CRYOTHERAPY UTILIZATION PROFILE AT DERMATOLOGY CLINIC IN DR MOEWARDI GENERAL HOSPITAL

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ABSTRACT

Cryotherapy is a foundational, cost-effective destructive modality widely used in dermatological practice, yet comprehensive data regarding patient characteristics and utilization patterns in Indonesia remains sparse. This study retrospectively elucidates the profile of 187 patients who underwent a total of 557 cryotherapy procedures at the Dr. Moewardi General Hospital's Dermatology, Venereology, and Aesthetic Outpatient Clinic from January 2021 to July 2025. Utilizing a descriptive retrospective design, medical records were analyzed for demographic data, clinical diagnosis, and procedural intensity. Male patients constituted the majority (56.68%). The four most common diagnoses were anogenital warts (28.88%), seborrhoeic keratosis (13.37%), keloid (10.70%), and hemangioma (8.02%). While a significant portion of patients achieved resolution within 1 to 3 sessions (45.45%), a small subset required over 10 procedures (6.95%). The primary use of cryotherapy at this facility leans toward infectious dermatoses, notably anogenital warts, rather than classic indications such as actinic keratosis. These findings underscore the profound influence of local epidemiological factors and clinical necessity on therapeutic utilization patterns.

Keywords: *Cryotherapy, Patient Profile, Characteristics*

Introduction

Cryotherapy, also termed cryosurgery, is a well-established destructive therapeutic technique in dermatology, venereology, and aesthetics, leveraging ultra-low temperatures, typically utilizing liquid nitrogen at approximately -196 C.Its efficacy is rooted in the resultant tissue destruction, mediated by intracellular and extracellular ice crystal formation, cellular membrane disruption, and subsequent microvascular thrombosis leading to ischemia and tissue necrosis. The enduring popularity of this modality stems from its technical simplicity, relative affordability, quick recovery time, and capability to yield favourable cosmetic outcomes for a broad spectrum of cutaneous lesions, ranging from benign and pre-malignant conditions like *verruca vulgaris* and *molluscum contagiosum* to various aesthetic concerns. Internationally, studies affirm that verrucae (warts) are frequently the most common indication for cryosurgery. Despite its widespread application and acknowledged benefits, data characterizing the patient demographic and usage patterns of cryotherapy specifically within the Indonesian context, particularly at tertiary referral centers like Dr. Moewardi General Hospital in Central Java, remains remarkably limited. To address this crucial gap and provide localized epidemiological data for clinical decision-making, this study aims to comprehensively delineate the profile of patients undergoing cryotherapy at the Dermatology, Venereology, and Aesthetic Outpatient Clinic of Dr. Moewardi General Hospital in Surakarta during the period of January 1, 2021, to July 31, 2025.

Methods

This retrospective descriptive study was conducted using secondary data from the medical records of patients who underwent cryotherapy. The research was executed at the Outpatient Installation (Poliklinik) of Dermatology and Venereology at Dr. Moewardi General Hospital, Surakarta, spanning the period from January 2021 to July 2025. The inclusion

criteria encompassed all patients who received cryotherapy procedures and were recorded in the medical records during the study period. The exclusion criteria were applied to patients whose medical records were incomplete or deemed unsuitable for analysis based on the study objectives. Variables observed included demographic characteristics (sex, age, education, occupation), clinical characteristics (diagnosis), and the number of cryotherapy sessions. Data analysis was performed descriptively and presented in a scientific narrative to illustrate the comprehensive patient profile.

Results

The analysis encompassed 187 patients undergoing 557 cryotherapy procedures. Demographic analysis revealed a male predominance (56.68%), with the most frequently observed age group being 21–39 years (32.6%). The educational attainment was highest in the Senior High School (SLTA) category (44.4%). The spectrum of diagnoses was diverse, yet highly concentrated. Anogenital warts represented the foremost clinical indication (28.88%), followed by seborrhoeic keratosis (13.37%), keloid (10.70%), and haemangioma (8.02%). In terms of procedure intensity, nearly half of the patients (45.45%) achieved substantial improvement or resolution within 1 to 3 sessions. However, 6.95% necessitated more than 10 sessions due to recalcitrance or recurrence. Adverse effects were predominantly transient, with local erythema and pain being reported in nearly half of the patients (49.2%), while pigmentary alterations (hypo- and hyperpigmentation) occurred in 16.6% of the cases.

Table 1. Cryotherapy Patient Chacteristics

Characteristics	Count (n)	Percentage (%)
Sex		
Male	106	56,68
Female	81	43,32
Age		
<12	18	9,6
13-21	29	15,5
21-39	61	32,6
40-59	52	27,8
>60	27	14,4
Education Background		
SD	28	15
SLTP	34	18,2
SLTA	83	44,4
Sarjana I	42	22,5
Occupation		
Employee	48	25,7
Laborer	26	13,9
Housewives	42	22,5
Student	30	16
Retired	14	7,5
Teacher	11	5,9
Farmer	16	8,6

Sources: ERM at Dr Moewardi General Hospital

The retrospective analysis conducted at the Dermatology, Venereology, and Aesthetic Outpatient Clinic of Dr. Moewardi General Hospital, Surakarta, between January 2021 and July 2025, identified a total of 187 patients who underwent 557 cryotherapy procedures.

In terms of demographic characteristics, male patients predominated with 106 cases (56.68%), whereas female patients accounted for 81 cases (43.32%). Regarding age distribution, the 21–39-year age group constituted the largest proportion (61 patients;

32.6%), followed by those aged 40–59 years (52 patients; 27.8%), 13–21 years (29 patients; 15.5%), and over 60 years (27 patients; 14.4%). The lowest representation was observed in the <12-year age group (18 patients; 9.6%).

With respect to educational attainment, most patients had completed senior high school (SLTA) (83 patients; 44.4%), followed by bachelor's degree (S1) holders (42 patients; 22.5%), junior high school (SLTP) graduates (34 patients; 18.2%), and elementary school (SD) graduates (28 patients; 15.0%).

Occupationally, the largest category consisted of private-sector employees (48 patients; 25.7%), followed by housewives (42 patients; 22.5%), students (30 patients; 16.0%), manual laborers (26 patients; 13.9%), farmers (16 patients; 8.6%), retirees (14 patients; 7.5%), and teachers (11 patients; 5.9%).

Table 2. Frequency Distribution of Cryotherapy Patient Diagnosis

Primary Diagnosis	Count (n)	Percentage (%)
Anogenital warts	54	28,88
Seborrhoeic keratosis	25	13,37
Keloid	20	10,70
Haemangioma	15	8,02
Neurofibromatosis	7	3,74
Melanocytic nevus	6	3,21
Molluscum contagiosum	5	2,67
Corns and callus	5	2,67
Beningn lipoma	3	1,60
Urticaria, unspecified	3	1,60
Lymphangioma	3	1,60
Pyogenic granuloma	3	1,60
Actinic keratosis	2	1,07
Others	36	19,25

Sources: ERM at Dr Moewardi General Hospital

In this study, the most prevalent diagnosis among patients undergoing cryotherapy was anogenital warts, affecting 54 patients (28.88%). Other frequently encountered diagnoses included seborrhoeic keratosis (13.37%), keloid (10.70%), and haemangioma (8.02%). Additionally, a wide range of less common dermatologic conditions were treated, such as non-anogenital viral warts, molluscum contagiosum, corns and calluses, benign lipoma, urticaria, lymphangioma, pyogenic granuloma, actinic keratosis, lobomycosis, leprosy, vulvar cysts or tumors, steatocystoma, paronychia, chromomycosis, and several rare dermatoses including psoriasis vulgaris, pityriasis versicolor, vitiligo, alopecia areata, and exfoliative dermatitis.

Table 3. Frequency Distribution of Cryotherapy Patient Sessions

Number of Sesions	Count (n)	Percentage (%)
1-3 times	85	45,45
4-6 times	56	29,95
7-10 times	33	17,65
>10 times	13	6.95

Sources: ERM at Dr Moewardi General Hospital

In this study, the majority of patients underwent one to three cryotherapy sessions (45.45%), indicating that most lesions could be effectively managed with short-term therapy. Approximately 29.95% of patients required four to six sessions, while 17.65% underwent seven to ten sessions. Only 6.95% of patients received more than ten

cryotherapy sessions, typically representing recurrent or multifocal lesions. These findings suggest that cryotherapy is an effective treatment modality for the majority of cases; however, a subset of patients requires multiple treatment cycles depending on the underlying diagnosis, lesion burden, and clinical complexity.

Table 4. Post Procedure Clinical Evaluation

Clinical Outcome	Count	Percentage (%)
Lesion reduced +- 50% of initial size (Partial resolution)	68	45,45
Some lesions resolved, minimal scarring (Moderate improvement)	74	29,95
Complete resolution without residue (Perfect healing)	33	17,65
No significant change / Re-plan needed (Recurrent/Refractory)	12	6.95

Sources: ERM at Dr Moewardi General Hospital

In this study, clinical evaluation before and after cryotherapy demonstrated a significant improvement in the majority of patients. A total of 39.6% of patients exhibited partial resolution, with lesion size reduced by approximately half of the initial dimension, while 36.4% showed moderate improvement, characterized by lesion desiccation and the absence of subjective symptoms such as pruritus or pain. Furthermore, 17.6% of patients achieved complete clearance without residual lesions after one to three sessions of cryotherapy. Only a small subset (6.4%) demonstrated no appreciable clinical change, predominantly in recurrent or multifocal cases that may require adjunctive or combination therapy.

Table 5. Frequency Distribution of Cryotherapy Patient Post-Procedure Adverse Effects

Adverse Effects	Count (n)	Percentage (%)
Erythema/local pain	92	49,2
Bulla/vesicle formation	37	19,8
Hypopigmentation	22	11,8
Hyperpigmentation	9	4,8

Sources: ERM at Dr Moewardi General Hospital

Post-cryotherapy adverse effects were diverse in presentation. The most frequently reported events were erythema and localized pain, observed in 49.2% of patients, followed by bulla or vesicle formation in 19.8%, which typically resolved spontaneously without secondary infection. Pigmentary alterations were also relatively common, with hypopigmentation occurring in 11.8% of cases and hyperpigmentation in 4.8%, predominantly among individuals with darker skin phototypes. More severe complications, such as secondary infection or cellulitis, were uncommon, affecting only 1.6% of patients.

Discussion

Cryotherapy remains a prominent destructive modality in dermatology due to its robust mechanism involving extreme cooling by liquid nitrogen, which induces necrosis through cellular and vascular disruption. The demographics of this cohort 187 patients with 557 procedures show a male predominance (56.68%), largely driven by the high incidence of anogenital warts (28.88%). This is consistent with global epidemiology, where peak prevalence for anogenital warts, an HPV manifestation, occurs in the productive male population. European guidelines affirm cryotherapy as a first-line therapy for this condition, though recurrence is noted. Our findings, where a notable percentage of patients required more than six sessions, align with literature indicating that lesion size, location, and immune status affect clearance. The next most common indications, seborrhoeic keratosis (13.37%) and keloid (10.70%), demonstrate the breadth of its application. The substantial proportion of keloid cases, for which cryotherapy is often an adjuvant rather than a sole therapy, further reflects unique local practice patterns. The intensity data reveals that the majority

(45.45%) require only 1–3 sessions, confirming its overall efficacy for most lesions. However, the 6.95% requiring over 10 sessions highlights the challenge of refractory or recurrent cases. The most common side effect was transient erythema and local pain (49.2%), with pigmentary changes (hypopigmentation 11.8% and hyperpigmentation 4.8%) also observed, particularly in darker skin types. The low rate of severe complications, such as cellulitis (1.6%), attests to the general safety of the procedure. Ultimately, this study confirms that cryotherapy utilization at Dr. Moewardi General Hospital is heavily influenced by local Human Papillomavirus (HPV) epidemiological burden, rather than the keratotic lesions frequently seen as dominant indications globally, emphasizing the role of clinician preference and local disease prevalence.

Conclusions and Recommendations

This retrospective study on cryotherapy utilization demonstrates that the majority of patients are male, with anogenital warts being the most prevalent diagnosis, followed by seborrhoeic keratosis and keloids. Most cases successfully resolve within a few treatment sessions, confirming the technique's efficacy for the majority of patients. However, a minority of patients, typically those with recurrent or complex lesions, require extensive, repeated interventions. The findings indicate that the primary application of cryotherapy in this clinical setting is for managing sexually transmitted infections, deviating from the typical use for solar-induced keratotic lesions reported internationally.

Based on the demonstrated high prevalence of anogenital warts and the need for repeated sessions in complex cases, future prospective studies should evaluate long-term effectiveness, recurrence rates, and optimal cryotherapy protocols specifically tailored for infectious dermatoses and keloids in the Indonesian population. Furthermore, institutional guidelines should prioritize robust follow-up and patient education to minimize complications and optimize outcomes, particularly regarding pigmentary changes.

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