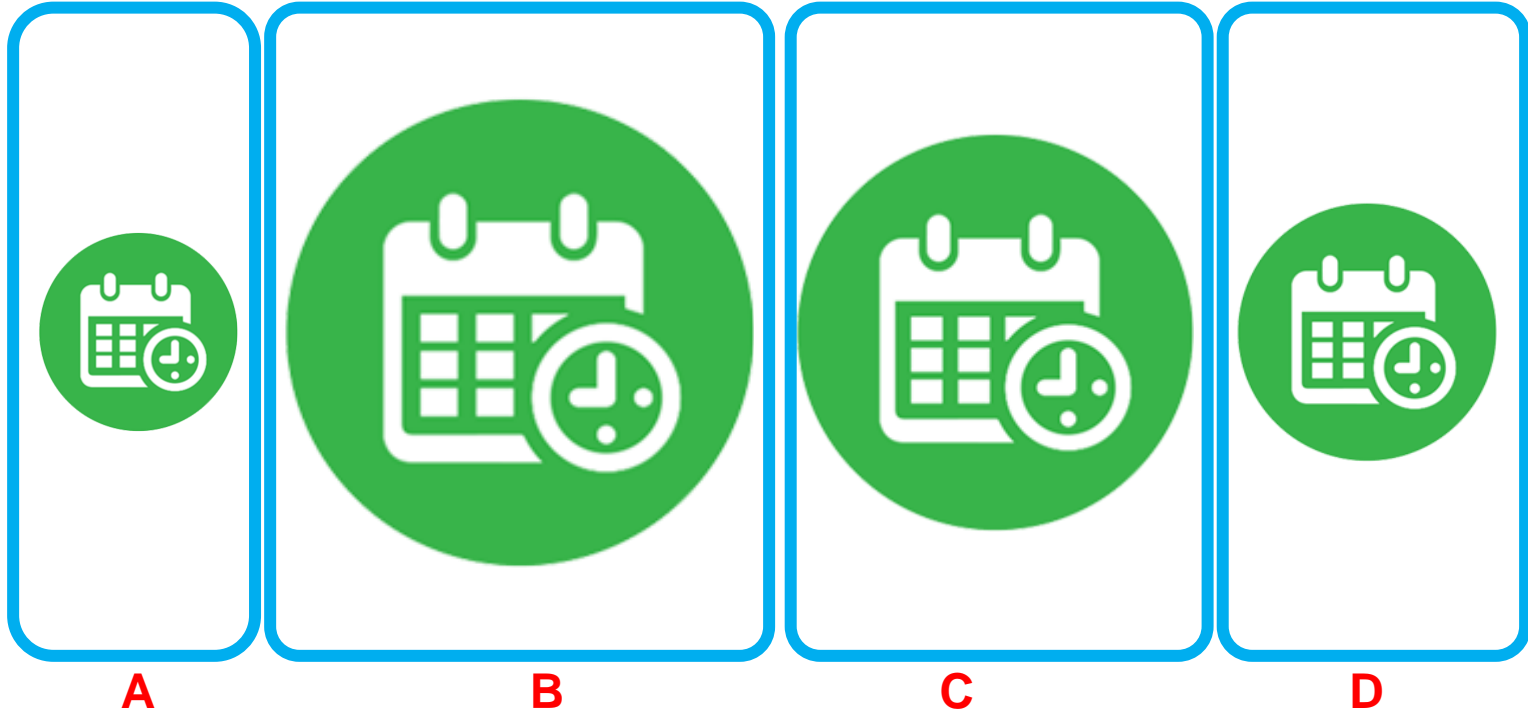
Table 1 - Results for all patient groups for both the pre-intervention and post-intervention audits.

Referral to Exam	Pre-Intervention (n=47)	Post-Intervention (n=35)	Mean (SD)	Mean (SD)	p-value
Acute to Inpatient	1.8	1.2	1.8 (0.8)	1.2 (0.4)	0.001
Inpatient to Inpatient	1.5	1.1	1.5 (0.7)	1.1 (0.4)	0.001
Acute to Outpatient	1.8	1.2	1.8 (0.8)	1.2 (0.4)	0.001
Inpatient to Outpatient	1.5	1.1	1.5 (0.7)	1.1 (0.4)	0.001
Trenal Colic	1.8	1.8	1.8 (0.8)	1.8 (0.8)	0.999
Mean	1.6	1.2	1.6 (0.7)	1.2 (0.4)	0.001

Figure 2 - Time from Scan to Ward Discharge (2014 vs 2015)



Aligned Booking and Scheduling...



Aligned Booking and Scheduling...



A

B

C

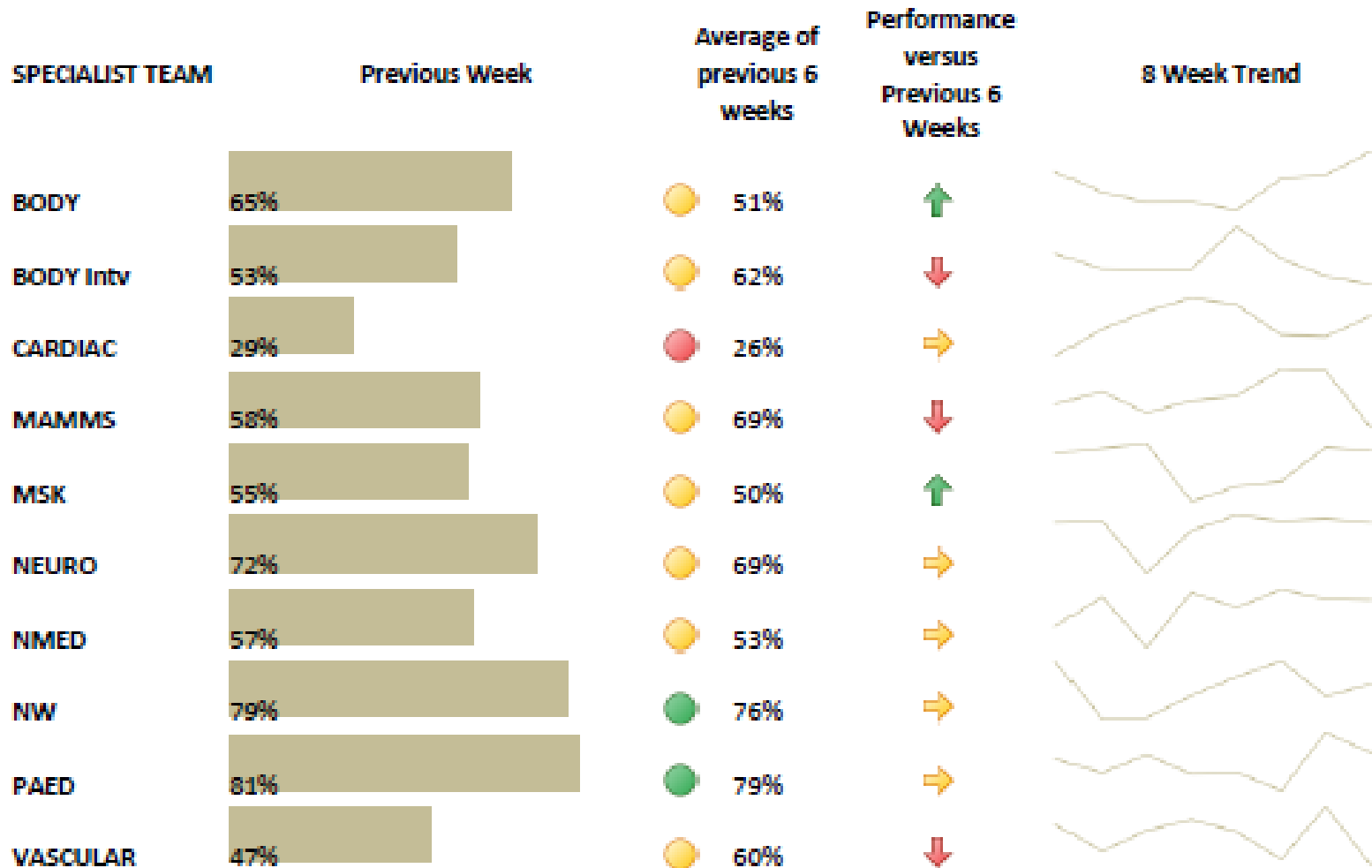
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Performance Dashboards...

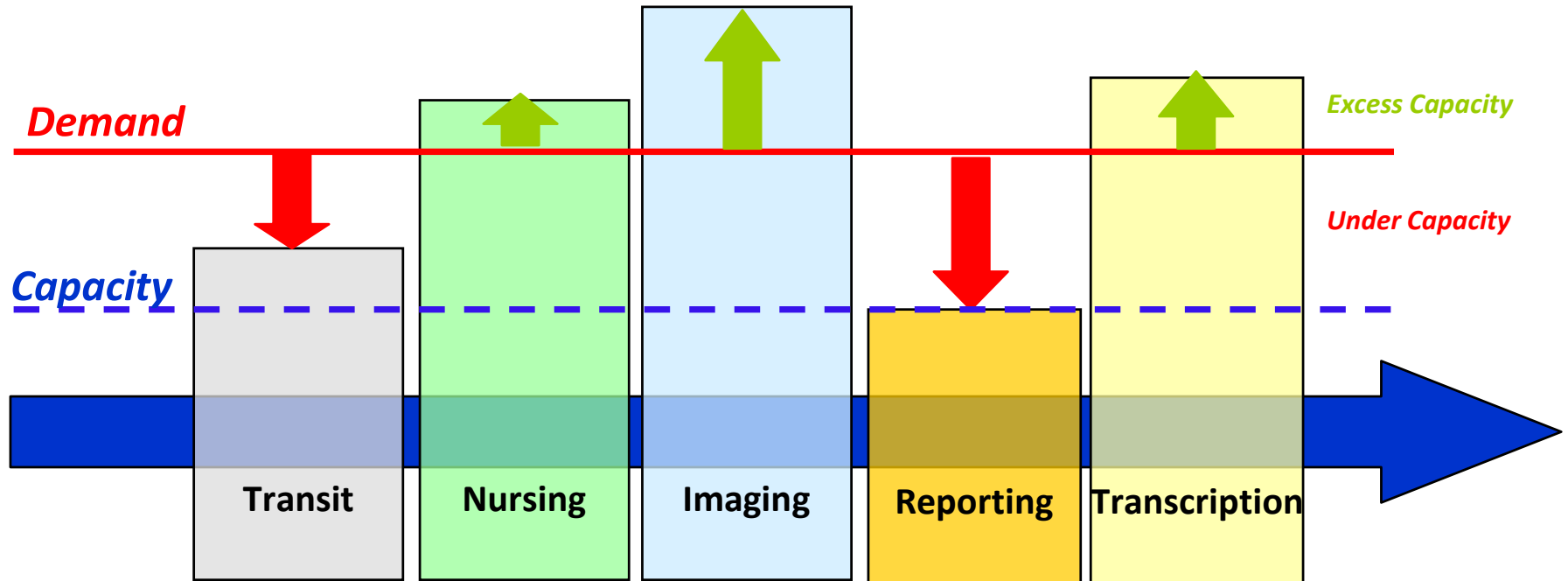
Time to Prioritise

Order creation Mon - Thurs - Prioritised with 18 hrs Order creation Fri - Prioritised within 72 hrs

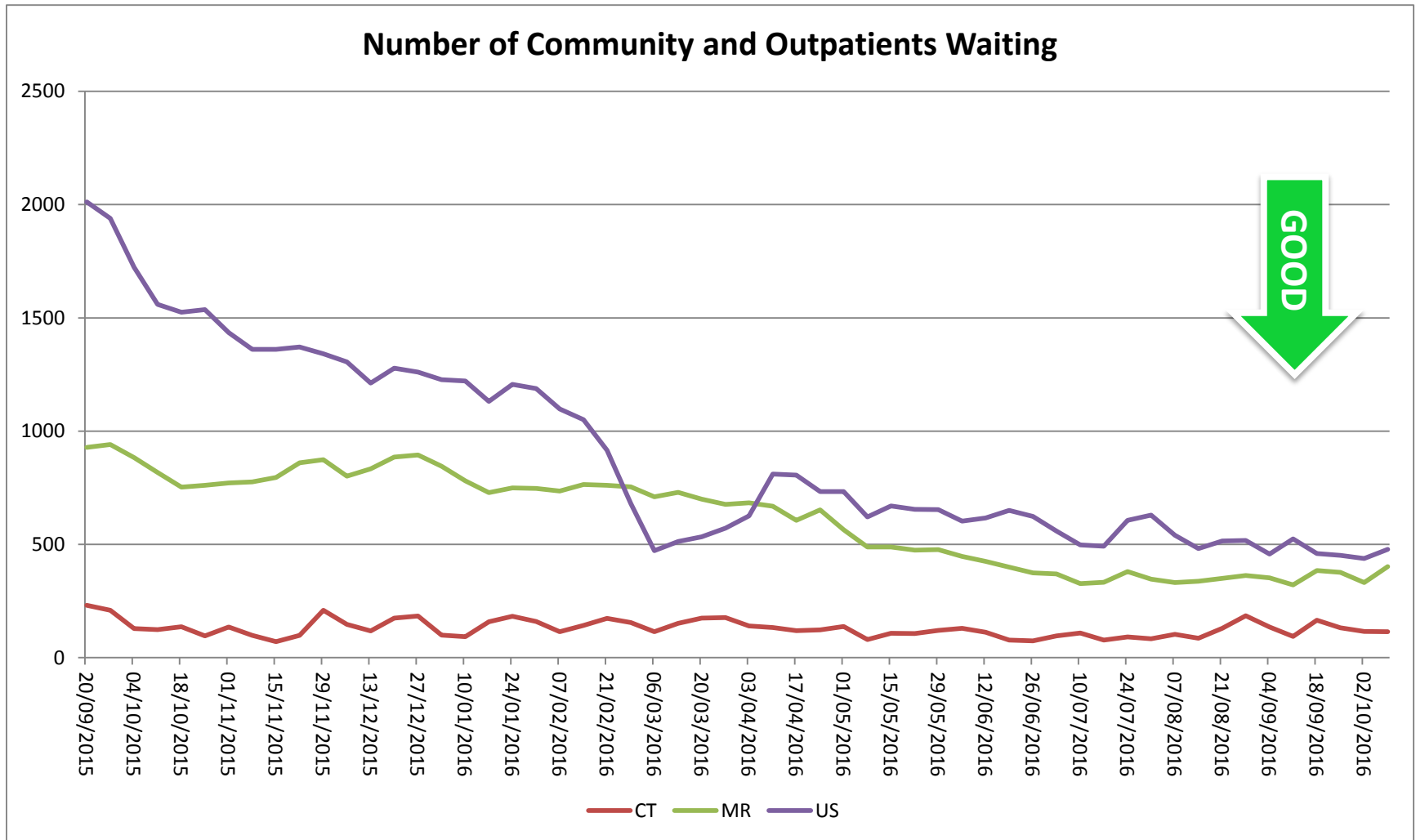
Order creation Sat - Prioritised within 48 hrs Order creation Sun - Prioritised within 24 hrs



Enhanced Production Planning...

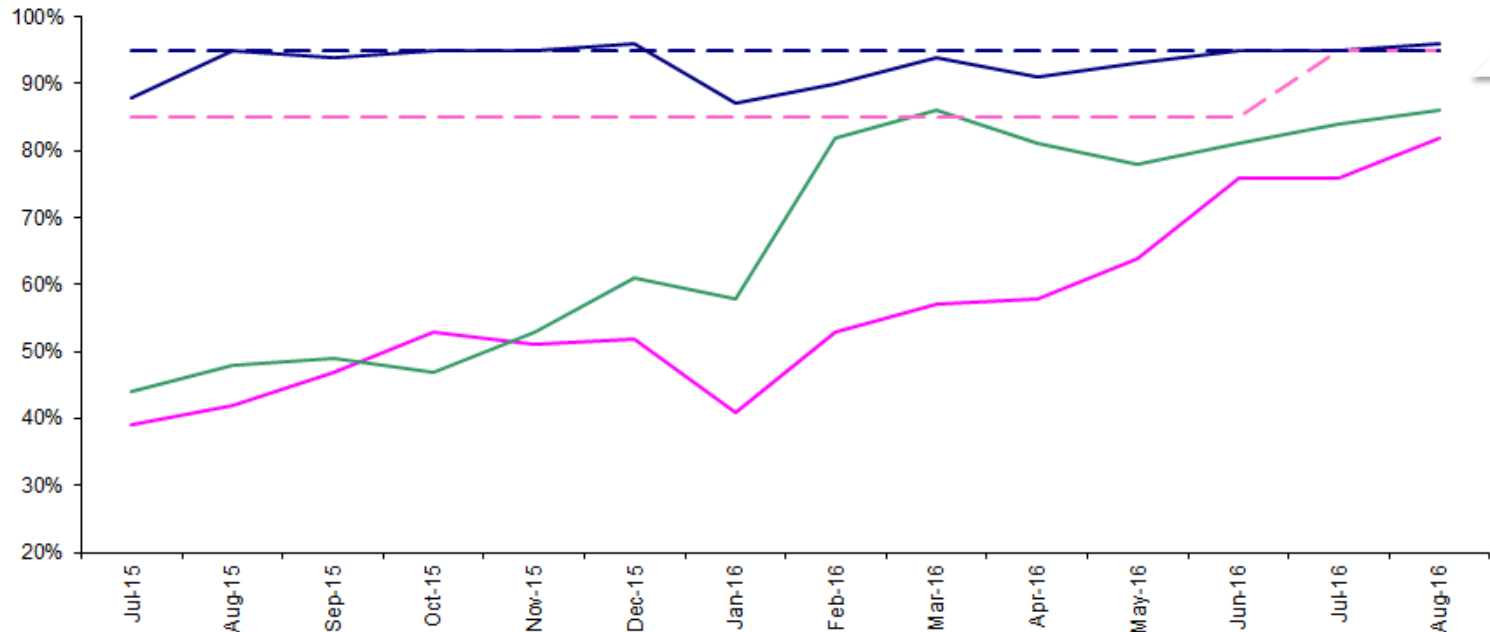


The Impact... Waiting Lists



The Impact... 6 Week compliance

OP/GP % Validated within 6 weeks of referral



	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16
CT	88%	95%	94%	95%	95%	96%	87%	90%	94%	91%	93%	95%	95%	96%
MR	39%	42%	47%	53%	51%	52%	41%	53%	57%	58%	64%	76%	76%	82%
US	44%	48%	49%	47%	53%	61%	58%	82%	86%	81%	78%	81%	84%	86%
MR Target	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	95%	95%
CT/US Target	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%

— CT — MR — US - - MR Target - - CT/US Target

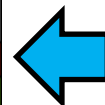
The Impact... 6 Week CT

	June 2016			July 2016			August 2016		
	Waiting or Scanned Within 42 Days	CT Waiting and Scanned	% CT in 42 Days or less	Waiting or Scanned Within 42 Days	CT Waiting and Scanned	% CT in 42 Days or less	Waiting or Scanned Within 42 Days	CT Waiting and Scanned	% CT in 42 Days or less
Auckland	637	669	95.2%	632	667	94.8%	725	753	96.3%
Bay of Plenty	581	588	99.1%	581	573	97.9%	595	600	99.2%
Canterbury	1,026	1,370	74.9%	1,079	1,301	82.9%	1,192	1,379	86.4%
Capital and Coast	687	800	85.9%	697	823	84.7%	749	851	88.0%
Counties Manukau	929	942	98.6%	886	907	97.7%	1,205	1,231	97.9%
Hawkes Bay	489	517	94.6%	469	510	92.0%	473	507	93.3%
Hutt Valley	332	369	90.0%	346	369	93.8%	321	338	95.0%
Lakes	435	563	77.3%	484	570	84.9%	527	638	82.6%
MidCentral	476	512	93.0%	474	509	93.1%	405	444	91.2%
Nelson Marlborough	349	474	73.6%	358	435	82.3%	389	453	85.9%
Northland	437	765	57.1%	413	668	61.8%	457	732	62.4%
South Canterbury	340	356	95.5%	327	338	96.7%	329	346	95.1%
Southern	738	957	77.1%	716	902	79.4%	841	1,055	79.7%
Tairāwhiti	159	175	90.9%	135	149	90.6%	180	192	93.8%
Taranaki	274	333	82.3%	255	328	77.7%	173	227	76.2%
Waikato	761	833	91.4%	784	849	92.3%	746	785	95.0%
Wairarapa	158	158	100.0%	170	170	100.0%	173	174	99.4%
Waitemata	1,362	1,413	96.4%	1,342	1,415	94.8%	1,401	1,484	94.4%
West Coast	90	90	100.0%	102	102	100.0%	124	124	100.0%
Whanganui	297	300	99.0%	288	289	99.7%	322	323	99.7%
National Total:	10,557	12,182	86.7%	10,518	11,874	88.6%	11,327	12,636	89.6%

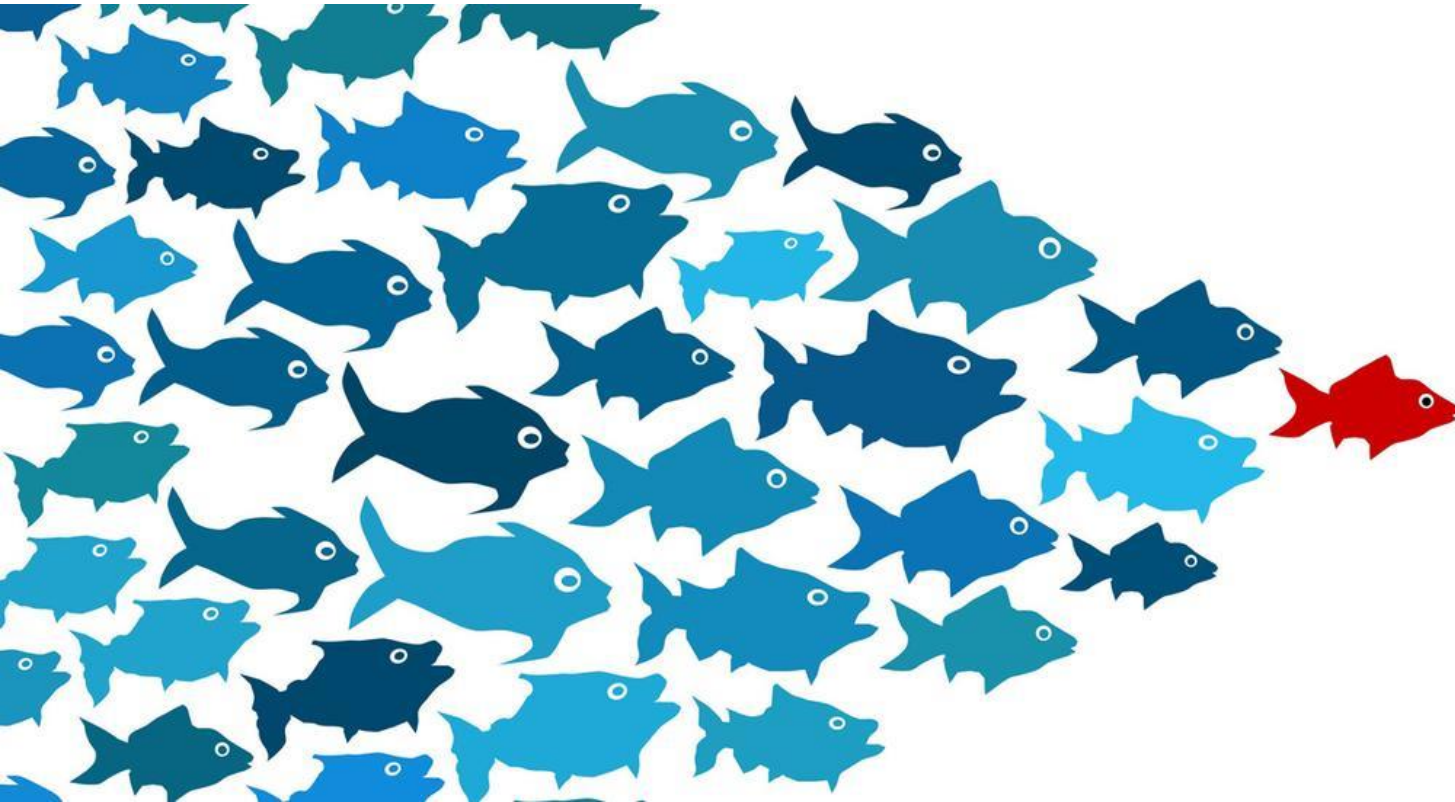


The Impact... 6 Week MRI

	June 2016			July 2016			August 2016		
	Waiting or Scanned Within 42 Days	MRI Waiting and Scanned	% MRI in 42 Days or less	Waiting or Scanned Within 42 Days	MRI Waiting and Scanned	% MRI in 42 Days or less	Waiting or Scanned Within 42 Days	MRI Waiting and Scanned	% MRI in 42 Days or less
Auckland	642	849	75.6%	595	784	75.9%	665	809	82.2%
Bay of Plenty	343	353	97.2%	346	365	94.8%	354	366	96.7%
Canterbury	747	1,259	59.3%	707	1,329	53.2%	800	1,553	51.5%
Capital and Coast	368	594	62.0%	350	606	57.8%	428	701	61.1%
Counties Manukau	506	754	67.1%	551	637	86.5%	631	679	92.9%
Hawkes Bay	255	571	44.7%	245	546	44.9%	254	535	47.5%
Hutt Valley	143	221	64.7%	157	188	83.5%	201	211	95.3%
Lakes	203	398	51.0%	202	391	51.7%	232	396	58.6%
MidCentral	387	387	100.0%	325	325	100.0%	402	402	100.0%
Nelson Marlborough	161	382	42.1%	205	403	50.9%	271	460	58.9%
Northland	238	473	50.3%	226	509	44.4%	192	460	41.7%
South Canterbury	180	184	97.8%	185	188	98.4%	180	185	97.3%
Southern	657	966	68.0%	584	833	70.1%	615	856	71.8%
Tairāwhiti	125	186	67.2%	110	142	77.5%	119	130	91.5%
Taranaki	111	118	94.1%	109	116	94.0%	66	70	94.3%
Waikato	670	757	88.5%	654	721	90.7%	711	785	90.6%
Wairarapa	59	74	79.7%	62	72	86.1%	58	59	98.3%
Waitemata	807	870	92.8%	752	827	90.9%	788	867	90.9%
West Coast	47	59	79.7%	67	79	84.8%	74	95	77.9%
Whanganui	172	233	73.8%	158	207	76.3%	167	189	88.4%
National Total:	6,821	9,688	70.4%	6,590	9,268	71.1%	7,208	9,808	73.5%



Sustaining the change...



Any questions...

