

Design and validation of the Skin Lesion Awareness Personal Application - a comprehensive, patient-centered skin cancer application

Proposed research plan

Aims and objectives

1. The Skin Lesion Awareness Personal Application (SLAPA) mobile application (app) is face valid compared to a paper-based information leaflet. ***This will be determined from comparing results of the knowledge assessment and survey between the leaflet and application groups.***
2. The SLAPA app improves the knowledge-base of high risk individuals regarding prevention and detection of common skin cancers. ***Questions will test whether the participants understand what preventative measures reduce their risk of skin cancer, and whether they can differentiate the general appearance of benign vs suspicious lesions.***
3. The SLAPA app encourages more frequent sun-safety behaviour in high-risk individuals. ***A survey will assess incidence of sunburn, incidence of applying SPF 50 sunscreen, incidence of wearing brimmed hats, incidence of wearing protective clothing, hours spent outdoors in midday sun (1000-1600).***

Rationale

Skin cancer is the most common cancer in Aotearoa New Zealand, accounting for 80% of all new cancers.¹ Approximately 2,800 invasive melanomas and 90,000 non-melanoma skin cancers are diagnosed annually. The financial implications of this are significant, with estimated healthcare costs of \$129.4 million and \$54.5 million respectively. By 2025, the total cost is expected to reach \$295 million.² The New Zealand-specific statistics for melanoma are considerably alarming. New Zealand has one of the highest incidences of melanoma in the world, occurring in approximately 35 to 40 people per 100,000 population per year.^{3,4} Despite being less common than other skin cancers, four out of five skin cancer-related deaths in New Zealand are caused by melanoma.^{3,5} Furthermore, New Zealand has the world's highest death rate from melanoma.¹ While many cases are preventable, the incidence and mortality rate from cutaneous malignancies continues to rise.⁶

The New Zealand Cancer Society outlines the importance of prevention and skin checks in early diagnosis, but notes that cost and access to primary health care is a significant barrier for many people.⁷ There is a clear need for greater health literacy about cutaneous malignancies, especially for communities who are disadvantaged in their access to health care.

Our study aims to show that a free mobile application that can be easily distributed nationwide will improve people's awareness about skin cancer and prevention behaviours.

We propose a mobile application that:

1. Educates about common skin lesions (melanoma, basal cell carcinoma, squamous cell carcinoma, actinic keratosis, seborrheic keratosis, dysplastic naevi)
2. Instructs on how to carry out skin-checks and self-examination of lymph node basins. This will include information on how to seek medical help in event of concerns.
3. Embeds a camera interface and gallery to store and organize skin checks by date for easy reference and comparison
4. Educates on the importance on sun protection and promotes sun-smart behaviours
5. Notifies patients if the UV index at their location is beyond a critical level and suggests either sun protection measures or avoidance
6. Includes a New Zealand specific melanoma-risk calculator

It is important to note that the SLAPA application is **not** designed as a diagnostic tool for skin cancer detection, but rather an educational adjunct to use in skin cancer care.

While SLAPA users can take photos through the application to help them document their skin checks, these images are stored locally on the user's phone, they are not analysed and are not accessible to the developers or owners of SLAPA.

Research design

Hypothesis:

The Skin Lesion Awareness Personal Application will provide comprehensive and easy to use skin cancer tools that will educate and empower patients, resulting in better uptake of prevention behaviours and knowledge of what concerning lesions look like.

Method:

The study will recruit at least 200 patients at high risk for skin cancer (individuals with previous T1A or greater melanoma and individuals immunocompromised by medications or haematological illnesses) who own smartphones.

The study cohort will be randomised into control and intervention groups.

At the commencement of the study, general skin cancer knowledge and skin cancer prevention behaviours of participants will be evaluated via a standardised Jotform questionnaire.

To confirm that the SLAPA app is face valid compared to a paper-based information leaflet, the control group will receive a paper-based information leaflet, which will reflect the content of the SLAPA app. The intervention group will be given access to the SLAPA application. Both groups will be reviewed clinically in the standardised manner for melanoma and non-melanoma skin cancers respectively.

Two weeks later, the knowledge of both groups will be re-evaluated via a standardised questionnaire. The questionnaire will include questions not directly covered in either the paper-based information leaflet or the SLAPA app to evaluate either modality encourages participants to improve their general knowledge about skin cancer.

The questionnaire will be repeated at the 6 week and 3 month point to determine the rate of educational decay.

The two-week questionnaire will also assess participants' opinions on specific features of both educational modalities including benefit, relevance, convenience, user-friendliness, likelihood of ongoing use and likelihood of recommending the modality to others.

Data collection will involve de-identified questionnaire scores pre and post intervention.

Following confirmation that the SLAPA app is face valid compared to a paper-based information leaflet and is considered beneficial, relevant, convenient, and user-friendly, it will be offered, free of charge, on Apple and Android App Stores to all in Aotearoa New Zealand. All participants of the study will be offered the opportunity to download the app at the end of the study.

1. References

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3. Melanoma. DermNet NZ. 2022. Available from: <https://www.dermnetnz.org/topics/melanoma> (Accessed Feb 2023).

4. Melanoma. Melanoma New Zealand. Available from: <https://www.melanoma.org.nz/> (Accessed Feb 2023).
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6. Sneyd MJ, Cox B. A comparison of trends in melanoma mortality in New Zealand and Australia: The two countries with the highest melanoma incidence and mortality in the world. *BMC Cancer*. 2013;13:372-80
7. Nartey Y, Sneyd MJ. The presenting features of melanoma in New Zealand: implications for earlier detection. *Aust N Z J Public Health*. 2018 Dec;42(6):567-571. doi: 10.1111/1753-6405.12815. Epub 2018 Aug 8. PMID: 30088686

Primary outcome

- Average score on knowledge quiz baseline versus post-intervention

Secondary outcome

Baseline versus post-intervention:

- Incidence of sunburn in last 14 days
- Percentage days in last 14 days using SPF 50 sunscreen
- Percentage days in last 14 days of wearing brimmed hat
- Percentage days in last 14 days wearing protective clothing
- Hours spent outdoors in midday sun (1000-1600) in last 14 days

Timeframe:

Dec 2023 – Feb 2024 Ethical approval

Mar 2024 – Aug 2024 Patient recruitment and data collection. This is a very conservative timeframe as we will aim to get 200 participants who are either immunosuppressed or have a history of T1a melanoma.

Aug 2024 – Nov 2024 Data analysis and write up for publication