Knowledge enhancement program for nursing staff on peri-operative care to patient under Local Anesthesia

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- Background information in UCH
- Significance of project
- Methodology
- Project design - Aim and objectives
- Timeline & Implementation plan
- Preliminary survey and data analysis
- Intervention - lecture/workshop/promotion
- Discussion & Recommendation
- Conclusion

Introduction

- Local anesthesia

  = Loss of sensation in a circumscribed area of body without loss of consciousness

  - depress excitation in nerve endings/ inhibit conduction process (Malamed, 2014)

- → induce adverse reactions locally and/or systematically

  → life threatening (Liu, Yang, Li,& Mo, 2013)

- Comprehensive understanding of nursing practice associated with local anesthesia

  → provide safe care to patients (Femcl, 2015)

Background information in UCH OR

- Anesthetists deficiency → 2 Consultants and 2 Associate consultant depart in 2021
- No. of LA sessions in UCH OR __ 15 → 33 sessions currently ;

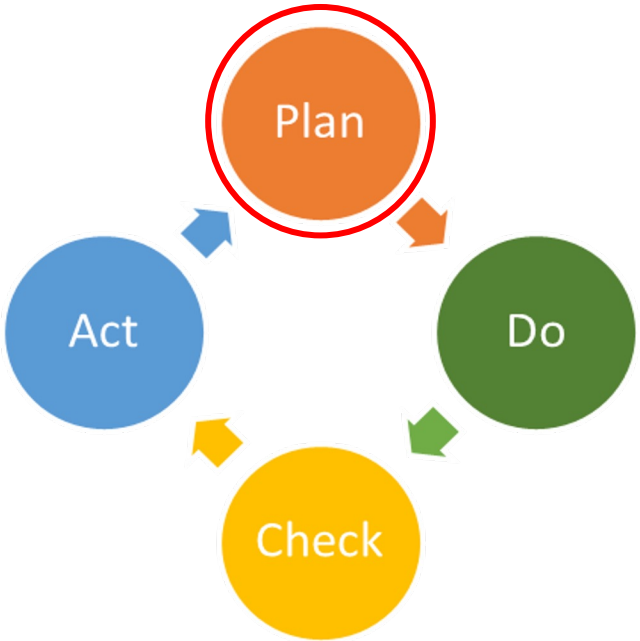
  increased 120% with respect to LA session in 2021

  Foreseeable increase in the conversion of GA session to LA session by 10 to 20
- Only OR nurses, ORA and surgeon involved during LA session (**No anesthetists**)
- OR Nurses play an important role in caring patient undergoing LA procedure and early detect for any adversities

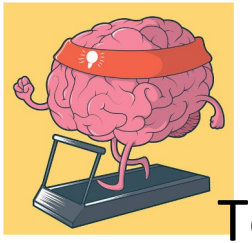
Significance of project – Gap of current practice

- No LA care training in current orientation program
- No LA care training for current nursing staff
- Nurses reported the lack of knowledge in managing local anesthetic cases
- LA complications are clinically significant when happened (Mörwald, Zubizarreta, Cozowicz, Poeran, & Memtsoudis, 2017)
  Consequences could be fatal (Lui & Chow, 2010)
- No Standard of Practice (SOP) regarding local anesthesia systemic toxicity (LAST) management in UCH OR

Methodology - Plan-Do-Check-Act



Aim



To strengthen nursing staff's competence in providing nursing care for patients undergoing local anaesthesia through knowledge enhancement

Objective

1. Assess nursing staff's knowledge in providing nursing care through preliminary test
2. Recruit all nursing staffs to the education program
3. Enhance nursing staff's theoretical knowledge through lecture, and staff shows a significant improvement of score in the post-lecture test in compared with the pre-lecture test
4. Promote nursing staff's concept attainment through experiential practice in workshop

Project Design

Intervention	Purpose	Rationale
Preliminary survey	Identify target group for the first phase of program	Address the time-constraint problem
Education lecture	Deliver theoretic information for the target group	Fast, simple, direct, Informative
Pre-lecture test & post-lecture test	Evaluate effectiveness of lecture in enhancing knowledge of nursing staff in LA case management	Objective evaluation of lecture outcome
Drill 	Provide hands-on experience for recruited staff and encourage application of knowledge into real practice	Mixed learning mode (lecture + simulation) promotes learning effectiveness and participants' satisfaction (Sinclair & Feeguson, 2009)
Peer observation form & debriefing session	-Participants' performance was evaluated against peer observation form for a duo-way learning effect. -Discussion was allowed and feedback was delivered at debriefing session.	-Peer evaluation enhances active student engagement in the learning process (Boehm, & Bonnel, 2010). -Debriefing allows immediate correction of misunderstanding and promote critical thinking (Fey, Scrandis, Daniels, & Haut, 2014)

Project Design (cont'd)

Intervention	Purposes	Rationales
Supporting materials - LA quick reference - modified LAST kit - Intralipid quick reference	-Designed for practical uses. -Allowed quick access to critical information and materials under emergency situation.	Reference cards were simple and readily accessed tools preferred by clinicians for implementing practice change (Jefferies, & Shah, 2011).

Suggested bolus (ml) / infusion rate (ml/hr) = Body weight (kg) x Administration order (ml/kg) / (ml/kg/hr)

Administration order	1.5 ml/kg	15 ml/kg/hr	30 ml/kg/hr	12 ml/kg
Body Weight	Bolus (ml)	Infusion rate (ml/hr)	Double infusion rate if remain unstable (ml/hr)	Maximum lipid dose (Bolus + Infusion) (ml)
35	52	525	1050	420
40	60	600	1200	480
45	67	675	1350	540
50	75	750	1500	600
55	82	825	1650	660
60	90	900	1800	720
65	97	975	1950	780
70 or over	105	1050	2100	840

Example: For patient in 52 kg, please refer 50 kg maximum recommended dosage
For precise dosage, please calculate accordingly

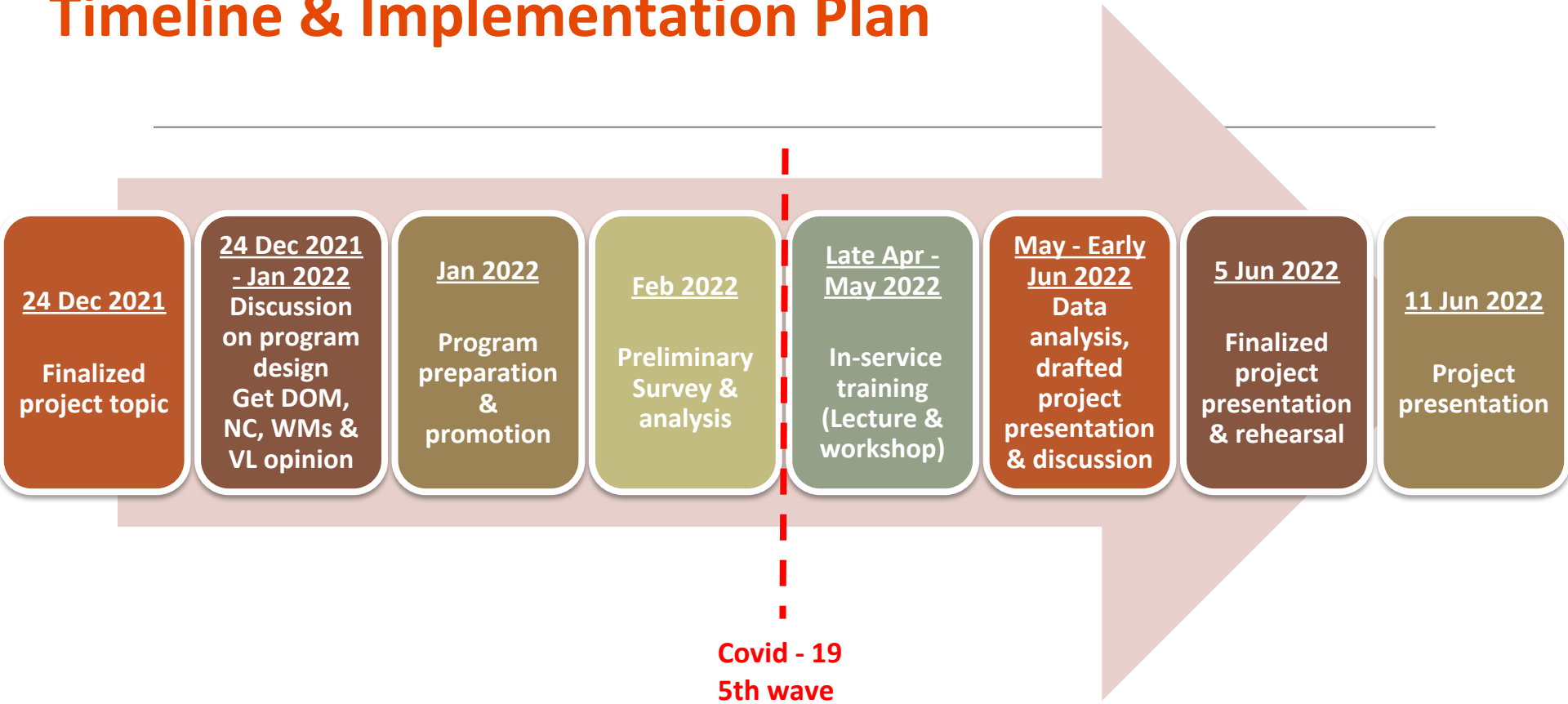
Reference: Wong, I. & Lam, J. (2021). *Guidelines on management of severe local anaesthetic toxicity*. Department of Anaesthesiology, Pain Medicine and Operating Services, United Christian Hospital , Hospital Authority

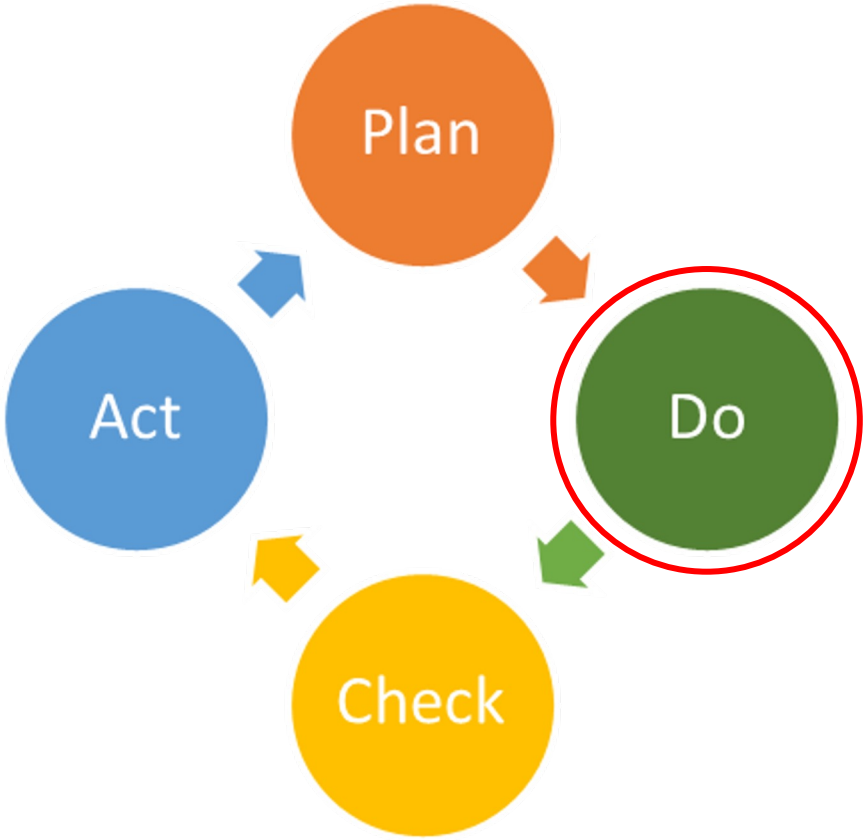
Maximum recommended dosage (in ml) = Max. dosage (mg/kg) x Body Weight (kg) / Conc. of drug (mg/ml)

Body Weight (kg)	Max dose of lignocaine without adrenaline: 3 mg/kg		Max dose of lignocaine with adrenaline: 7 mg/kg		Max dose of lignocaine with topicalization: 9 mg/kg	
	Maximum recommended dosage (Round up in nearest 0.5 ml)				Maximum recommended dosage (Round up in nearest 1 dose/ 1 ml)	
	1% Lignocaine (10mg/ml)	2% Lignocaine (20mg/ml)	1% Lignocaine with adrenaline	2% Lignocaine with adrenaline	10%Spray (10mg/dose)	Lignocaine Gel 2% (20mg/ml)
35	10.5 ml	5 ml	24.5 ml	12 ml	31 dose	15 ml
40	12 ml	6 ml	28 ml	14 ml	36 dose	18 ml
45	13.5 ml	6.5 ml	31.5 ml	15.5 ml	40 dose	20 ml
50	15 ml	7.5 ml	35 ml	17.5 ml	45 dose	22 ml
55	16.5 ml	8 ml	38.5ml	19 ml	49 dose	24 ml
60	18 ml	9 ml	42 ml	21 ml	54 dose	27 ml
65	19.5 ml	9.5 ml	45.5 ml	22.5 ml	58 dose	29 ml
70	21 ml	10.5 ml	49 ml	24.5 ml	63 dose	31 ml
75	22.5 ml	11 ml	52.5 ml	26 ml	67 dose	33 ml
80	24 ml	12 ml	56 ml	28 ml	72 dose	36 ml
85	25.5 ml	12.5 ml	59.5 ml	29.5 ml	76 dose	38 ml
90	27 ml	13.5 ml	63 ml	31.5 ml	81 dose	40 ml
95	28.5 ml	14 ml	66.5 ml	33 ml	85 dose	42 ml
100	30 ml	15 ml	70 ml	35 ml	90 dose	45 ml

Example: For patient in 52 kg, please refer 50 kg maximum recommended dosage
For precise dosage, please calculate accordingly
Refer to: XYLOCAINE WITH ADRENALINE Product Information (2017)
Williams, K. A., Barker, D. L., & Harwood, J. J. and Woodall, N. M. (2003). Combined nebulization and spray-as-you-go topical local anaesthesia of the airway. In British Journal of Anaesthesia,91(4), 549–53

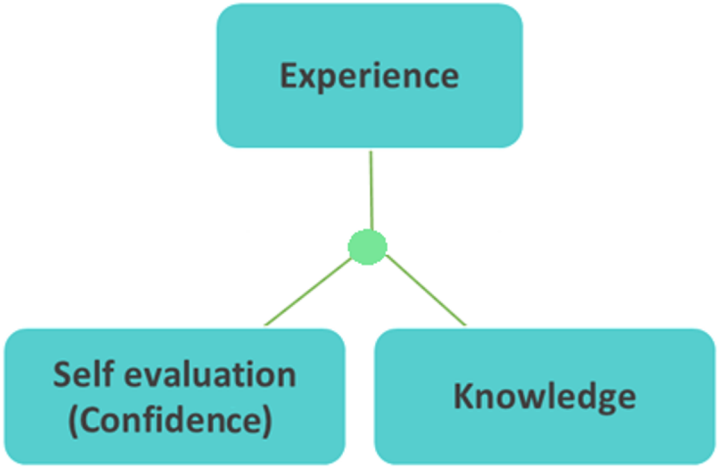
Timeline & Implementation Plan




Plan
Do
Check
Act

Preliminary survey

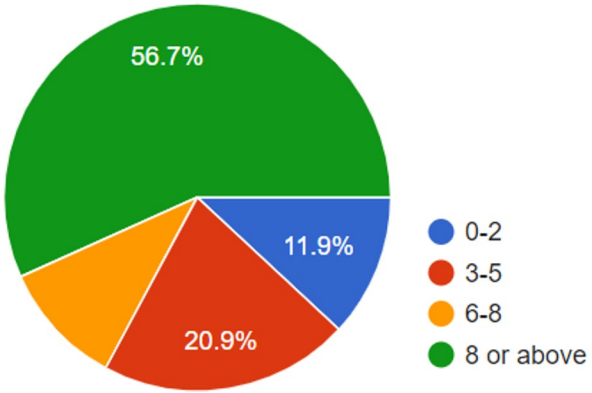
- Objective: To identify target group for the first phase of education program depending on staff competency
- Rationale: Address time limitation of the program
- Format: Questionnaires (e-form)
- Interviewee: 70 under different years of experience from different specialties in UCH OR (93% of all nursing staff)



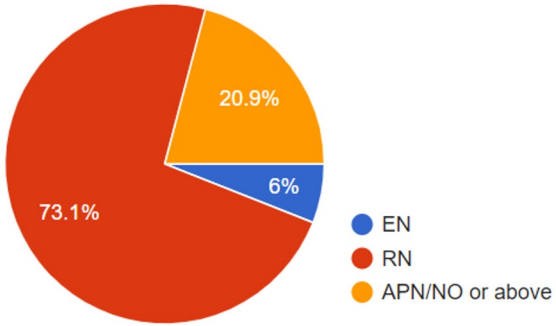
Result of preliminary survey

Experience

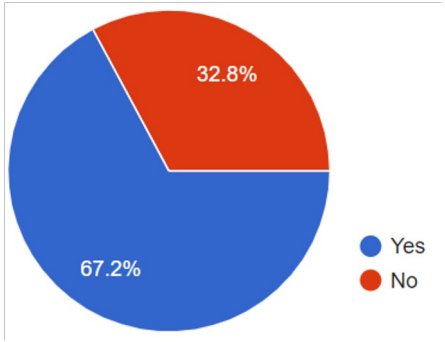
Years of experience in UCH OR



Ranking



Completion of PRCC

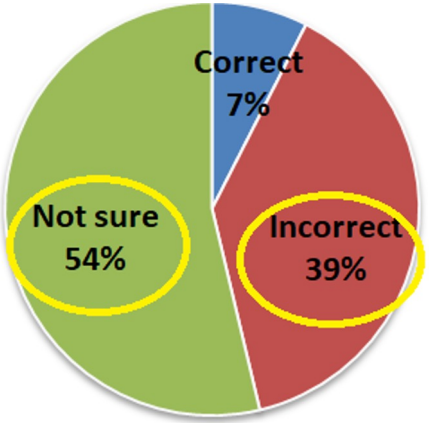


Result of preliminary survey

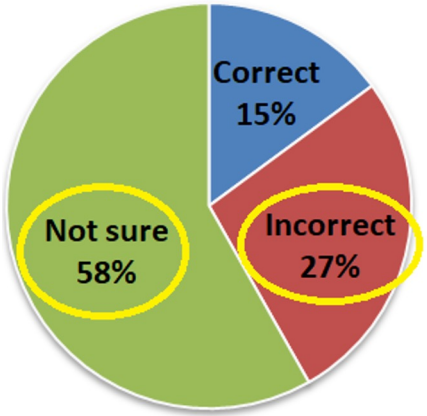
Knowledge

Recognize risk

Max. dose of plain 1% Lignocaine for tissue infiltration

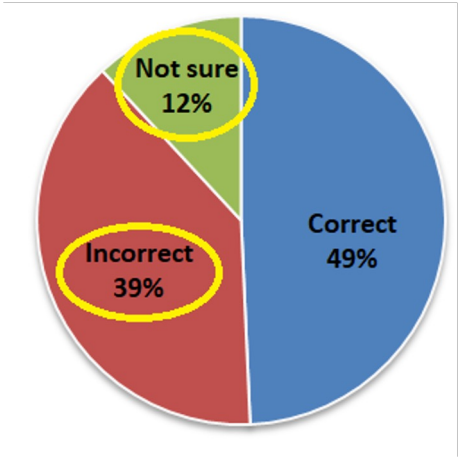


Max. dose of 2% Lignocaine w/ adrenaline 1:200k for tissue infiltration



Handling emergency situation

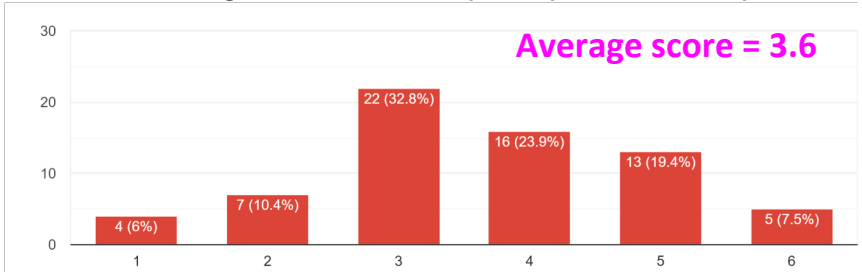
Location of antidote



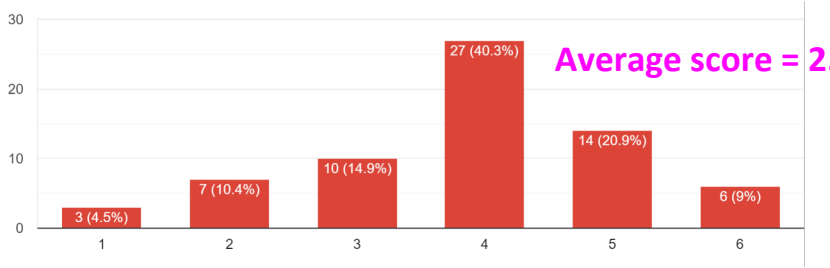
Result of preliminary survey

Self evaluation (Confidence)

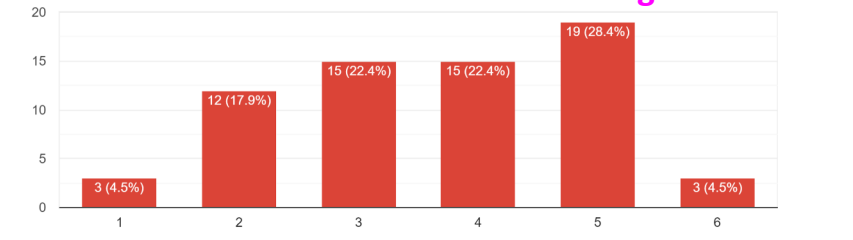
I am knowledgeable about the peri-op care for LA patient



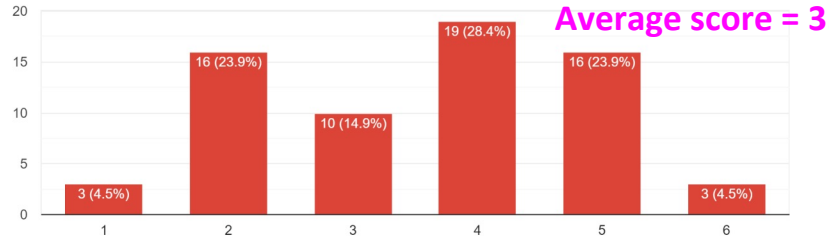
I am able to identify adverse effects of LA medication on patients



I am confident in managing patients w/ identified adverse effects of LA medication

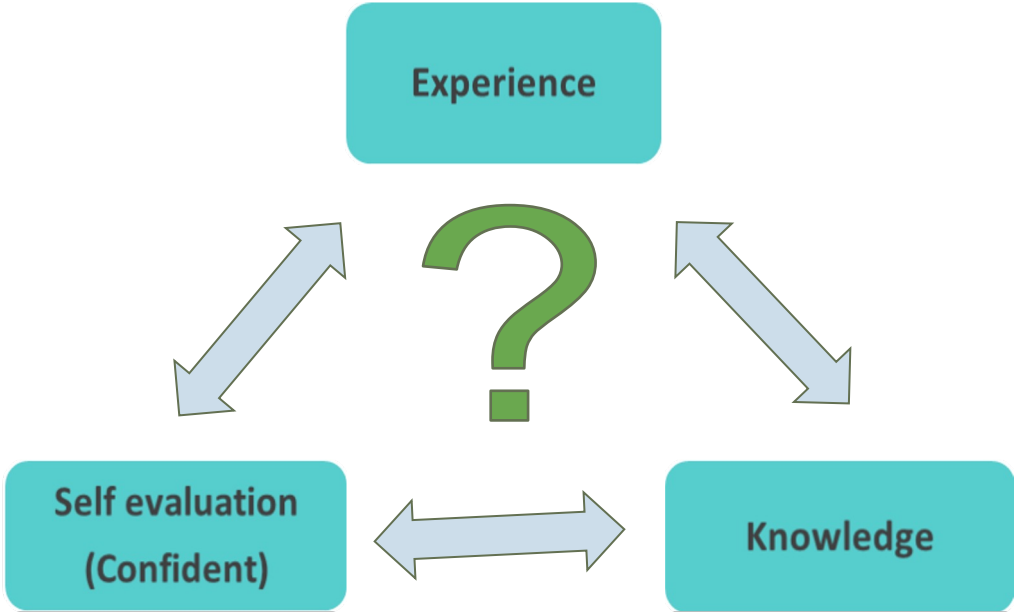


I am confident in managing LA systemic toxicity (LAST)



Data Analysis of preliminary survey

- Software: SPSS Statistics

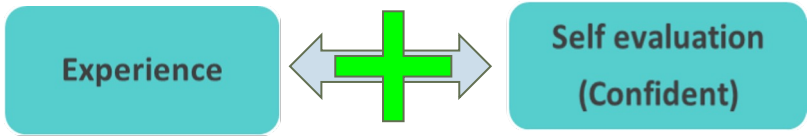


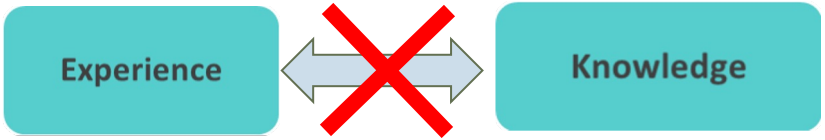
Data Analysis of preliminary survey

Correlations			
		Mean_Confident	Year
Mean_Confident	Pearson Correlation	1	.410**
	Sig. (2-tailed)		<.001
	N	67	67
Year	Pearson Correlation	.410**	1
	Sig. (2-tailed)	<.001	
	N	67	67

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations			
		Year	Mean_knowledge
Year	Pearson Correlation	1	.031
	Sig. (2-tailed)		.805
	N	67	67
Mean_knowledge	Pearson Correlation	.031	1
	Sig. (2-tailed)	.805	
	N	67	67





Data Analysis of preliminary survey

- Experienced staff have high confidence but lack of knowledge
- Senior staff have supervision responsibility

→ 1st phase target group: APN/NO

→ Stepwise approach to all staff in later phase

Implementation - Supporting material

Lignocaine dosage quick reference

- (+) awareness of dosage usage before administration
- (-) calculation → convenience
- Prevention of overdose

Modified LAST Kit

- Prepare antidote in emergency situation efficiently
- Promote patient safety

20% Lipid Emulsion dosage quick reference

- Place together with LAST kit
- (-) calculation
- Prepare required dosage and infusion rate effectively

Lignocaine use - Liquid, Spray, Jelly

Maximum recommended dosage (in ml) = Max. dosage (mg/kg) x Body Weight (kg) / Conc. of drug (mg/ml)

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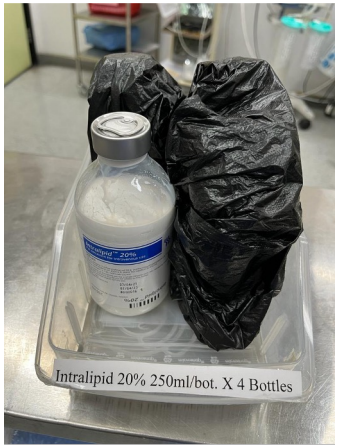
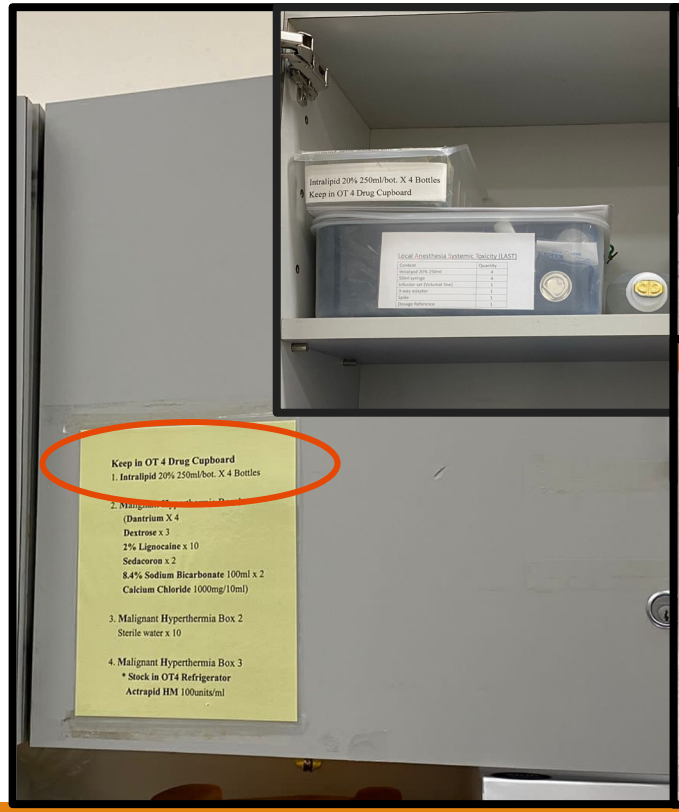
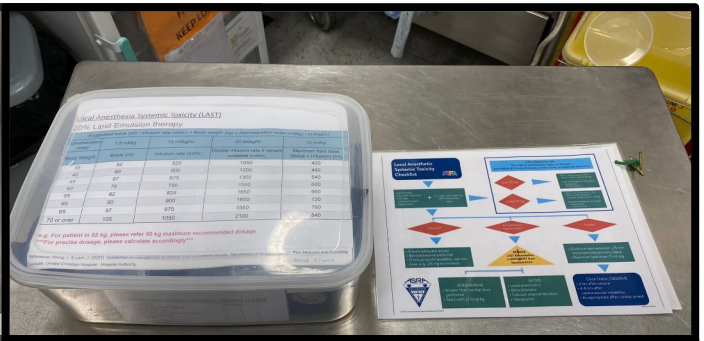
Endorsed by UCH anesthetist and pharmacist

Modified LAST kit

Original Kit







20% Lipid Emulsion therapy

Suggested bolus (ml) / infusion rate (ml/hr) = Body weight (kg) x Administration order (ml/kg) / (ml/kg/hr)				
Administration order	1.5 ml/kg	15 ml/kg/hr	30 ml/kg/hr	12 ml/kg
Body Weight	Bolus (ml)	Infusion rate (ml/hr)	Double infusion rate if remain unstable (ml/hr)	Maximum lipid dose (Bolus + Infusion) (ml)
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70 or over	105	1050	2100	840

*****Example: For patient in 52 kg, please refer 50 kg maximum recommended dosage*****
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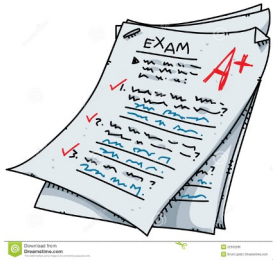
Reference: Wong, I. & Lam, J. (2021). *Guidelines on management of severe local anaesthetic toxicity*. Department of Anaesthesiology, Pain Medicine and Operating Services, United Christian Hospital , Hospital Authority

Endorsed by UCH anesthetist and pharmacist

Implementation - Lecture + Pre & Post test



Pre- Test

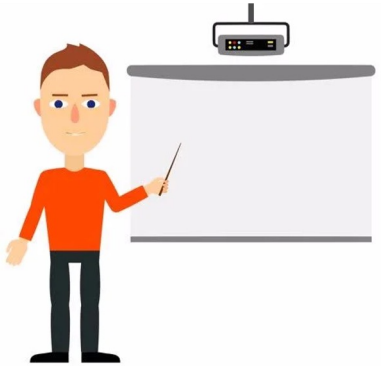
- Identify level of knowledge

Lecture

- Basic nursing care in LA cases
- Common LA introduction, preparation and its maximum dosage
- Prevention & Management of local anesthesia systemic toxicity

Post- Test

- Analyze changes in knowledge



Two sessions were held in OT theater

Implementation - Drill + Peer evaluation

- Scenario-based training
- Tailor made according to the UCH OR setting

  e.g. location of equipment
- Interactive and immersive learning experience
- Scenario design:

  Normal → Deteriorate → Crisis
- Encourage participant to apply knowledge into real practice
- Surrounding observers

  to evaluate peer nursing care / corresponding action

Drill _ Observation form

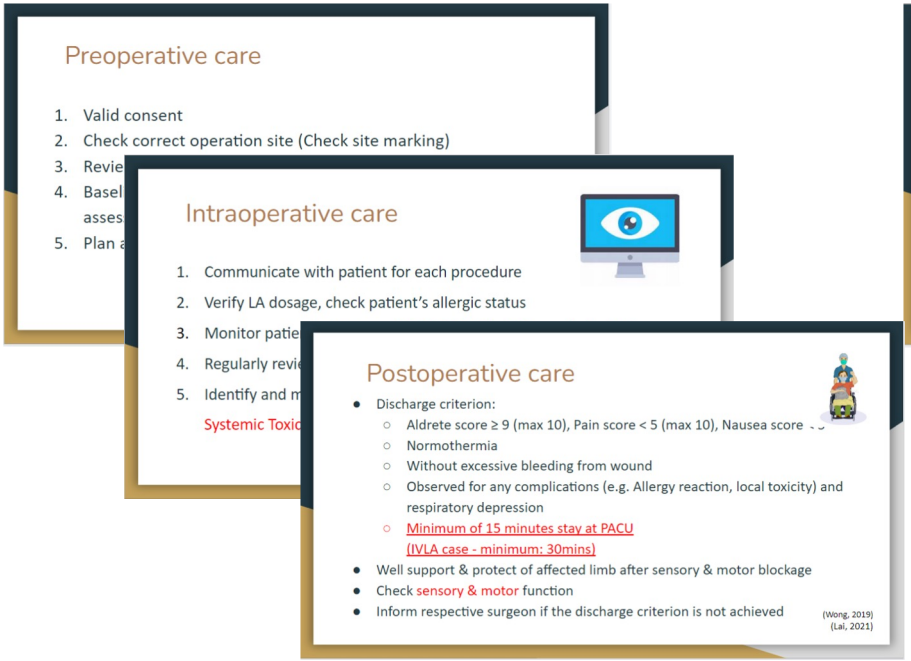
		Nursing care	Yes	No
1	a	Baseline physiological assessment for the patient was conducted (e.g. neurological, respiratory, cardiovascular)		
	b	Baseline psychological assessment for the patient was conducted		
2		Psychological support was provided to the patient (e.g. explained to the patient on the care flow, provided reassurance)		
3		Nursing actions were initiated based on patient's conditions and needs specific to the procedure through the course of local anesthesia (e.g. patient's positioning)		
4		Measures were carried out to ensure correct medication to be administered to the patient (right drug and right dosage)		
5		Effectiveness of the local anesthesia was assessed		
6		Patient's psychological change was monitored		
7		Patient's physiological changes were monitored (e.g. neurological, respiratory, cardiovascular status)		
8		Maximum dose of local anesthetic medication was alerted		
8		Adverse medication reactions were identified		
9		Surgeon was informed about the patient's medication effects		
10		Called for help in case of emergency		
11		Nursing intervention was carried out accordingly in case of emergency (e.g. get antidote, maintain patient's airway)		


MAQUET

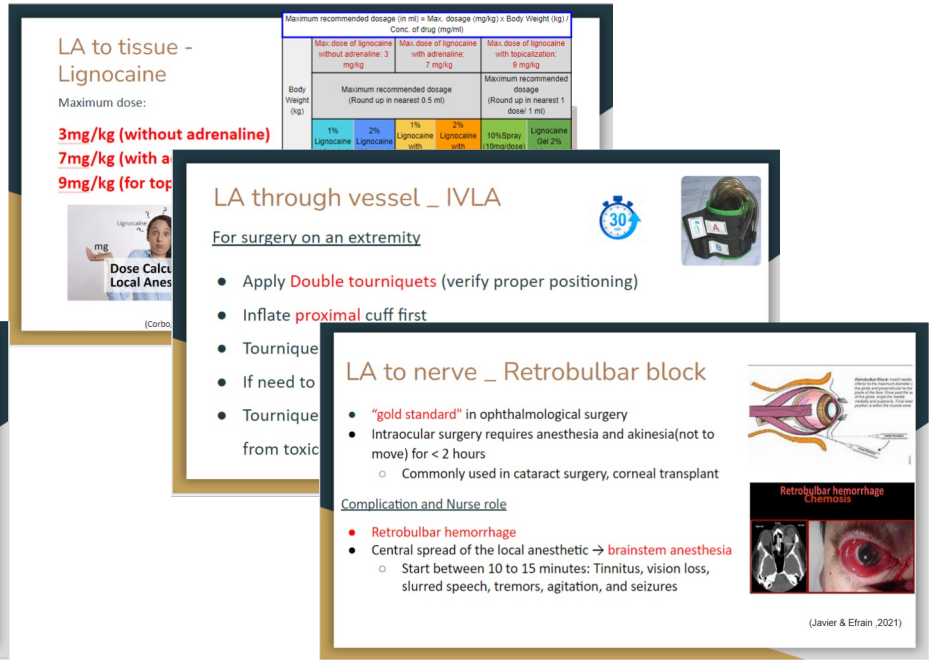
Implementation - Continuous promotion

Slide show

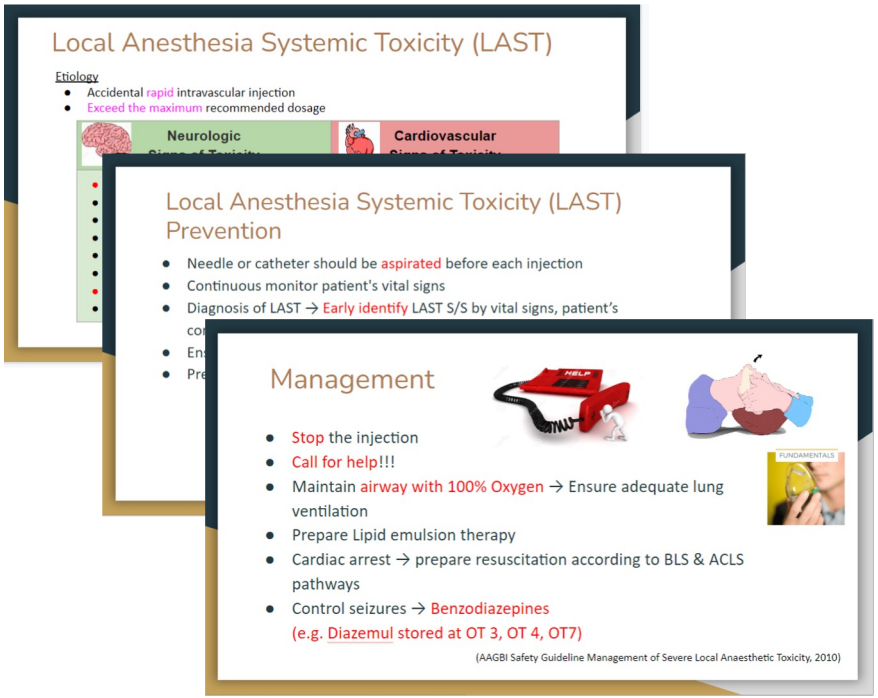
- Sustain learning process
- LA care slide show in scrub area



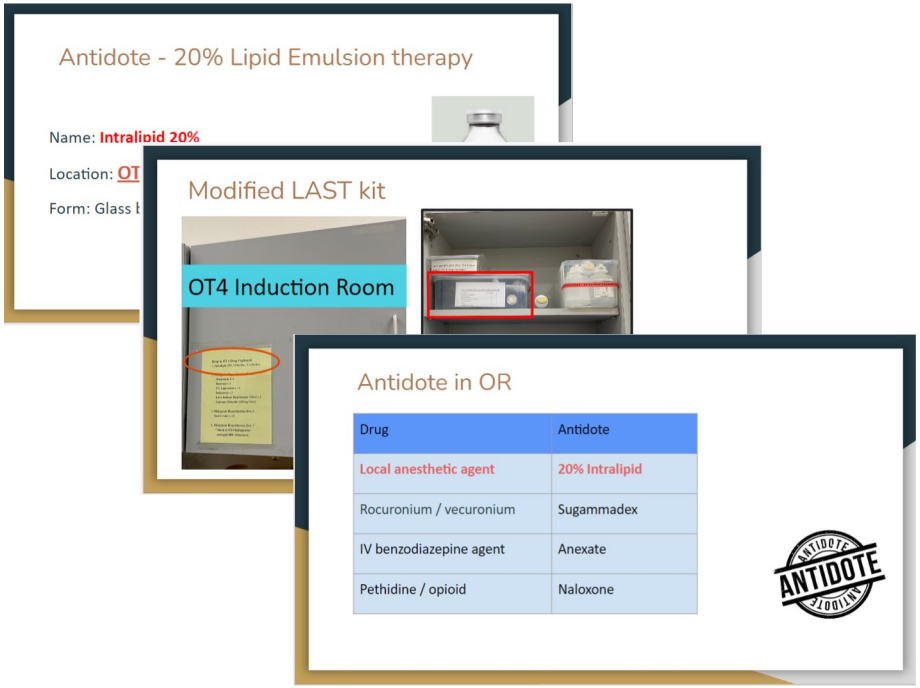
- LA peri-operative nursing care



- Maximum dosage of lignocaine & special care



- LAST sign & symptom, prevention and management

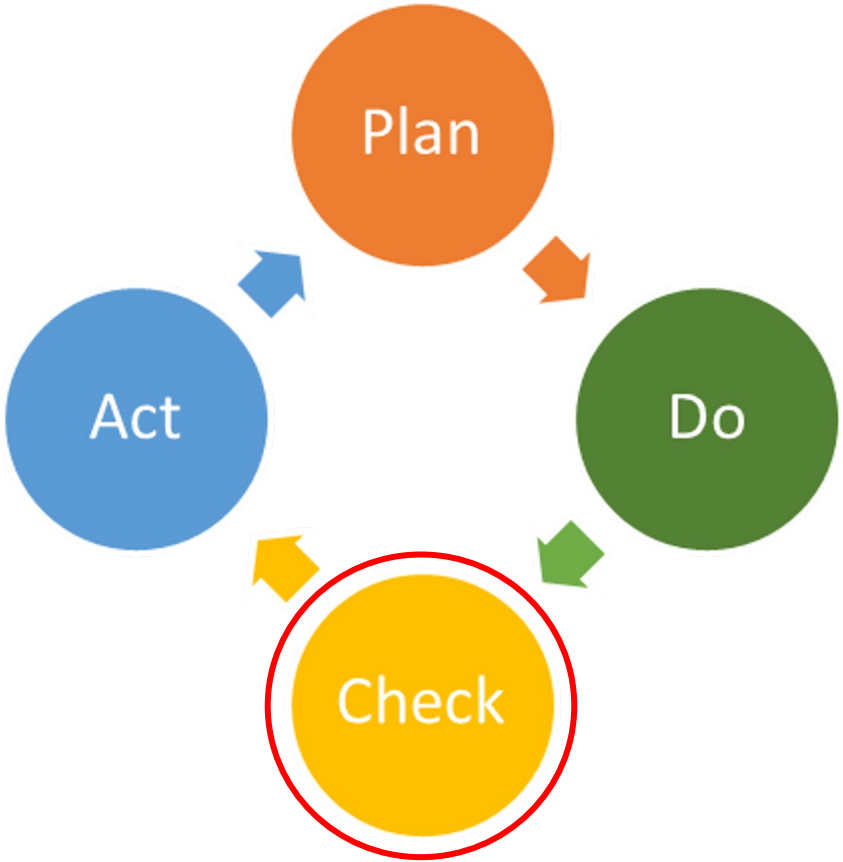


- Antidote for LAST, Location of the LAST kit

Implementation - Continuous promotion

Evernote

- UCH share point software
- Access by personal cell phone
- Check it when necessary


Plan
Do
Check
Act

Program Demographic

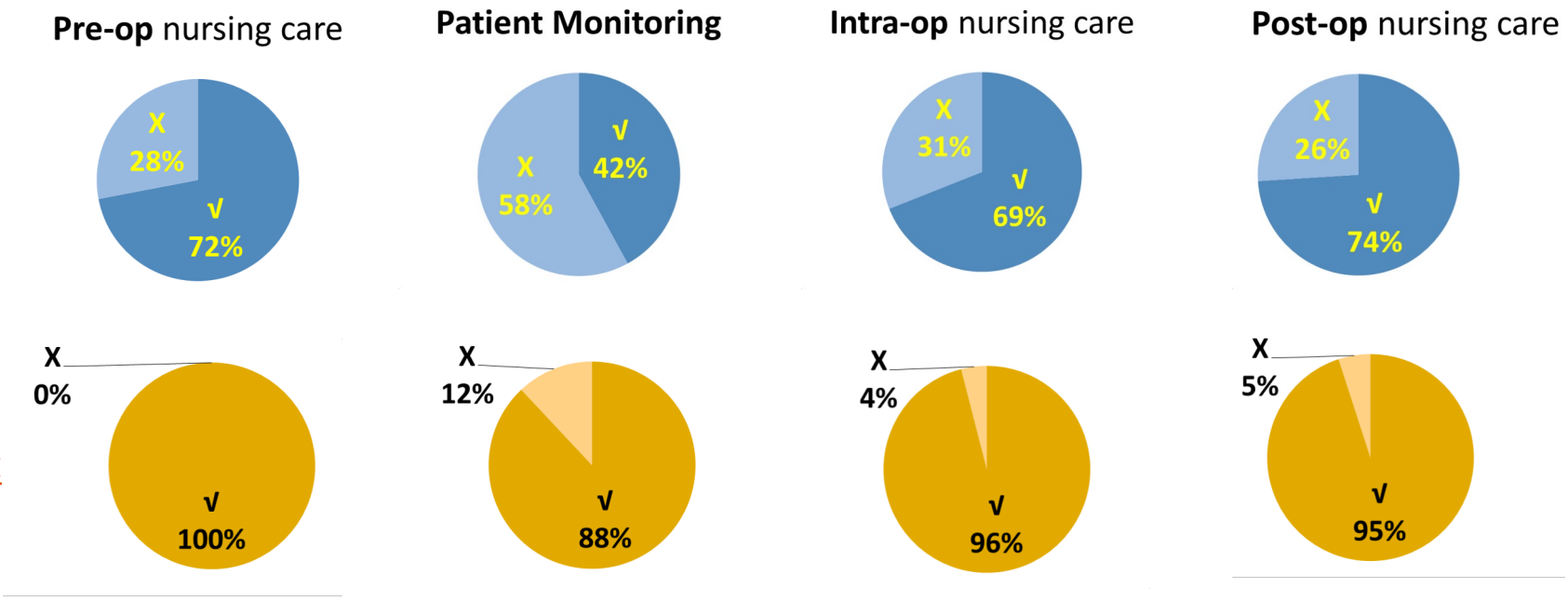
First phase

- Target group: APN/NO
- Session: 2
- Attended participants: 15/18 (83%)

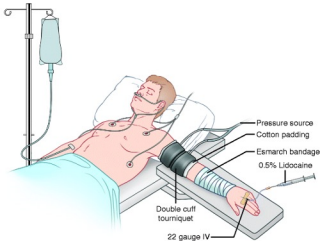
Knowledge evaluation - General care

Pre-test

Post-test



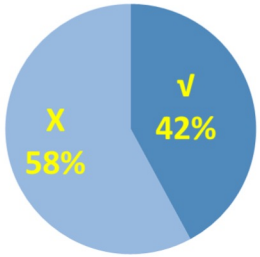
Knowledge evaluation - IVLA

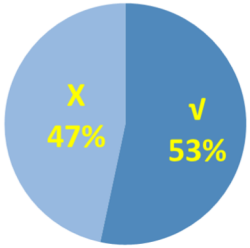


Min. tourniquet pressure
for IVLA

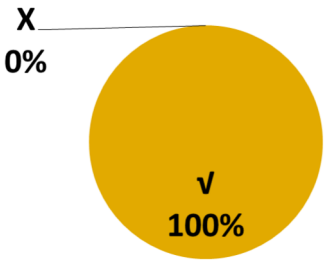
Specific Nursing care
for IVLA patients

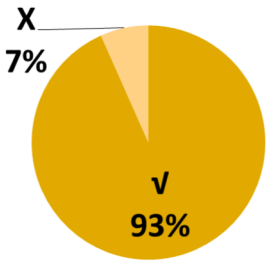
Pre-test





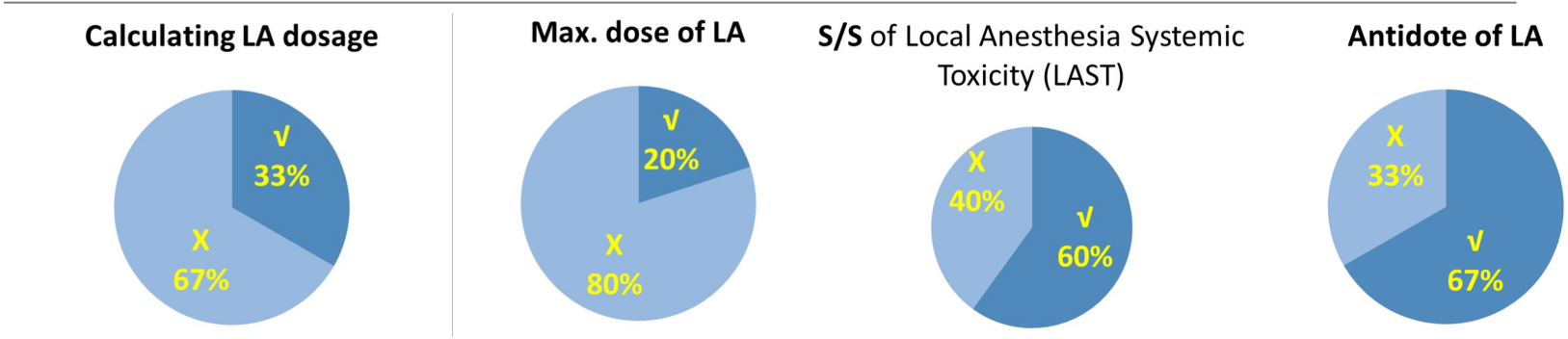
Post-test



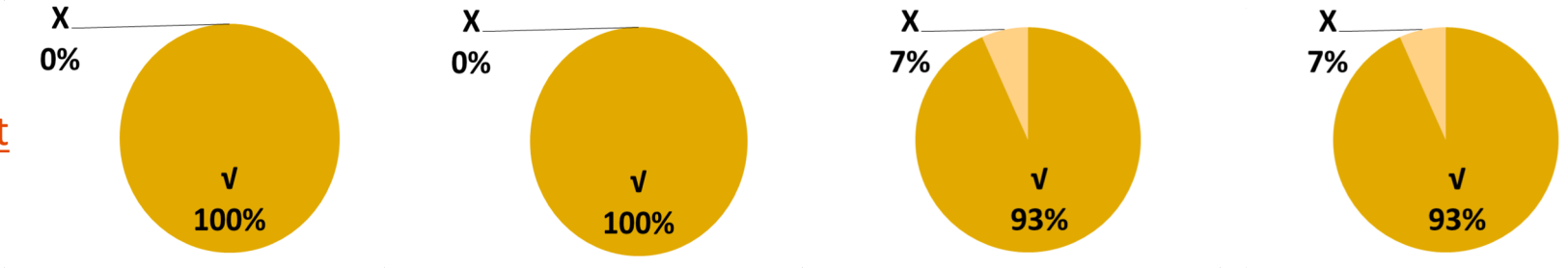


Knowledge evaluation - LA toxicity

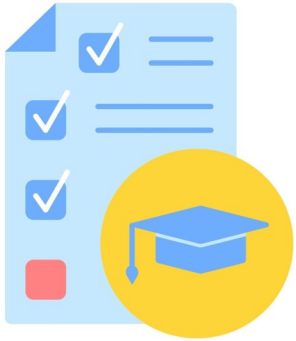
Pre-test

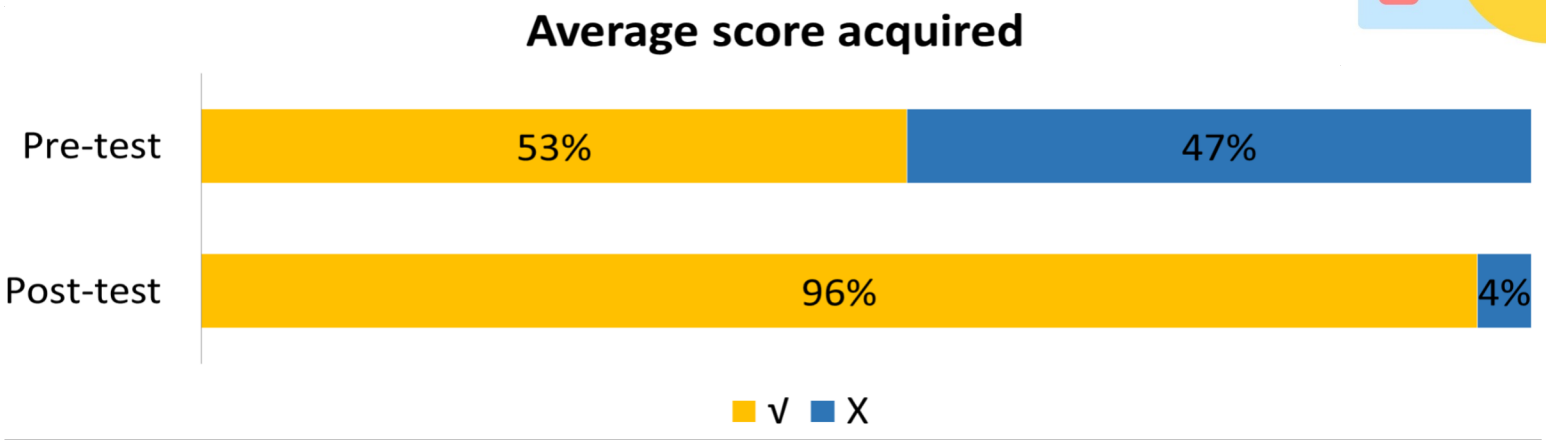


Post-test



Knowledge evaluation - Summary



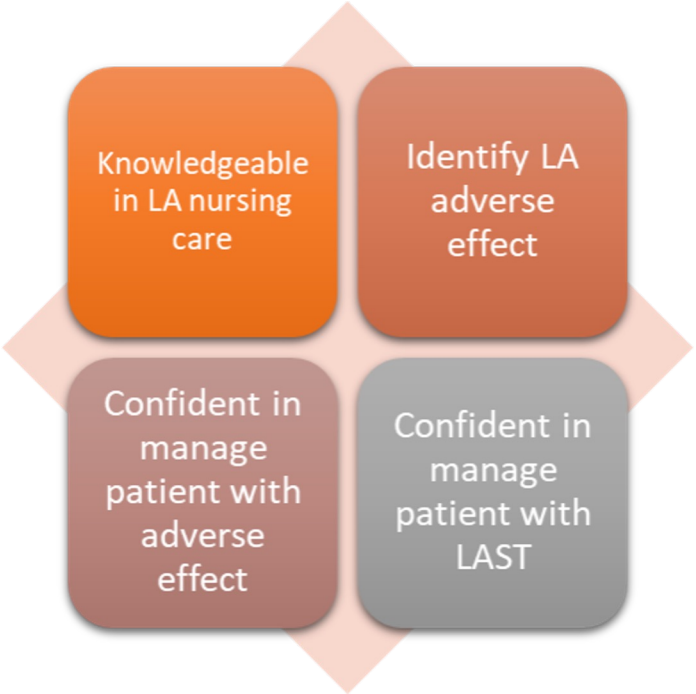


Improved 43%

Self-evaluation - Confidence

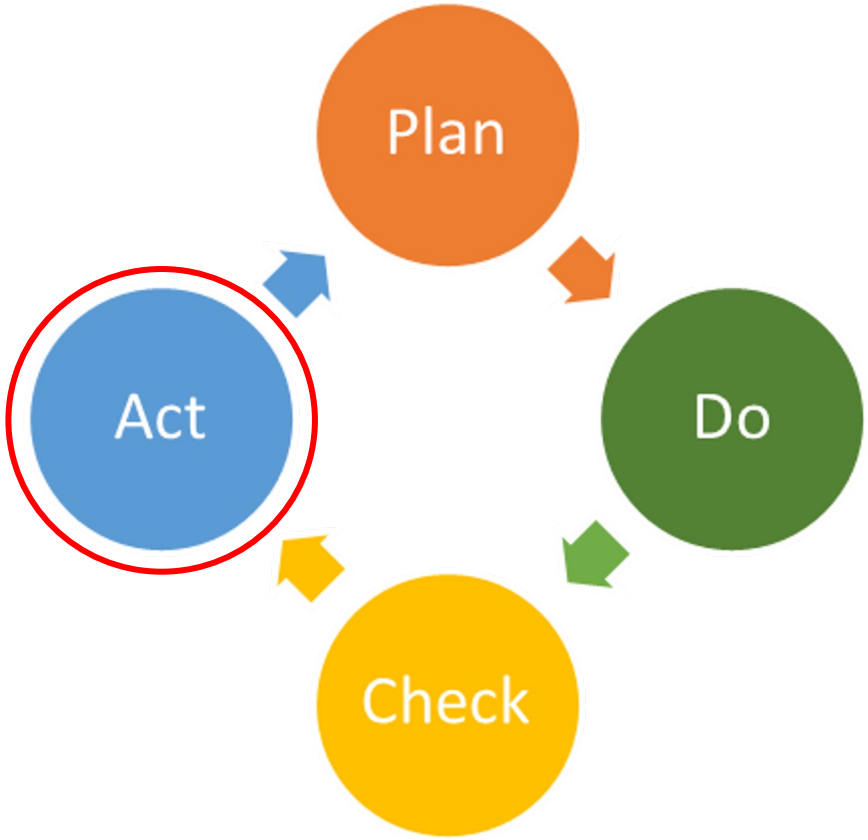
Self-evaluation score

- Average score: 4.12/6 → 5.22/6
- Increased 18%



Program evaluation & feedback

- Knowledge enhancement, application in workplace, program content, difficulty, duration, satisfaction
  → Program average score 5.45/6
- Lecture was informative with practical content
- LA quick reference was very useful & convenient
- LAST Kit was convenient & well prepared
- Drill was interesting with realistic scenario & sound effect


Plan
Do
Check
Act

Discussion - Program's Strength

- Informative (lecture) & Practical (drill)
- LA medication quick reference – consulted Anaethetist & Pharmacist
- Modification of LAST kit – consulted NC & Anesthetist
- NC participation in the drill (supervision & debriefing)
- Sustainability

  - Simple set-up, limited resources & manpower required
- - Evernote, slide show

Discussion - Program's Limitations (1)

Time limitation - not 100% OR staff participation

Solution:

- Education program was conducted in a stepwise approach
  with the first phase targeting at the staff with the highest demand.
- Colleagues missing the first phase are welcomed join at the later phase

Discussion - Program's Limitations (2)

The drill cannot fully reflect real situation

Improvement:

- Modify the set-up to enhance sense of reality
- Collect expired medications for educational purpose
- Use of electronic device to show patient's vital signs
- Actors dress up like character
- Invite ORA, Anesthetist, surgeon to play their roles

Recommendations

- Preparation of LA Quick reference list & LAST kit for LA session

  → becomes usual practice

- Integrate the program into mandatory orientation program for new staff
- Modify and tailor education program to supporting staff e.g. ORA

Conclusion

- Preliminary survey reveals colleagues have lack of confidence & knowledge in LA care
- Program designed with stepwise approach starting from highest demand group – APN/NO
- The Program included lecture and drill

  - Lecture outcome was evaluated by pre & post test

  - Drill outcome was evaluated with program evaluation form & feedback at debrief session
- The program significantly enhanced participants' knowledge & confidence
- Strengths and weaknesses of program recognized
- Continually modify the workshop to enhance sense of reality
- Expand the program to all nursing staff & tailored program to supportive staff

We would like to express our deepest appreciation to:

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Mr T F Leung, UCHN WM (OR/DOT)

Ms K W Chu, UCHN WM (OR/DOT)

Ms W P Shuen, UCHN APN (OR)

ALL UCH OR staff

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Mr W Tang, UCHAH (Pharmacist)

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Thank
You


Q&A