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INTRODUCTION

- Clinical Pharmacokinetics Service (CPS) is crucial in interpreting serum drug concentrations in order to optimize a patient's drug regimen and to assess drug toxicity.
- 70% delayed of CPS reports was identified in HTAN in 2020.
- A **delayed CPS reporting** refers to reporting of CPS to medical officers **beyond 24 hours from the specimens were sent to referring facility by pathology unit** (Ong et. al,2018).

1. SELECTION OF OPPORTUNITIES

1.1 PROBLEM PRIORITIZATION

PROBLEMS	S	M	A	R	T	TOTAL
Increased number of delayed CPS reporting	21	19	19	17	20	96
Increased impress stock indents after office hours in HTAN	12	14	15	15	14	70
Increased number of incomplete CPS forms received by pathology unit	18	13	17	17	14	79
Increased counselling requests after office hour.	17	16	14	14	12	73

RATING SCALE: 1 (LOW), 2 (MEDIUM), 3 (HIGH) (8 GROUP MEMBERS)

1.2 REASON FOR SELECTION

SERIOUSNESS

- Increased number of delayed CPS reports in HTAN from 62% in 2019 to 70% in 2020.
- Delayed pathology results lead to prolonged hospital stays.
- Rejected blood samples lead to waste of reagents.
- Repeated blood withdrawn caused painful to patient.

MEASURABLE

- Percentages of delayed CPS reporting.

APPROPRIATENESS

- Reduce errors and delayed CPS reporting.
- Improve patient care.
- Shorten hospital stays.

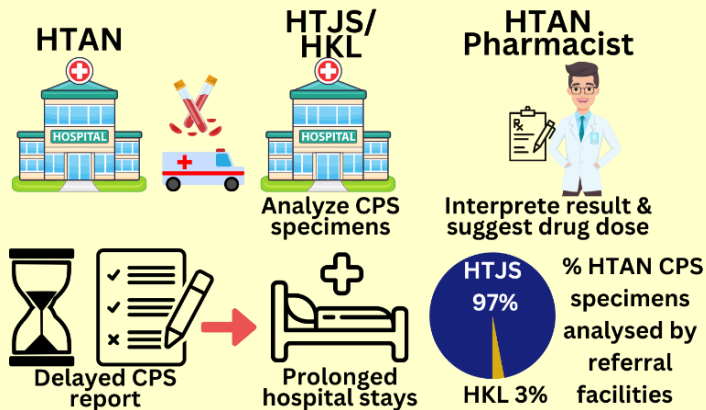
REMEDIALABLE

- Improve multidisciplinary collaboration (Doctor-Pharmacist-Pathology unit-Nurse)

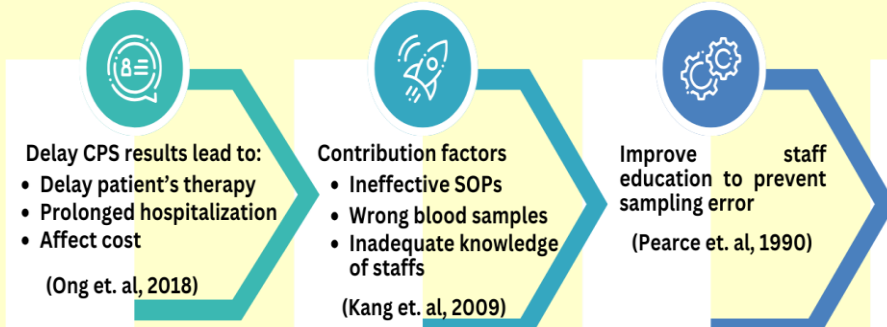
TIMELINESS

- 1 year.

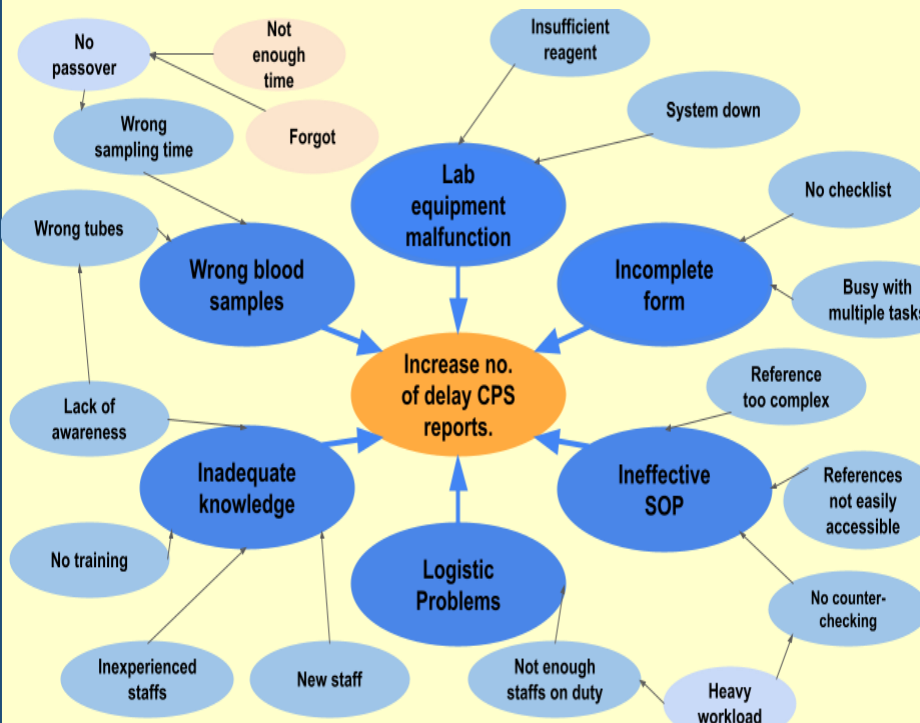
1.3 PROBLEM STATEMENT



1.4 LITERATURE REVIEW



1.5 PROBLEM ANALYSIS CHART

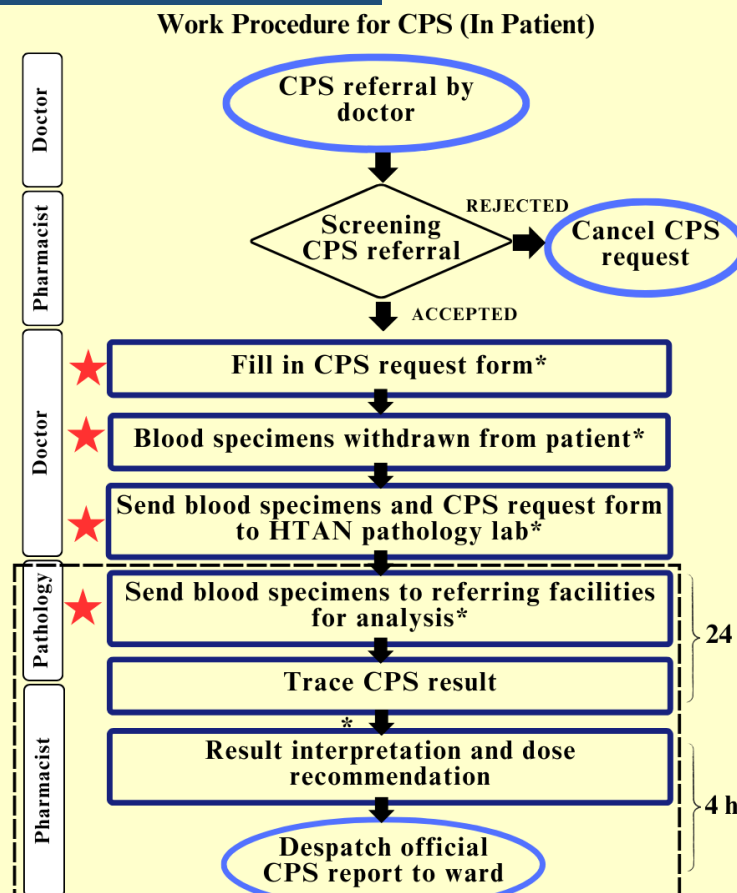


2. KEY MEASURES FOR IMPROVEMENT

2.1 OBJECTIVES

- General objective**
To reduce the percentage of delayed in reporting CPS results in HTAN.
- Specific Objectives**
 - To verify the percentage of delayed in reporting CPS results.
 - To identify the causes of delayed CPS reporting.
 - To formulate and implement proper remedial measures.
 - To evaluate the effectiveness of remedial measures.

2.2 PROCESS OF CARE



2.3 INDICATOR

Percentage of delayed CPS reports (>24 hours):

$$\frac{\text{Total number of delayed CPS reports}}{\text{Total number of CPS reports}} \times 100\%$$

2.4 STANDARD

Standard set to 0%

Based on Drug & Therapeutic Committee Meeting HTAN BIL. 1.2021

3. PROCESS OF GATHERING INFORMATION

3.1 METHODOLOGY

Study Design	Quality improvement
Study Sample	All CPS requests for inpatients in HTAN
Sampling Technique	Universal sampling
Study Period	Verification: Apr – Jun 2021 Cycle 1 : Jul – Oct 2021 Cycle 2 : Nov 2021 – Feb 2022 Cycle 3 : Mar – Jun 2022 Sustainability : Jul 2022 – Feb 2024
Sampling Tools	Questionnaire, Audit form
Inclusion Criteria	CPS specimens analyzed in HTJS
Exclusion Criteria	CPS specimens analyzed in HKL

4. ANALYSIS & INTERPRETATION

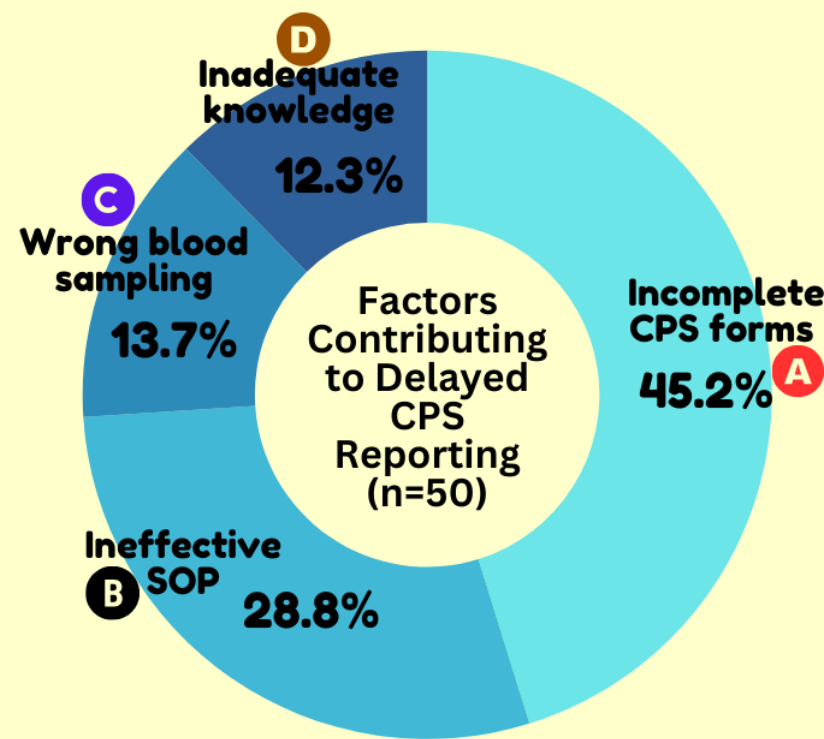
4.1 VERIFICATION STUDY

Total number of delayed CPS reports

$$\frac{\text{Total number of delayed CPS reports}}{\text{Total number of CPS reports}} \times 100\%$$

$$= \frac{91}{125} \times 100\% = 72.8\%$$

4.2 CONTRIBUTING FACTORS:



5. STRATEGIES FOR CHANGE

Cycle 1: Jul - Oct 2021 Factors to be tackled: A+B+C+D

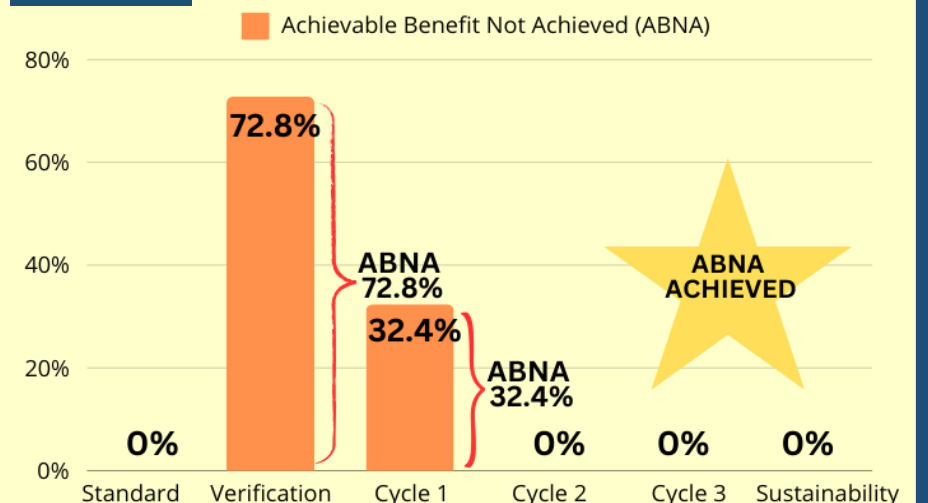
- Revised existing workflow
 - Refer CPS pharmacist for all new CPS cases
 - Screening of CPS forms & specimens by Pathology unit
 - Digitalizing CPS reports to E-Knowledge
 - Improve communication between pathology unit & pharmacist
 - Checklist implementation to guide on CPS SOP. (attached to CPS request form)
 - Regular CPS updates to new staffs.
 - Sampling time sticker to guide doctor on the blood sampling time
- Cycle 2: Nov 2021 - Feb 2022 Factors to be tackled: A+C+D
- Publication of SOP into a book & distribution to all wards.
 - Video orientation to guide new doctors & pharmacist on CPS.
 - Asterisk on CPS request form to ensure the completion of the form.

6. EFFECTS OF CHANGE

6.1 MODEL OF GOOD CARE

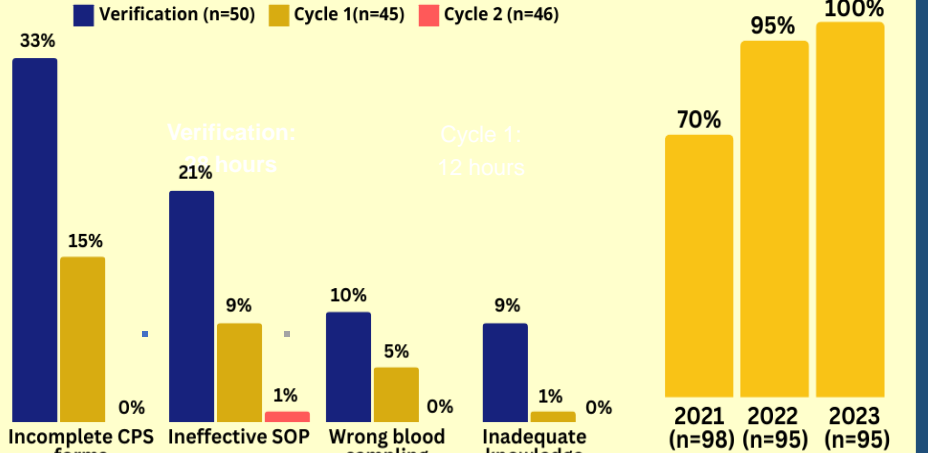
PROCESS	CRITERIA	STANDARD	VERIFICATION (n=125)	CYCLE 1 (n=140)	CYCLE 2 (n=145)	CYCLE 3 (n=164)	SUSTAINABILITY (n=321)
Fill up CPS Request Form	Fill up CPS Request Form completely	100%	55.2%	95.6%	100%	100%	100%
Blood specimen taking. Ensure label specimen.	Take blood specimen. Ensure specimen is placed in correct tube and labeled completely (Patient name, drug, pre/post/random)	100%	38.4%	97.1%	100%	100%	100%
Send blood specimen to HTAN pathology lab (immediately after sampling)	Send blood specimens immediately after sampling (at room temperature)	100%	98.4%	100%	100%	100%	100%
Send blood specimen to referring facility for analysis	Send blood specimen to HTJS without rejection	100%	72.3%	100%	100%	100%	100%

6.2 ABNA:



6.3 Bar graph:

Comparison of Percentage of Factors Contributing to the Delayed CPS Reporting Before & After Study



6.4 Impacts:

Mean duration of CPS reporting: 28hr → 6hr
Cost saving: ~RM4K/yr reagent wastage

6.5 Lesson Learnt

- Our remedial strategies proved successful in reducing the percentage of delayed CPS reporting in HTAN.
- These strategies can be applied to other health facilities with and without on-site CPS analysis.
- Starting March 2022, CPS Pharmacists in HTJS had already replicated CPS reporting via E-Knowledge to facilitate doctors in tracing CPS reports.

7. THE NEXT STEPS

- Expand the study to other hospitals in Negeri Sembilan.
- Continue the current strategies to ensure the overall objectives are achieved and sustained.
- Publish in Q-Bulletin

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- Kang, J.S., and Lee, M.H. (2009). Overview of therapeutic drug monitoring. Korean J. Intern. Med. 24: 1–10.
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ACKNOWLEDGEMENT

- Dato' Dr. Harlina binti Abdul Rashid, Pengarah Kesihatan Negeri, Negeri Sembilan.
- Pn. Ezatul Rahayu binti Anuar, Timbalan Pengarah Kesihatan Negeri (Farmasi), Negeri Sembilan.