

# Use of operations management in healthcare: Reducing wait times and increasing throughput by managing variability in patient flow

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## Introduction

Since the 1950's, most major industries e.g. airlines, banking, have widely adopted the use of scientific operations management methods to ensure customer satisfaction, timely service and high quality products. The use of such methods in healthcare delivery is still nascent, and much needs to be done to adapt the methods to the unique characteristics of healthcare operations. The Institute for Healthcare Optimization (IHO) has successfully developed their Variability Methodology™ and implemented these patient flow optimisation methods at numerous North American hospitals. However this developed technique has as yet had limited testing within the UK NHS setting.

### Aim

To investigate the effect of an Operations Management Methodology within NHS Scotland in improving Patient Flow

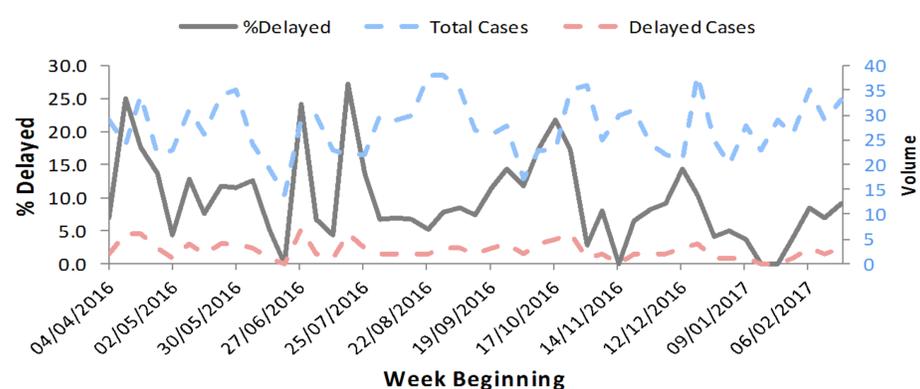
## Methods

Four pilot NHS Boards were selected to participate in the programme. Each undertook a Guided Patient Flow Assessment to assess and identify opportunities for improvement in areas of limited patient flow. Consequently three Boards decided to work on optimising surgical flow while one Board focused on medical inpatient flow.

All Boards began standardising clinical processes such as booking of immediate/urgent surgical patients or developing admission, discharge and transfer (ADT) criteria for medical in-patients. Effective capture of when a patient was 'ready to move' to the next stage of their care plan was key.

Once criteria standardisation was achieved and data capture and review mechanisms were established, each Board collected 12 weeks of prospective patient level data. Mathematical tools such as Queuing Theory and Discrete Event Simulation modeling were utilised to develop scenarios that would assure certain levels of quality and access (i.e. wait time) performance.

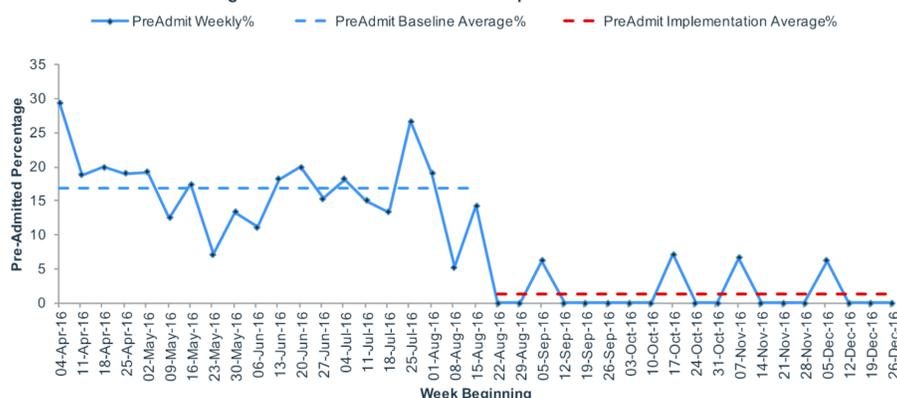
### CEPOD Cases % Delayed / Volume Weekly



Proportion of surgical cases not getting to theatre within predetermined wait times and overall weekly volume of cases

### Surgical Unit Smoothable Admissions

Percentage Pre-Admitted Each Week From April 2016 to December 2016



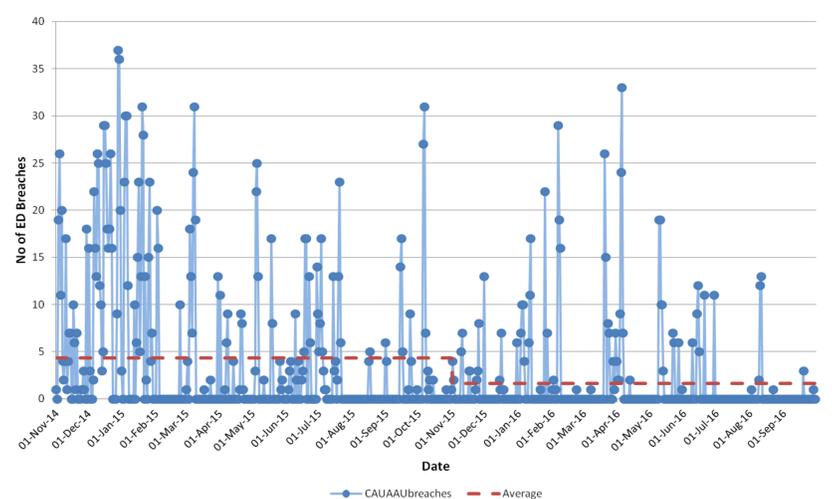
Proportion of patients admitted one day prior to elective surgery

## Results

Boards optimising surgical patient flow reported increased compliance with their internally established wait time thresholds, with compliance improving to >95% for immediate/urgent cases. Boards also reduced unnecessary pre-admission of elective patients the day prior to surgery as ward bed availability improved.

The medical flow project reported a significant reduction in hospital stay, equating to an annualized saving of 3039 bed days. Compliance with the emergency access standard was significantly improved with a 66% reduction in 'wait for AMU bed' breaches from an average of 5.3 to 2.9 to 1.8 per day (2014 vs 2015 vs 2016). This contributed to an increase in compliance with the four hour emergency access standard from 94.4% in 2015 to 95.3% in 2016.

ED breaches - waiting for AAU or CAU bed



No. of patients breaching the four hour wait in ED waiting for a bed in the Assessment Unit or Combined Assessment Unit

	Actual LOS for Home w/o POC* (days)		Post-Implementation Compared to Baseline	
	Jan 15- Oct 15	Nov 15- July 16	LOS Difference (days)	% Change
<b>4 Medical Wards</b>				
<i>Specialty Patients</i>				
A12 (haem, endo, DM)	8.8	7.9	-0.9	-10.2%
A31 (geriatric)	6.9	6.6	-0.3	-4.3%
B12 (respiratory)	6.5	5.5	-1.0	-15.4%
B32 (GI)	6.8	6.4	-0.4	-5.9%
Avg Specialty Patients	7.3	6.6	-0.7	-9.0%
<i>General Med Patients</i>				
A12 (haem, endo, DM)	6.6	5.8	-0.8	-12.1%
A31 (geriatric)	5.4	5.1	-0.3	-5.6%
B12 (respiratory)	4.1	4.1	0.0	0.0%
B32 (GI)	6.4	4.6	-1.8	-28.1%
Avg Medical Patients	5.6	4.9	-0.7	-12.9%

Average length of stay for Specialty and Gen Med patients pre and post implementation of ADT Criteria for patients discharged without a Package of Care

## Discussion

Reliable application of surgical urgency classification and ADT criteria in itself helped drive measurable improvements in patient flow and quality of care. Based on modeling scenarios: Boards are considering changes to clinical practice models as well as resource reallocations in order to reliably and sustainably ensure optimal use of resources. Across pilot boards, this work has created capacity for an additional 1,072 patients per year without adding beds or staff.

Elimination of artificial (man-made) variability (including clinician variability) is a significant driver of patient flow challenges world-wide. The benefits of eliminating or reducing artificial variability for patient outcomes, access and quality of care and provider satisfaction have been demonstrated within the pilot projects. Further detailed studies of the impact on additional quality, safety & efficiency metrics are underway.

## Conclusions

Operations Management techniques have directly improved patient flow and reduced clinical variation across NHS Scotland.