Nurse coordinated CABG Clinical Pathway resulting in Shortening of Hospital Length of Stay and Improvement in Clinical Outcomes

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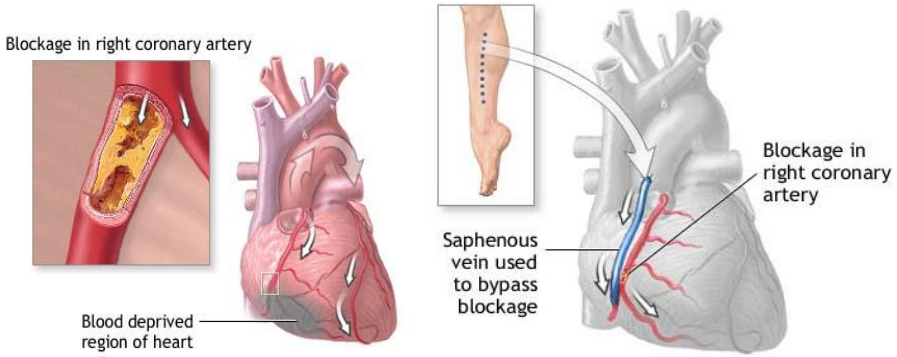
CABG Surgery

- There is **growing demand** for **coronary artery bypass grafting (CABG)**
- Because of high demand
  - to **shorten hospital length of stay**;
  - to **streamline the care process**
  - with **ensured clinical outcomes**
- Therefore, need for **CABG clinical pathway .**



CABG Clinical Pathway Development

- A clinical pathway
  1) multidisciplinary care
  2) guiding management
     a) specific group of patients
     b) anticipated clinical course.
- Its goal is to
  1) standardize management
  2) minimizing variability
  3) optimizing outcomes

Set up and implementation of CABG clinical pathway

CABG Clinical Pathway Development

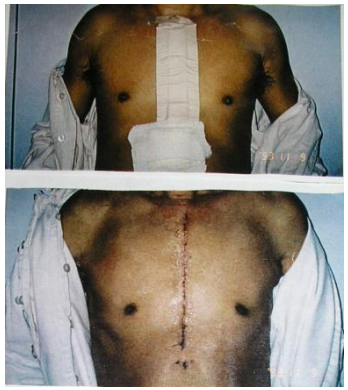
- Involved the **multi-disciplinary team**
  - Cardiothoracic surgeons
  - Anaesthetists
  - Nurses,
  - Physiotherapists.

- Designed by
  - ✓ Reference on best-available evidence-based clinical practice
  - ✓ Iterations of drafts and reviews
  - ✓ Conducting pilot run
  - ✓ Continuous improvement

CABG Clinical Pathway Development

- fully integrated into patient's peri-operative care, including:
    1) use of clinical investigations,
    2) post-operative care management,
    3) analgesia,
    4) mobilization schedules,
    5) physiotherapy,
    6) wound care, and
    7) communication with patient and family.

- Allows for
    - individualization of care
    - variances are documented and audited.



Set Up CABG Clinical Pathway

Care Map for elective CABG

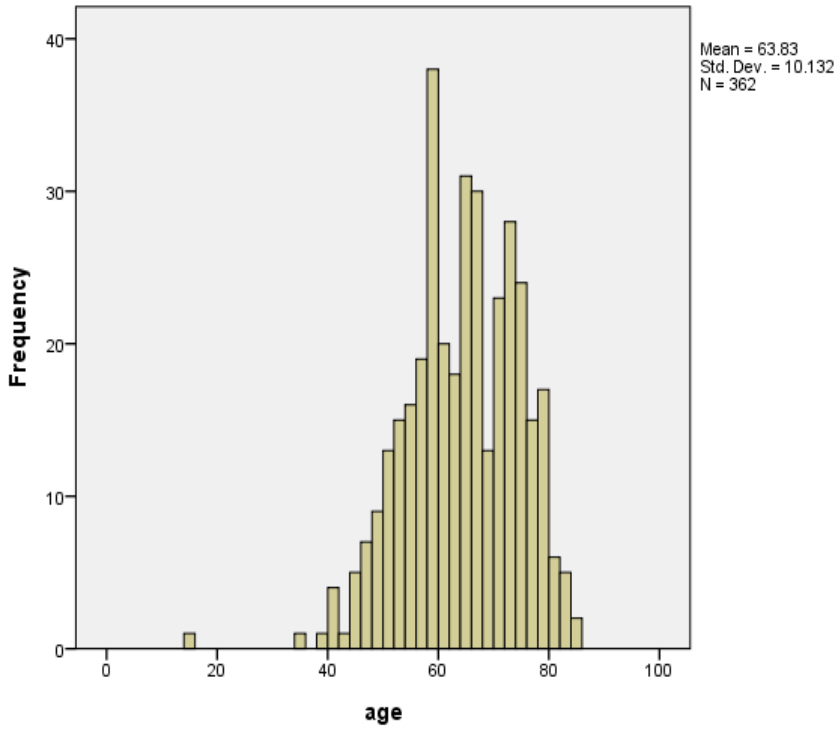
Date	Pre-Op /Admission	Day 0	Day 1	Day 2	Day 3	Day 4 - 5	Day 6- 9
Location	General ward (GW)	GW to ICU	☐ICU to GW	☐To GW if still in ICU	GW	GW	GW to Home
Assessment & Monitoring	Preoperative checklist Height / weight Emotional needs Discharge planning needs	Monitoring & assessment per ICU guidelines	Monitoring & assessment per ICU/ GW guidelines	Monitoring & assessment per GW guidelines	Monitoring & assessment per GW guidelines	Monitoring & assessment per GW guidelines ☐Off Telemetry ☐Off I/O	Monitoring & assessment per GW guidelines ☐Off Telemetry ☐Off I/O
Investigation	Cardiac Cath/ Echo results Open heart routine for CABG	Lab tests, CXR, ECG	Lab tests, CXR, ECG	Labs tests, CXR, ECG	Blood for NA, K; CXR, ECG Other test as indicated	Pre-discharge lab tests, CXR, ECG ☐Pre-discharge Echo assessment	Pre-discharge lab tests, CXR, ECG ☐Pre-discharge Echo assessment
Medication	Continue all meds except: • Aspirin/ Plavix • Warfarin Prophylactic antibiotic	Titrate inotropes, vasodilators, sedations infusions as ordered Prophylactic antibiotic Fluid replacement ☐Early aspirin	☐Wean off infusion drugs Resume oral meds, especially: • Aspirin • Beta Blocker • Lipid lowering agent • Diltiazem for radial artery Transition to oral analgesia	Adjust medications Oral analgesia prn ☐Wean off infusion drugs	Adjust medications Oral analgesia prn	Adjust medications Oral analgesia prn	Adjust medications Oral analgesia prn
Treatment	Hibiscrub shower PM before & AM of surgery Bowel prep PM before surgery	Ventilator setting by anesthetist Care for invasive lines & tubes Foley catheter to BSB ☐Early extubation NGT – off when extubated Drains to suction as ordered O_2 therapy	☐Wean support and consider off invasive monitoring ☐Off leg/ arm drain(s) ☐Extubation Continue O_2 therapy, wean as tolerated	☐Wean support and consider off invasive monitoring ☐Off peri/ medi/ chest drians ☐Off Foley catheter Continue O_2 therapy, wean as tolerated	☐Off central line ☐Off peripheral line ☐Remove all drains ☐Off Foley catheter if not done Wean/ off O_2 as tolerated	☐Off peripheral line ☐Off O_2 As indicated	☐Off peripheral line ☐Off O_2 As indicated
Activities	Activity as tolerated or as ordered Pre-op activity level documentation	Bed rest with HOB ≥ 30° as tolerated Sit up or chair position for 2-4 hr after extubation, if appropriate	Sternal precautions ☐Sit out in chair ☐Ambulate with assistance Antiembolism stockings, remove BD	Sternal precautions ☐Sit out in chair ☐Ambulate in ward with assistance Antiembolism stockings, remove BD	Sternal precautions ☐Sit out in chair ☐Ambulate *with/ *without assistance Antiembolism stockings, remove BD	Sternal precautions ☐Sit out in chair ☐Ambulate *with/ *without assistance Antiembolism stockings, remove BD	Sternal precautions ☐Ambulate without assistance Antiembolism stockings, remove BD
Nutrition	Continue normal diet NPO after MN/ per order	NPO. Sips after extubation Advance as tolerated	Advance diet as tolerated	DAT	DAT	DAT ☐*BO/ *Give laxatives	DAT ☐*BO/ *Give laxatives
Discharge Planning/ Instruction	Pre-op Teaching: • Patient Pathway/Care Map • Incentive spirometer • Smoking Cessation • Explain pre-op preparation Initiate discharge planning	Orient pt/family to ICU routines, visitation policy Reinforce pre-op teaching	Reinforce pre-op teaching Add instruction re: • Incision care • Activity restrictions • New medications • Pulmonary hygiene • Sternal precautions • Heart Healthy diet • Smoking cessation	Continue assessment and planning for discharge needs Continue discharge teaching	Continue assessment of discharge needs Review discharge plans Reinforce discharge instructions	Consider Cardiac Rehab referral ☐Patient/family attend post-op teaching class by discharge Review discharge meds Review discharge instructions, pt education Provide follow-up phone contacts	
Outcomes	Ready for surgery	Recovery from anesthesia and surgery Monitor and treat any complications Pain control	Monitor and treat any complications Pain control/ Skin integrity Increasing ADLs/ mobility Post-op teaching in progress	Pain control/ Skin integrity Increasing ADLs/ mobility Discharge teaching in progress	Pain control/ Skin integrity Resume normal ADLs/ mobility Discharge teaching in progress	Discharge home with home care instructions: • medications • restrictions • pain management • OPD FU appt • cardiac rehab info/ referral • CNS referral if needed	

Implementation of CABG clinical pathway

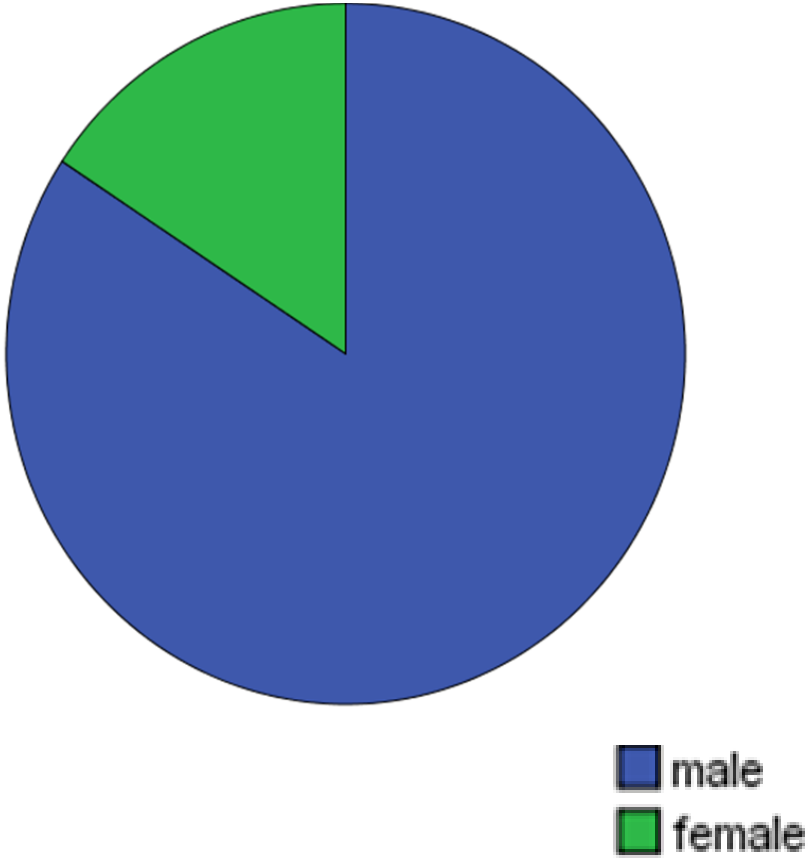
- Inclusion Criteria:
  - elective cases for CABG
- Exclusion Criteria:
  - Urgent or emergency OT
  - Redo cases
  - CABG with other operations/ procedures:
    - CABG + Valve operations
    - CABG + VSD repair
    - CABG + Wedge resection of lung
- Time frame:
  - 29/6/2010 to 31/12/2013
- Cases recruited:
  - **362 cases**
    - total 531cases of CABG done
    - 169 cases not recruited (urgent /emergency OT or OT with other procedures)

Demographics

- Age: range from 15 to 84; **mean age 63.83** (+/- 10.13).



- Gender: Male: 84.3%; Female: 15.7%



CABG clinical pathway review

- 362 patients recruited into elective CABG clinical pathway
  - 227 (62.7%) patients followed the clinical pathway
  - 135 (37.3%) patients fell through from the clinical pathway

Clinical Pathway / Year	Total cases	Followed cases	Fell through cases
2010 (June – Dec)	61	34 (55.7 %)	27 (44.3%)
2011	108	61 (56.5%)	47 (43.5%)
2012	84	57 **(67.9%)**	27 (32.1%)
2013	109	75 **(68.8%)**	34 (31.2%)
Total	**362**	**227 (62.7%)**	**135 (37.3%)**

Risk score (Euro/ QMH risk score)

- The risk score reflected the baseline patient condition including
  - age, co-morbidities
  - previous myocardial insults
  - other pre-operative conditions of patients.

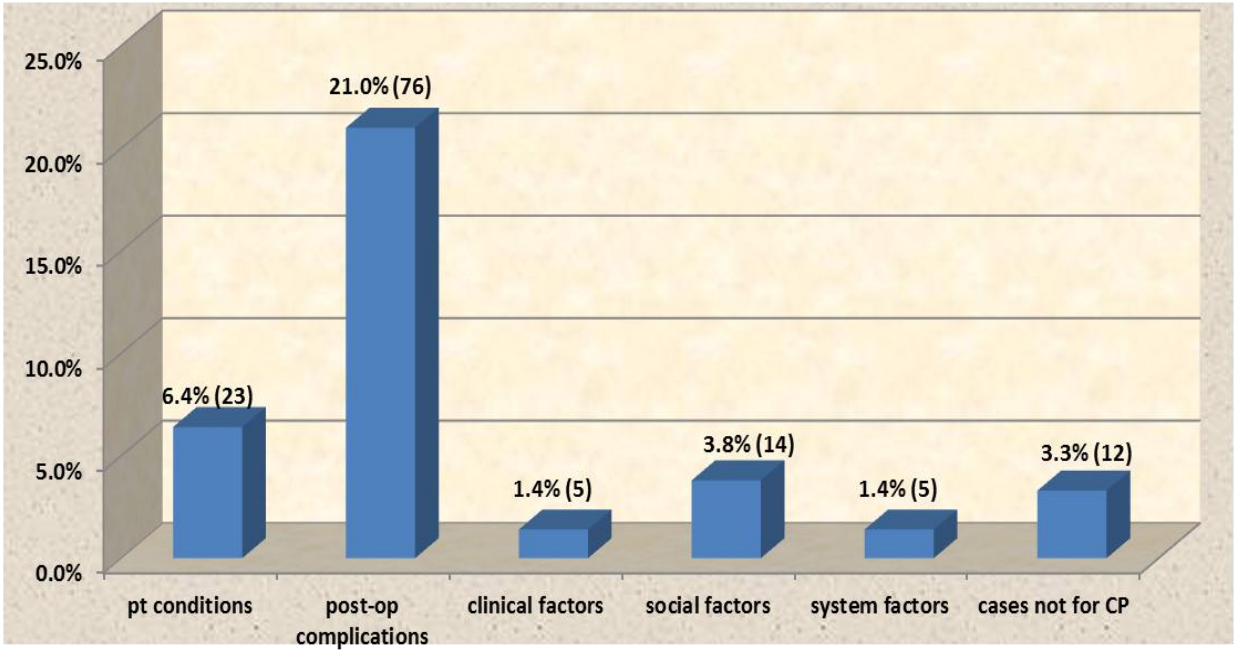
- **Higher risk score** would be **more likely to fall through**
  (poorer pre-operative health status, more co-morbidities and higher risk for surgery)

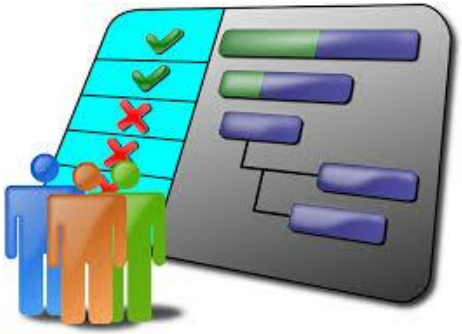
	Euro score (additive)	Euro score (logistic)	QMH risk score
Total cases	3.38 (+/- 2.62)	3.54 (+/- 4.13)	2.19 (+/- 1.79)
Followed cases	2.87 (+/- 2.32)	2.70 (+/- 2.69)	1.85 (+/- 1.56)
Fell-through cases	**4.21** (+/- 2.84)	**4.86** (+/- 5.48)	**2.75** (+/- 1.99)
Significance	p < 0.000	p < 0.000	p < 0.002

Review, analysis and implementation of improvements

Review and audit

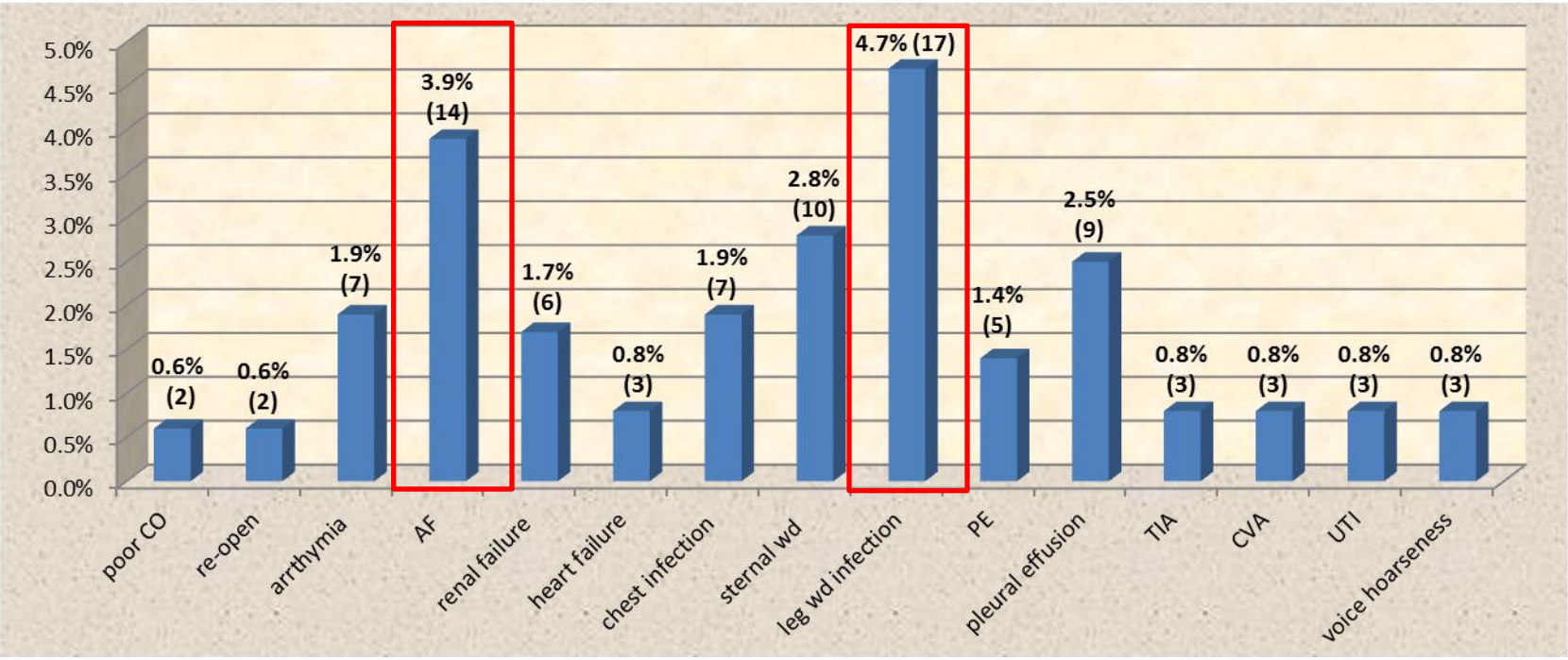
- Among 362 cases, 135 cases fell through
- “Fell through” cases are sorted into 6 categories.
- Search for systemic factors and formulate improvement measures





Post-op complications

- Among 362 cases, post-op complications occurred
  - most common: leg wound infection & post-op atrial fibrillation (AF)
  - Others: Urinary tract infection (UTI), renal failure



Nurse-led improvement measures

- Day Centre team reviewed the results and conducted nurse-led improvement measures including:

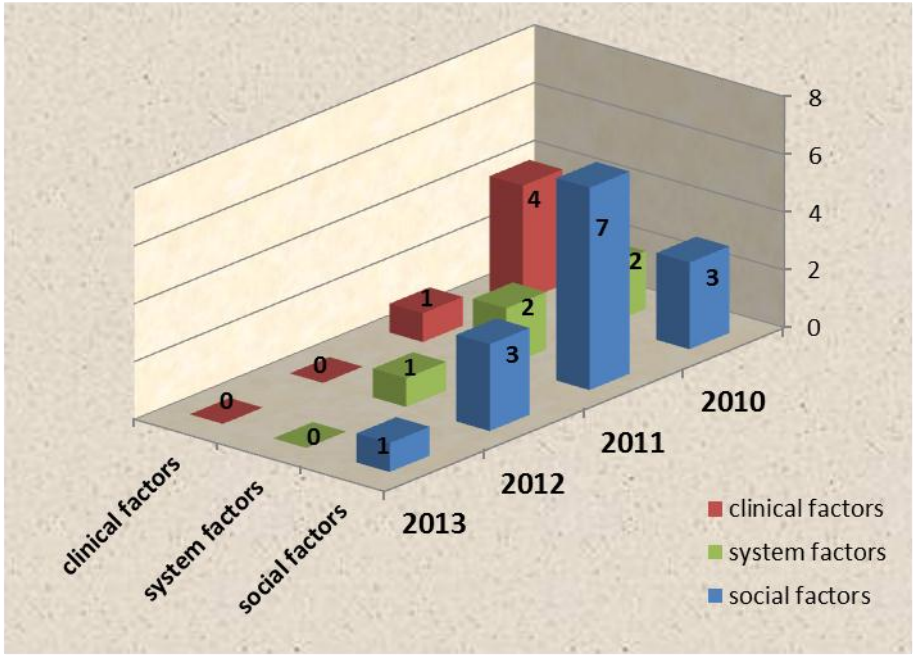
1. Length of hospital stay **(LOS) expectation management**

2. **More comprehensive patient education**
   - provided for patients and family members better *understanding of patient care*.

3. **Patient partnership programs** with **telephone hotline**
   - help relief their anxiety and concerns arisen from the shorten hospital stay.

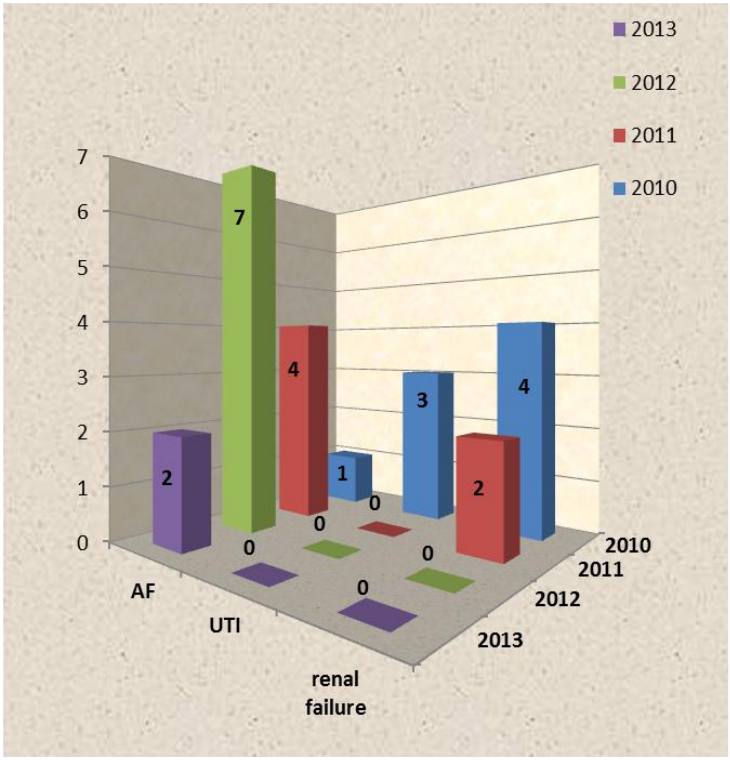
Improvement in clinical outcomes

- Nurse-led improvement measures:
  - Social factors
    - LOS expectation management
    - Confirm post-op homecare arrangements before operation.
  - System factors
    - Reserve post-op general bed for pathway cases.
  - Clinical factors
    - Keep tract with pathway milestones:
    - Early off IV, CVP, foley if pt conditions fits to avoid clinical complications
- Noted improvement with the decrease in occurrences of the incidents.



Improvements in post-op complications

- Improvement measures taken to prevent post-op complications:
  - **Early resume of Beta-blockers**
    - to prevent post-op AF
  - **Ensure early removal of Foley's catheter**
    - to prevent urinary tract infection (UTI)
  - **Pre-op arrangement for renal impaired or renal failure patients**
    - to prevent post-op renal failure
- Noted improvement with the decrease of occurrence of these complications



Results and Outcomes

Shorten Length of Stay (Before and After)

- Outcomes compared with historic **control group** of **488** patients receiving surgery **4 years preceding** its introduction.

- The mean post-operative length of stay (LOS) significantly reduced
  - **13.16** ± 7.25 **versus 9.03** ± 6.32 **days (p<0.000)**

Nurse coordinated CABG clinical pathway resulting in shortening of hospital length of stay				
	Before implementation	**After implementation**	**Days Shortened**	**Significance**
Shortening of Length of Stay after implementation of CABG clinical pathway	**13.16 (+/- 7.25) days**	**9.03 (+/- 6.32) days**	**4.13 days**	**p < 0.000**

Shorten Length of Stay
(Followed Vs Fell-through cases)

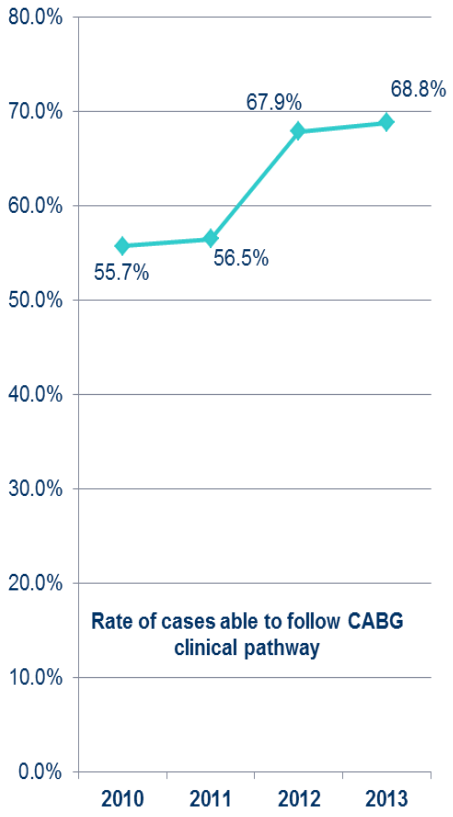
- Of 362 patients, mean post-operative LOS for **followed** further significantly reduced compared to **fell through cases**
  - **6.75** ± 1.32 **versus 12.79** ± 9.03 **days, (p<0.000)**

Nurse coordinated CABG clinical pathway resulting in shortening of hospital length of stay				
	Followed cases	**Fell Through cases**	**Days Shortened**	**Significance**
Shortening of Length of Stay for cases who follow the CABG clinical pathway	**6.75 (+/- 1.32) days**	**12.79 (+/- 9.03) days**	**3.76 days**	**p < 0.000**

Improvement of rate in following CABG clinical pathway

- Noted improvement in the rate of cases able to follow CABG clinical pathway
- The rate of cases able to follow the pathway improved to **67.9%** & **68.8%** (previous ~55%).

	2010 (1/2 yr)	2011	2012	2013
LOS of cases followed the pathway	7.44 days (+/- 1.75)	6.26 days (+/- 1.25)	6.16 days (+/- 1.15)	7.58 days (+/- 1.11)
LOS of cases fell thru from the pathway	11.79 days (+/- 8.91)	11.4 days (+/- 8.74)	13.6 days (+/- 8.23)	15.74 days (+/- 11.24)
Significance	p< 0.000	p< 0.000	p< 0.000	p< 0.000
Cases able to follow CABG clinical pathway	55.7%	56.5%	67.9%	68.8%



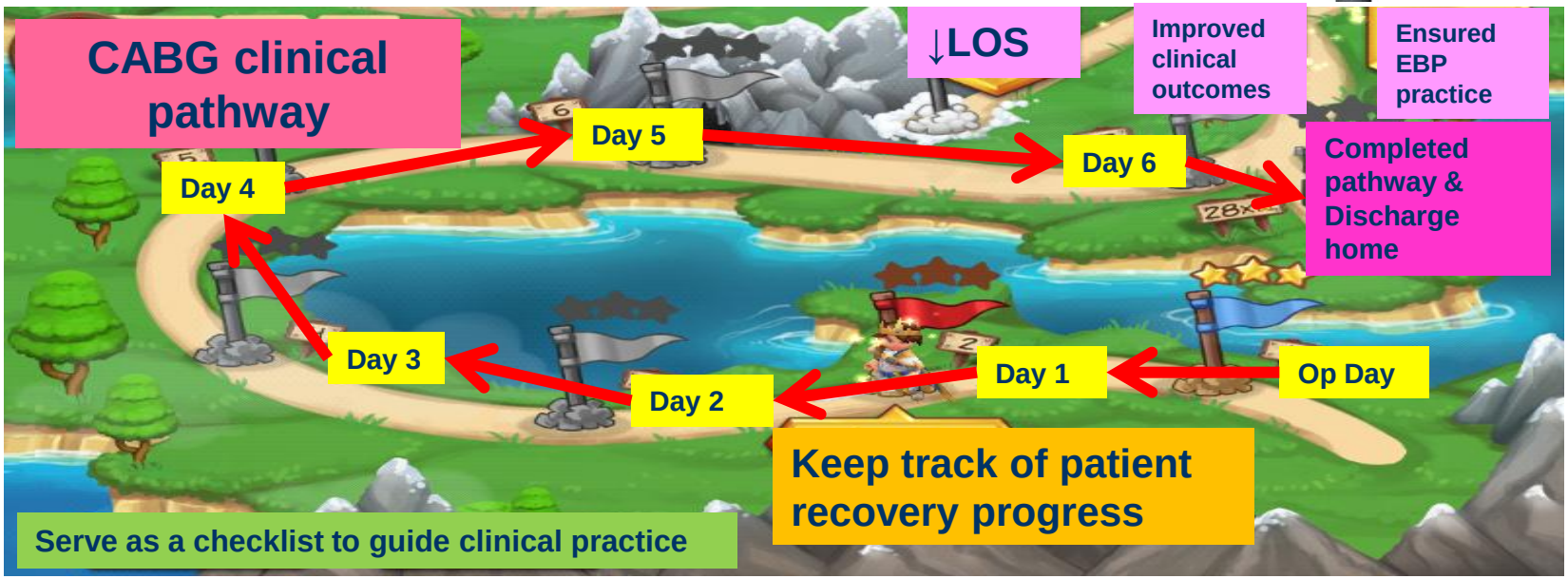
Accepting higher risk patients with stable clinical outcomes

- We were handling **more complex patients with higher risks, higher risk scores, more complicated cases.**
- Yet we were still able to maintain a relative **stable clinical outcomes**.
- Also the patients recruited were **more able to follow the clinical pathway in the recovery process**.

	2010 (1/2 yr)	2011	2012	2013
Mean Euro score (logistic)	2.89 (+/- 2.82)	3.51 (+/- 3.55)	3.93 (+/- 5.26)	3.78 (+/- 4.69)
Rate of cases able to follow CABG clinical pathway	55.7%	56.5%	67.9%	68.8%
Average LOS in cases able to follow CABG clinical pathway	7.44 days (+/- 1.75)	6.26 days (+/- 1.25)	6.16 days (+/- 1.15)	7.58 days (+/- 1.11)

Achieving Milestones of the clinical pathway

- After implementation of the clinical pathway, patients who followed the clinical pathway can achieve the recovery milestones including :
  - early extubation ;
  - **early aspirin in-take**
  - weaning off inotropic support
  - early transfer to general ward
  - early removal of Foley's catheter
  - early sit out
  - early ambulation
  - early bowel movement
  - and discharge within Day 5 to Day 9.



Ensured proven effective treatment are given

- Early aspirin improve vein graft patency
- Best to take within 6 hours after operation, no benefit if >48 hours

Circulation

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Saphenous Vein Graft Patency 1 Year After Coronary Artery Bypass Surgery and Effects of Antiplatelet Therapy

Results of a Veterans Administration Cooperative Study*

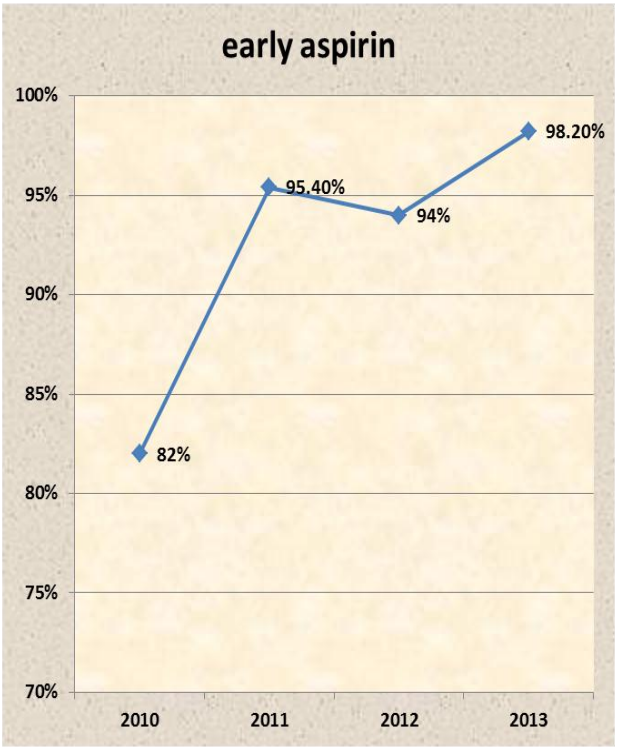
S Goldman, J Copeland, T Moritz, W Henderson, K Zadina, T Ovitt, J Doherty, R Read, E Chesler and Y Sako

Circulation 1989;80;1190-1197

Ensure early Aspirin intake

- Noted team effort for early aspirin intake.
  - Ensure aspirin given within 6 hour after operation.
- Change traditional routine practice:
  - given Aspirin via Ryles' tube even before extubation.
- Rate of early intake of aspirin improved

	2010	2013
Early aspirin	82%	98.2%

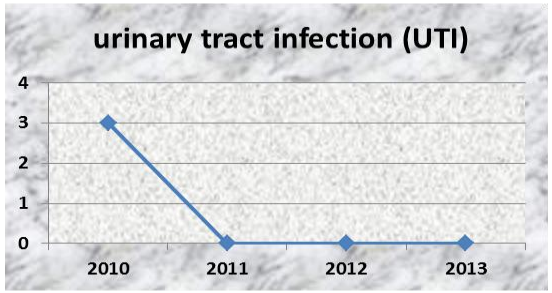


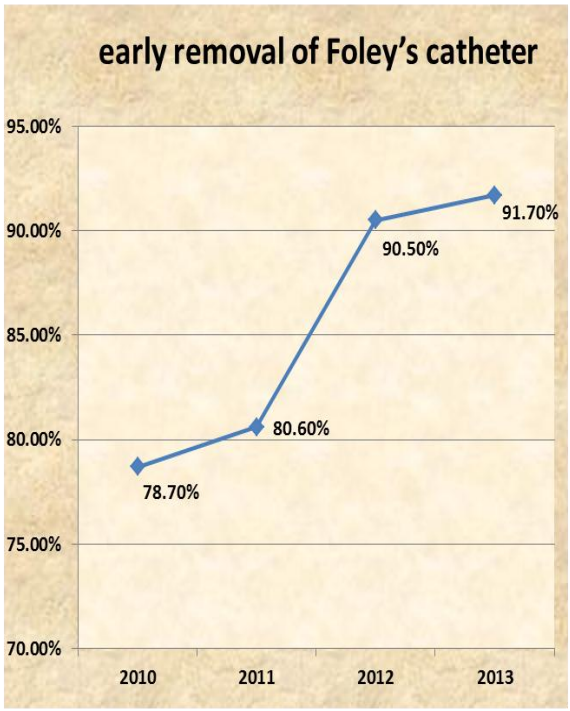
Early removal of Foley's catheter

- Review on post-op complications of UTI.
- Audit on compliance of pathway.
- Ensured early removal of Foley's catheter.
- Rate of early removal of Foley's catheter improved:

	2010	2013
Early removal of Foley	78.7%	91.7%

- Complication rate of UTI decreased.

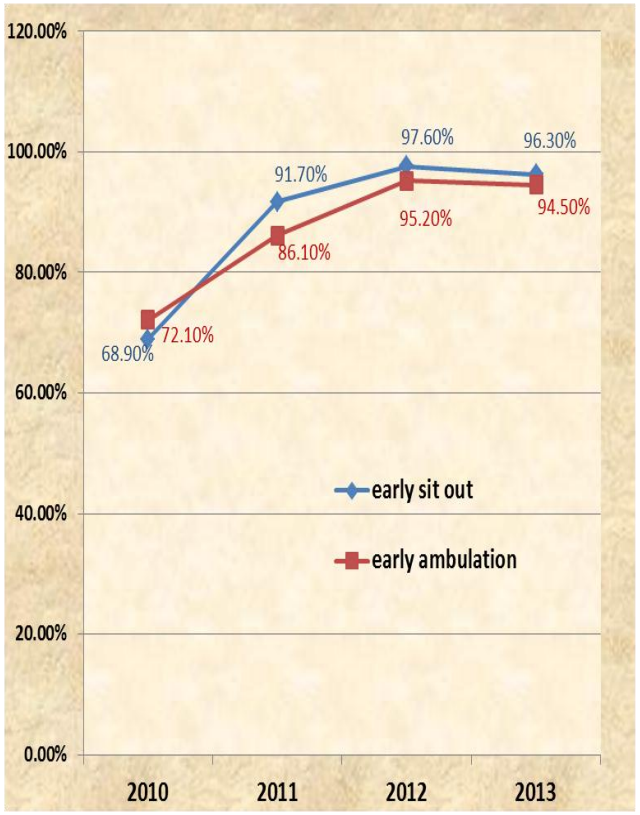




Early Sit Out and Mobilization

- Team effort to encourage early sit out & mobilization.
- Noted improved rate of early sit out and ambulation:

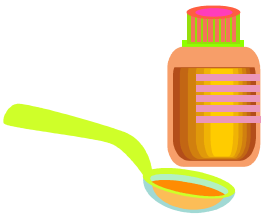
	2010	2013
Early Sit Out	68.9%	96.3%
Early Ambulation	72.1%	94.5%

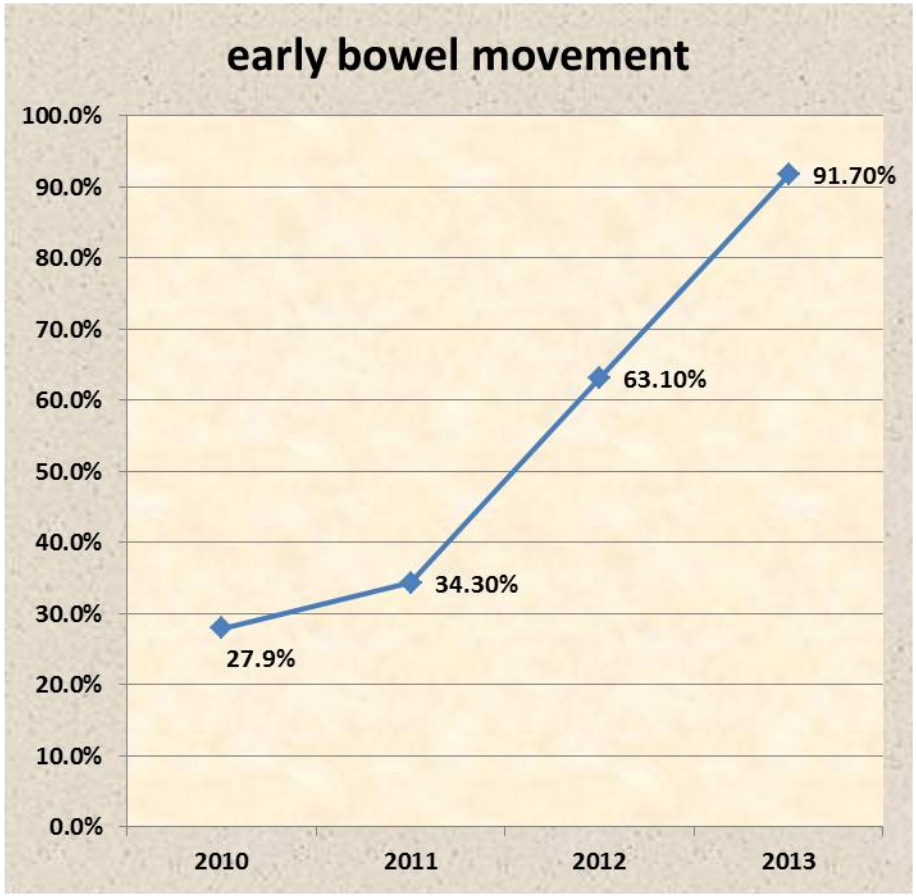


Early Bowel Movement (BO)

- Review of result shown poor compliance in early BO.
- Audit and reinforce routine Rx of laxatives if not yet BO on post-op D4.
- Ensure nurses checking on patients' post-op BO.
- Rate of early BO improved:

	2010	2013
Early BO	27.9%	91.7%





Outcomes

The CABG clinical pathway

- served as a **checklist** to prompt the staffs to perform patient care in a systematic way
- **ensured proven effective treatments** were given to patients by following the pathway

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