

Standardisation of systemic anti-cancer therapy (SACT) prescription forms: a pre–post audit evaluation

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Keywords anti-cancer therapy, prescription form, audit, pretest–posttest

For referencing Sim F et al. Standardisation of systemic anti-cancer therapy (SACT) prescription forms: a pre-post audit evaluation. *Australian Journal of Cancer Nursing* 2020; 21(1):4-8.

DOI <https://doi.org/10.33235/ajcn.21.1.4-8>

Abstract

Introduction Clinical practice guidelines based on best available evidence and national safety and quality standards promote high quality and safe care.

Aim To review and standardise systemic anti-cancer therapy (SACT) forms in a 20-chair cancer centre to reflect Australian and international clinical practice guidelines.

Method A pre–post audit design based on Clinical Oncological Society of Australia (COSA) guidelines for the safe prescribing, dispensing and administration of systemic cancer therapy underpinned the project. The pre-audit (47 forms) provided a benchmark for SACT form improvements: 177 new forms were then developed over 18 months and implemented.

Results Pre-audit: 9/19 criteria were >70% compliant with best practice guidelines. Post-SACT implementation audit: 15/19 criteria were >70% compliant. The recent 2018 audit: improvements shown in 18/19 criteria.

Conclusion This nurse-led multidisciplinary initiative effectively standardised SACT charts with best practice guidelines, potentially reducing serious medication errors and facilitating a high standard of multidisciplinary patient care.

Background

Systemic anti-cancer therapy (SACT) is classified as a high-risk medication and is predominantly used in complex anti-cancer treatment regimens. SACT can cause fatal adverse toxicity events even when used at therapeutic dosages due to narrow therapeutic indices, complex anti-cancer treatment regimens, and the vulnerable cancer patient population^{1,2}. Despite the known risks, medication errors related to incorrect prescribing, preparation and/or administration remain relatively common despite recent increased efforts to enhance patient safety¹. Ranchon et al.³ demonstrated in their prospective study of 6,607 antineoplastic prescriptions that 341 (5.2%) contained at least one medication error (total errors n=449). Of these errors, 436/449 were intercepted before the medication was

administered to a patient. Prescription errors accounted for 91% of errors, with 13.4% of avoided errors potentially resulting in temporary injury and 2.6% in permanent injury.

The Pennsylvania Patient Safety Authority¹ analysed 1,015 medication error events associated with haematology and oncology outpatient departments over a 2-year period from June 2015 to June 2017. Medication events included antineoplastic drugs, SACT pre-medication drugs, opioids and anticoagulants. High alert medications – those that pose an increased risk of patient harm when involved in medication errors – accounted for 55.5% (n=563) of events; the most commonly prescribed being antineoplastic agents (94.3%, n=531). More than half (53.7%, n=545) of the events affected the patient and 43.3% (n=439) were intercepted before reaching the patient. Errors occurred

most frequently during the prescribing and administration processes. Car et al.⁴ recruited 40 North West London cancer care clinicians to identify and prioritise perceived causal reasons for, and solutions to, medication errors in cancer care using a priority-setting approach. Thematic analysis revealed 20 distinct problems and 22 solutions. Twenty-six clinicians from the original cohort then ranked the composite list of perceived problems. Improved communication between healthcare providers, quality assurance procedures – during prescription and monitoring stages – and patient education were identified as key strategies for improving antineoplastic medication safety. The prescribing stage was identified as most vulnerable to medication safety threats. Banasser, Karpow, Gaunt and Grissinger⁵ suggested that error reduction strategies in outpatient oncology clinics should commence with a risk assessment of medication use processes with a focus on communication and quality procedures during the prescribing process.

There has been a notable shift in the evidence-based international guidelines related to the administration of SACT. Well-designed, standardised, regimen-specific SACT order forms decrease potential errors by organising treatment information in a clear, consistent and uniform format⁶. The use of computerised prescriptions is now recommended as best practice to reduce the risk of adverse events and that, in lieu of computerised prescribing, standardised, pre-printed forms must be used to maintain consistency, and that handwritten orders are unacceptable^{6–11}.

Leung et al.¹² developed an evidence-based practice guideline for the safe administration of SACT and management of preventable adverse events for use in the Canadian Province of Ontario. The guideline was influenced by the clinical expertise of the working group members and multiple international SACT administration guidelines including COSA's guideline for the safe prescribing, dispensing and administration of systemic cancer therapy⁹, and eviQ's timeout procedure checklist¹³ and clinical safety procedure¹⁴. The quality of the Australian eviQ^{13,14} and COSA⁹ guidelines and other international guidelines was evaluated by the working group using the Appraisal of Guidelines for Research and Evaluation (AGREE) II Tool¹⁵. The guidelines were rated highly across all domains¹². Of note, the COSA guideline for the safe prescribing, dispensing and administration of systemic cancer therapy recommends that a fully validated electronic prescribing system should be utilised for the prescribing of SACT wherever available; if not, pre-printed prescriptions should be used⁹.

In Australia, the safe administration of SACT is guided by the COSA guidelines for the safe prescribing, dispensing and administration of systemic cancer therapy⁹ and eviQ's online evidence-based, consensus driven cancer treatment protocols and information for use at the point of care.

Australian healthcare organisations are required to undergo mandatory accreditation, the recognition by a healthcare accreditation body of the achievement of eight quality and safety standards through an external peer assessment process. The National Safety and Quality Health Service (NSQHS) standards are developed by the Australian Commission on Safety and Quality in Health Care in consultation with the Australian government, states and territories, the private health sector, clinical experts, patients and carers¹⁶. The primary aim of the NSQHS standards is to: protect the public from harm, improve the quality of health service provision; and support a quality assurance mechanism that tests whether relevant systems are in place to ensure that expected standards of safety and quality are met. The delivery of SACT is mandated by the NSQHS standard 4, medication safety¹⁶, that requires SACT order charts to reflect current best practice guidelines.

Consistent with other national and international tertiary cancer treatment centres, SACT at the study site is constantly evolving with the introduction of immunotherapies and targeted therapies which are transforming treatment regimens for many cancers. Prior to study commencement it was observed that current SACT charts did not meet minimum Australian and international best practice standards for the delivery of SACT.

Ethical issues

Approval to conduct this nurse-led study was granted by the study site's Human Research Ethics Committee. Approval was based on a waiver of consent and contingent on the analysis and presentation of aggregated data ensuring patient anonymity.

Plan, Do, Study, Act (PDSA) model for service improvement

The Plan-Do-Study-Act (PDSA)^{17,18} framework guided development and standardisation of SACT prescription forms. Stages of the PDSA cycle are:

- Plan – determine the change to be tested or implemented
- Do – carry out the test or change
- Study – based on the measurable outcomes agreed before commencement, collect data before and after the change and reflect on the impact of the change and what was learned
- Act – plan the next change cycle or full implementation¹⁹.

Prior to implementation, three guiding questions were considered:

- What are we trying to accomplish (aim)?
- What measures of success will be used (audits)?
- What change concepts will be tested (best practice SACT prescription forms)?

Plan

The study was conducted in a 20-chair outpatient cancer centre located within a large 507-bed private tertiary teaching hospital in the southern corridor of the Perth metropolitan area in Western Australia. The study site has witnessed a steady increase in patient presentations over recent years from 4,500 in 2009/10 to >15,000 in 2017/18, with 10,384 episodes of anti-cancer treatment provided in 2018.

The SACT charts used prior to the study commencement were developed in 2013 prior to the introduction of immunotherapies, targeted biological therapies and current Australian and international best practice SACT guidelines. This study aimed to review, develop and standardise SACT prescription forms to reflect current national and international best practice.

Do

In 2015 a multidisciplinary committee was convened to review 47 SACT order charts in use pre-study. Committee membership comprised cancer nurses, oncology pharmacists, oncologists and haematologists. SACT charts were compared against the Cancer Institute New South Wales *eviQ*¹⁴, the National Comprehensive Cancer Network (NCCN)²⁰ and the British Columbia Cancer agency (BC Cancer)²¹ protocols. The team agreed that development of individual charts for each treatment regimen (n=224) was required to reflect current best practice and reduce the risk for adverse medication errors. A compliance audit tool based on the COSA guidelines for the safe prescribing, dispensing and administration of systemic cancer therapy⁹ was developed and used to audit 50 SACT charts in June 2015. SACT charts were randomly selected and audited over a 1-week period to identify inconsistencies with best practice.

Study

Baseline audit results were disseminated and reviewed by all committee members (Table 1). In consultation with the multidisciplinary team, the study centre pharmacists assumed responsibility for the process of revising 47 existing, and developing 177 new, SACT prescription forms using the Cancer Institute NSW standard cancer treatments (*eviQ*) guidelines¹⁴, the NCCN²⁰ and the BC Cancer chemotherapy guidelines²¹ protocols as reference tools. Two hundred and twenty-four SACT forms were approved for circulation and patient use in the cancer centre over an 18-month period between June 2015 and November 2016. Each SACT prescription chart was peer reviewed by oncologists, haematologists, the nurse unit manager (NUM) and an external lead pharmacist from a non-oncology department within the hospital. The hospital's Medication Safety Committee advised that due to the specialised nature of the SACT prescription forms, approval from the cancer centre team was sufficient to proceed with the implementation of the new forms. Prior to implementation in November 2016, education was primarily provided to the multidisciplinary team

by the lead oncology pharmacist via face-to-face meetings with oncologists and haematologists to explain the changes to the SACT prescription forms and the proposed implementation process. All other staff were notified electronically via email with the same information and requested to provide feedback to the multidisciplinary committee. This feedback process continues as an ongoing process.

Act

In February 2017 a repeat audit using the same audit tool was undertaken with 50 randomly selected SACT charts over a 1-week period (Table 1). The results were disseminated to all oncologists, haematologists, pharmacists and nursing staff.

Based on the four areas with the lowest compliance, a number of interventions were employed. Further education was provided by the chief pharmacist to oncologists and haematologists to address key deficits identified by the audit via one-to-one discussions. These physicians were encouraged to initial and date treatment dose changes and to clearly identify the treatment cycle, the most common deficits identified by the audit. Nurses were requested not to accept incomplete SACT order charts.

Results

Table 1 presents pre- and post-audit results. A compliance rate of <70% requires immediate action; compliance between 70% and 85% indicates a need for improvement, and compliance >85% signifies good compliance with best practice guidelines.

The pre-audit conducted in 2015 showed that only three domains illustrated >85% compliance with current best practice guidelines. More than 50% of domains showed a compliance of <70% and highlighted a need for immediate action since they indicated potential for serious adverse events for patients receiving SACT. During the 18-month period when SACT charts were being revised, oncologists and haematologists were educated by the lead pharmacist regarding the COSA best practice guidelines and expectations of them as prescribers of anti-cancer therapy.

Results of the second audit performed in 2017 after the standardised charts had been in use for 3 months showed an improvement, with nine domains achieving good compliance and only four domains illustrating poor compliance. The 2018 audit showed the cancer centre had achieved good compliance in 14 domains, while the four areas with poor compliance showed an overall improvement and highlighted areas where the cancer centre needs to improve. The only area which has shown a decrease in compliance between the 2017 and 2018 audits is the accurate height, weight and body surface area (BSA) domain. This is concerning as accurate dosing of anti-cancer therapy is dependent on accurate BSAs. There is the potential for patients to be underdosed, with resultant compromise of success of

Criteria	Compliance Jun 2015	Compliance Feb 2017	Variance ▲/▼	Compliance Aug 2018	Variance ▲/▼
UMRN sticker with hospital number, name, DOB	98%	98%	nil	98%	nil
Current height, weight and accurate BSA	42%	89%	▲ 47%	72%	▼ 17%
Computer-generated prescription (not handwritten)	82%	82%	nil	88%	▲ 6%
If handwritten, is the drug and dose clear and unambiguous?	50%	86%	▲ 36%	96%	▲ 10%
Is the drug dosing clear and do drug doses have appropriate measurements?	63%	78%	▲ 15%	92%	▲ 14%
Are the drugs prescribed clearly in the correct order?	80%	88%	▲ 8%	100%	▲ 12%
Has written consent been obtained?	0%	0%	nil	0%	nil
Is the chart signed and dated?	77%	96%	▲ 19%	100%	▲ 4%
Is the name of the regimen clear and appropriate?	61%	88%	▲ 27%	88%	nil
Is the cycle number clearly written?	49%	55%	▲ 6%	68%	▲ 13%
Is the route of administration clear?	89%	92%	▲ 3%	98%	▲ 6%
Is the tumour type and stage stated?	59%	74%	▲ 15%	92%	▲ 18%
Is the infusion rate clear?	77%	80%	▲ 3%	98%	▲ 18%
Is the diluent/compatible fluid clearly recorded?	75%	78%	▲ 3%	98%	▲ 20%
Are allergies clearly stated?	92%	94%	▲ 2%	98%	▲ 4%
Are dose changes initialled and dated?	2%	1%	▼ 1%	13%	▲ 12%
Are 'crossings off' initialled and dated?	4%	0%	▼ 4%	13%	▲ 13%
Are the required laboratory tests documented?	70%	88%	▲ 18%	89%	▲ 1%
Is supportive therapy charted unambiguously?	43%	77%	▲ 34%	98%	▲ 21%

UMRN = unit medical record number, DOB = date of birth, BSA = body surface area

the therapy, or overdosed and experience potentially fatal side effects³. BSA is initially calculated by the prescribing doctor and checked by the pharmacist, although nurses check the patient's weight at each cancer centre visit. If the weight has changed, the nurse will recalculate the BSA and inform the prescriber. Nursing staff will continue to receive education around completing this calculation and support to return the chart to doctors if the dosing is incorrect.

Of note, whilst 'obtaining written consent' was recorded as 0% for each audit, this is because verbal, not written, consent was gained from patients during the period covered by the audit. Since 2018, the practice has changed to ensure the written consent form is kept with the patient's SACT prescription.

A patient safety analysis of 1,015 medication errors reported in the Pennsylvania Patient Safety Reporting System from outpatient haematology and oncology clinics⁵ illustrated that dosage errors were mostly attributed to inaccurate patient weights; this was also a finding of our quality initiative. Current patient information is therefore essential to guide accurate prescribing.

Currently, in 2019, the standardised SACT charts remain in use within the cancer centre. The success of this initiative has prompted standardisation of SACT charts across all of the

organisation's Western Australian divisions who administer SACT, with the new chart considered the benchmark.

Discussion

Adherence to best practice SACT guidelines ensures safe and high quality care for patients receiving anti-cancer therapies in an outpatient cancer setting. This nurse-led study has demonstrated how a systematic approach has produced clinically significant improvements in multidisciplinary practice through implementation of standardised SACT prescription forms. Importantly, this change in practice has reduced the potential for serious medication errors.

Notwithstanding the positive outcomes of this study, improvement is still required in some areas. It is proposed that continued application of this collaborative multidisciplinary approach can facilitate improvement in a number of ways. It is essential the cancer centre adopts a strong culture of safety and quality. We recommend that cancer nurses, oncologists and pharmacists are provided with continuous education about the requirements of SACT prescription charts as per current best practice national and international guidelines. Nurses and pharmacy staff must be encouraged and supported to 'refuse to accept and use' incomplete SACT prescription charts. The cancer centre is also committed to performing an annual audit and review of the forms in order to standardise SACT forms

and minimise the risk of medication errors and patient harm. Electronic SACT prescribing is due to be introduced to the cancer centre in the near future and will further embed the culture of safety and quality we strive to maintain.

Recommendations

- Perform an annual audit and review of SACT prescription forms.
- Maintain multidisciplinary team education to ensure best practice prescribing and administration of SACT;
- Continue peer review of SACT prescription forms as new SACT become available.
- Ensure SACT prescription forms are used as the benchmark for the organisation's other Western Australian cancer centres to prevent and/or minimise medication errors.
- Continuously review both actual and near miss medication errors in order to implement further risk prevention strategies to reduce errors for this high risk population.

Conflict of Interest

The authors declare no conflicts of interest.

Funding

The authors received no funding for this study.

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