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National UV and Skin Cancer Strategy

DSA

Norwegian Radiation and Nuclear Safety Authority

Reference:

Nilsen LTN[1], Saxebøl G[1], Kofstadmoen H[1], Espetvedt SL[2], Sørensen IL[2], Nøkleby H[3], Robsahm TE[4], Husaas E[5], Husby ML[6]. National UV- and skin cancer strategy. DSA-rapport 2019:02, Østerås: Norwegian Radiation and Nuclear Safety Authority, 2019.

1. Norwegian Radiation and Nuclear Safety Authority. 2. Norwegian Directorate of Health. 3. Norwegian Institute of Public Health. 4. Cancer Registry of Norway. 5. Ministry of Local Government and Modernisation. 6. Bærum municipality

Key words:

UV radiation. Sun. Sunbeds. Skin cancer. Melanoma. Prevention. Diagnosis.

Abstract:

The report presents the national UV- and skin cancer strategy. The strategy's aim is to reduce incidence and mortality from skin cancer in Norway. The strategy in its original form is published in Norwegian and as DSA report 2019: 02. This report presents a translated version of the strategy itself, without attachments.

Referanse:

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1. Direktoratet for strålevern og atomsikkerhet. 2. Helsedirektoratet. 3. Folkehelseinstituttet. 4. Kreftregisteret. 5. Kommunal- og moderniseringsdepartementet. 6. Bærum kommune

Emneord:

UV-stråling. Sol. Solarier. Hudkreft. Føflekkreft. Forebygging. Diagnose.

Resymé:

Rapporten presenterer den nasjonale UV- og hudkreftstrategien, med mål om å redusere forekomst og dødelighet av hudkreft i Norge. Strategien i sin originale form er publisert på norsk og som DSA-rapport 2019:02. Denne rapporten presenterer en oversatt versjon av selve strategien, uten vedlegg.

Approved:

Hanne Kofstadmoen, director, Department of Radiation Protection and Measurement Services

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Norwegian Radiation and Nuclear Safety Authority
P.O.Box 29, Skøyen, N-0213 Oslo, Norway.

Telephone +47 67 16 25 00, fax +47 67 14 74 07.

E-mail: dsa@dsa.no

www.dsa.no

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National UV and Skin Cancer Strategy

Innholdsfortegnelse

Summary

Norway is among the countries with the highest incidence and mortality of melanoma in the world, and skin cancer is one of the types of cancer that has increased the most in the course of the past ten years. In order to meet these challenges, the Ministry of Health and Care Services gave the Norwegian Radiation and Nuclear Safety Authority (DSA) the assignment of establishing and coordinating a cross-sectoral working group[1]. Under DSA's leadership, the group has prepared a national UV and skin cancer strategy. The aim of the strategy is to reduce the incidence and mortality of skin cancer in Norway. The final strategy is endorsed by the Government.

Increased risk of skin cancer is linked to exposure to UV radiation from the sun and sunbeds. The annual total costs for the society associated with skin cancer are estimated to be in the magnitude of 6.5 BNOK. The treatment costs alone are estimated to be around 450 MNOK. With an increasing proportion of older people and access to new, life-prolonging medicines, the costs associated with skin cancer are expected to increase in the years to come. However, skin cancer can be prevented, and the prognosis is good when skin cancer is detected early. The treatment becomes less comprehensive and it is much more cost effective to prevent rather than treat skin cancer.

Many people expose themselves too much to the sun or sunbeds and harm themselves by being sunburned. The society must facilitate making healthy choices and ensure that the population receives knowledge about UV radiation, sun and skin cancer from an early age. Each person should be enabled to translate this knowledge into behaviours with less risk and notice suspicious lesions at an early stage.

The national UV and skin cancer strategy includes prevention for all types of skin cancer and applies for a five-year period from 2019 to 2023. The strategy's aim is to reduce the increase in incidence of skin cancer in Norway by 25% by the year 2040, versus 2018. Further, it shall contribute to reduce mortality by detecting tumours at an early stage. The goal is to reduce the average thickness of melanoma tumours on diagnosis from 1.0 mm (today's thickness) to under 0.8 mm in the year 2040. Thinner tumours at the point of diagnosis give a better prognosis for survival.

Measures to achieve the goals are proposed within three target areas: 1) Prevention in the administrative sector, 2) Knowledge and awareness about prevention, and 3) Earlier detection. The strategy is a tool for managing and coordinating skin cancer preventive measures in several sectors.

[1] Participants from the Norwegian Radiation and Nuclear Safety Authority, the Norwegian Directorate of Health, the Norwegian Institute of Public Health, the Cancer Registry of Norway, the Ministry of Local Government and Modernisation and Bærum municipality.

1 Background and status

1.1 Public Health

Public health is a central concept and public health work is defined as:

Public health work is the society's attempt to influence factors, which either directly or indirectly, promote the population's health and wellbeing, prevent mental and somatic illnesses, damage or disorders, or which protect against health threats, and work for a more even distribution of the factors, which either directly or indirectly, influence health (Source: Regjeringen.no). Skin cancer prevention forms a natural part of public health work.

In general, prevention work can be divided into three stages: before the illness occurs (primary prevention), when the illness has occurred and is "active" (secondary prevention) and after the illness has been treated (tertiary prevention) (Source: Forebygging.no).

1.2 Skin cancer - a national challenge

In Norway, skin cancer is one of the types of cancer that has increased the most in the course of the past ten years and Norway is one of the countries with the highest incidence and mortality rates of melanoma in the world. There are three main types of skin cancer: melanoma, squamous cell carcinoma and basal cell carcinoma (table 1). Melanoma is the most serious form of skin cancer. Norway has the highest mortality rate in Europe which strongly suggests that there is a lot to gain from earlier detection and diagnosis. The annual cost of treatment for melanoma alone is estimated to be more than 300 MNOK.

The annual combined cost of treatment for the three different forms of skin cancer is estimated to be 450 MNOK. In addition to these costs, comes the annual cost of nursing and care services, which is estimated to be around 150 MNOK. With an increasing aging population as well as access to new life-prolonging medicine, it is expected that these expenses will increase dramatically in the coming years. If untreated, squamous cell carcinoma can, on seldom occasions, spread. Basal cell carcinoma is the form of skin cancer that most people get. It is less serious but can require extensive treatment.

Table 1. Occurrence, mortality and prevalence of skin cancer in Norway in 2016 (Føflekkreftregisteret 2017).

Type of skin cancer	Number of new cases in 2016*	Number of deaths in 2016	Prevalence ** in 2016
Melanoma	2311	Approx. 330	24594
Squamous cell carcinoma	2082	49	15425
Basal cell carcinoma	≥ 20 000***	-	-

* The number of cases is higher than the number of patients. This is due to the fact that some of the patients had several occurrences of melanoma in the same year. The number is therefore a little higher than the number in the Cancer Registry of Norway's report for 2016.

** Prevalence: The number alive after diagnosed cancer illness at any given point in time. The combined prevalence for melanoma and squamous cell carcinoma make up 15.2 % of the prevalence of all of the cancer diagnoses.

*** The Cancer Registry of Norway does not monitor the occurrence of basal cell carcinoma. The estimate is based on Swedish figures and takes into account the higher incidence of squamous cell carcinoma and melanoma, as well as the smaller population in Norway.

It is a well-established fact that UV radiation from the sun and sunbeds is the most important cause for the development of skin cancer. Skin cancer can be prevented, and it is much more cost effective to prevent rather than treat skin cancer. In general, the prognosis is good when skin cancer is detected early and the treatment is less comprehensive. It is neither realistic nor advisable to completely avoid UV radiation from the sun. There are many positive effects associated with being outdoors. These include physical activity and fresh air. Many people consider the tanning effect, which UV radiation has on the skin to be attractive and associate it with physical and social wellbeing, beauty and social status. Many people spend a lot of time and money on outdoor activities, holiday trips to countries further south and/or on commercial sunbeds to achieve a tan. Pale skin is easily sunburnt. The fact that too much sunbathing leads to sunburn, more rapid aging of the skin and potentially to late effects such as keratosis and skin cancer, seems to be attributed less importance by many.

For many years, the Norwegian Radiation and Nuclear Safety Authority (DSA; changed its name from the Norwegian Radiation Protection Authority on the 1st January 2019), the Norwegian Cancer Society (NCS), dermatologists and many others have, with limited resources, carried out various measures in order to increase people's knowledge and draw attention to the dangers of sun exposure and the early signs of skin cancer. The NCS study on sun habits[2] found an improvement in Norwegian sun habits in the last number of years. In comparison to 2012, a larger number of people claim that they use sunscreen with a higher protection factor and a somewhat smaller number report to being sunburnt, both at home in Norway and on holidays. There has also been a decrease in the use of sunbeds, from one in six in 2014 to one in ten in 2018. These figures refer to those who have used a sunbed at least once in the course of the past year. However, the study also shows that just over a third of the population are sunburnt every year, both in Norway and on holidays. Data from the Cancer Registry of Norway (CRN) shows that the occurrence of skin cancer is increasing in all of the age groups over 30 years. A strong national commitment to reducing the incidence of and mortality from skin cancer is therefore required.

A description of skin cancer rates and the status of the development of this illness in the population is given in attachment 1 and is the basis for the work with the strategy.

The most important challenges with respect to the prevention of skin cancer are:

- → many people expose themselves to too much UV from the sun or from sunbeds
- → sunburns in everyday life, at holidays and while using a sunbed
- → persistent and strong preference of a tanned skin as an expression of health, wellbeing, social status and attractiveness
- → little knowledge about how one's own skin type is connected to the risk of being sunburnt and developing skin cancer
- → the difference between what people know and what people do with respect to sun tanning behaviour and use of sun protection
- → sun exposure has both positive and negative health effects and communication from different interest groups about for example the use of sunscreen and vitamin D can be perceived as conflicting
- → low awareness about the necessity for both sun and shade in outdoor areas in schools/ kindergartens and public areas as well as sun protection as an integrated part of the physical environment

[2] The Norwegian Cancer Society. Sun habits in the Norwegian population. In Norwegian. Performed by Kantar TNS May 2018.

- → low attention to sun protection as a part of the environment, health and safety (EHS) work for employees who fully/partially work outdoors
- → a lack of compliance with the sunbed regulation requirements
- → skin cancer, especially melanoma is often detected too late and this can result in resource intensive treatment and premature death.

A prerequisite for meeting the challenges connected to skin cancer is that the society facilitates making healthy choices and ensures that the population receives more knowledge about UV radiation and skin cancer. Hence, people are enabled to make informed choices and adopt a behaviour associated with less risk.

1.3 Strategic goal

The strategy shall contribute to reducing the increase in incidence of skin cancer in Norway by 25 % by the year 2040, versus 2018. Furthermore, it shall contribute to reduce mortality by earlier detection, with a goal of reducing the average thickness of melanoma tumours on diagnosis from 1.0 mm (today's thickness) to under 0.8 mm in the year 2040. Thinner tumours, at the point of diagnosis, give a better prognosis for survival.

In the strategy, it is assumed that people are exposed to UV radiation in the following situations:

- → normal daily outdoor behaviour when the sun shines – fully or partially
- → planned sunbathing in Norway or in countries further south – typical holiday/ leisure time
- → use of sunbeds.

Measures for preventing skin cancer shall facilitate that every person

- → understands when they themselves or the people/groups they are responsible for, can be exposed to harmful UV radiation
- → has knowledge about sun tanning behaviour as well as the necessary protection
- → has the possibility to make healthy choices which eliminate or reduce the effects of harmful UV radiation.

Measures for earlier detection of skin cancer should facilitate that

- → every person understands and recognizes the early signs of skin cancer both when it comes to themselves or when it comes to the people they are responsible for
- → every person can seek and be taken care of by competent health services
- → the health services have knowledge about, and appropriate equipment and procedures for earlier detection of skin cancer.

To succeed, the Governmental Authorities and the society must carry out a cross-sectorial public health work with the means, resources and measures, as proposed in the sub-strategies.

The strategy is developed in line with the National Cancer Strategy "Leve med kreft, Nasjonal kreftstrategi (2018-2022)", ("Living with Cancer, National Cancer Strategy (2018-2022)"), about being targeted and personalized. Measures will facilitate giving increased knowledge and information about the link between exposure to UV radiation and skin cancer enabling everybody to make healthy choices.

1.4 About the work with the strategy

In January 2015, the Norwegian Institute of Public Health published a comprehensive overview of the occurrence, causality connections and measures for preventing melanoma, mandated by the Ministry of Health and Care Services (Magnus and Brunborg, 2015). They concluded that it is important with repeated information about sun protection, targeted measures in schools, kindergartens and for other vulnerable groups, and that the consequences of banning sunbeds in Norway should be examined.

In the period 2017-2018, the Ministry of Health and Care Services gave the Norwegian Radiation Protection Authority (NRPA), (now the Norwegian Radiation and Nuclear Safety Authority), the task of establishing and coordinating a national working group. The aim of this working group was to prepare a proposal for a national UV- and skin cancer strategy, including an action plan to reduce the occurrence and mortality of skin cancer in Norway. This strategy should cover the primary and secondary prevention of all types of skin cancer. Diagnosis, treatment and follow-up of melanoma are covered in the "Nasjonalt handlingsprogram med retningslinjer for diagnostikk, behandling og oppfølging av maligne melanomer" ("National Action Plan with guidelines for diagnostics, treatment and following up of malignant melanoma"), which is managed and directed by the Norwegian Directorate of Health.

NRPA established and headed a working group with representatives from authorities, with the competence and means to support the work: the Norwegian Directorate of Health, the Norwegian Institute of Public Health, the Cancer Registry of Norway, the Ministry of Local Government and Modernisation, and Bærum municipality. Furthermore, relevant authorities and experts, voluntary organizations and interest groups were invited to participate in a reference group. These have contributed to the work within specific areas and have contributed with additional competence. For more information on the mandate, the working group's composition, way of working and members of the reference group, please see attachment 2.

The Ministry of Health and Care Service's NCD strategy "NCD-strategi 2013-2017» forms the basis for the work with this strategy. The NCD strategy is based on recommendations from WHO regarding prevention of the four dominant, non-communicable diseases (cardiovascular diseases, diabetes, chronic respiratory diseases and cancers). The goal of the NCD strategy is to reduce early death as a result of these diseases by 25% by the year 2025. Prevention of skin cancer can potentially contribute significantly to this reduction. The proposed strategy and measures against the pronounced observed growth in occurrence of skin cancer have clear parallels with the NCD strategy, with cross-sectoral public health work as a key ingredient.

The work is rooted in DSA's strategic plan 2018-2020, and will supplement the latest cancer strategy "Leve med kreft, Nasjonal kreftstrategi (2018-2022)" ("Living with Cancer, National Cancer Strategy (2018-2022)").

1.5 Follow-up and duration

The strategy provides a framework for DSA's work with UV radiation and skin cancer, including a framework for cooperation with other authorities. The strategy is valid for the period 2019-2023.The strategy will be implemented within annual government budgets, subsidies and relevant parliamentary papers. The strategy will be a tool for managing and coordinating the preventive skin cancer work in several sectors. DSA will establish a national coordination group who will follow up the strategy. The coordination group will consist of representatives from authorities with the competence and means to support the work. DSA will report the result of the strategy achievements to the Ministry of Health and Care Service through the normal dialogue with the Ministry.

1.6 Economic and administrative consequences

Oslo Economics have compiled a report "Samfunnskostnader forbundet med hudkreft" ("Costs, associated with skin cancer, for the society"). This report was an assignment from DSA. Based on their calculations, the annual total costs for the society associated with skin cancer are estimated to be in the magnitude of 6.5 BNOK. This calculation is based on today's regime with respect to prevention and treatment.

As for other types of cancer, health loss is the factor that makes up the largest part of the combined costs for the society. This health loss is a result of years of life lost and lost quality of life. This cost is estimated to be in excess of 5 BNOK. The health service costs are estimated to be around 450 MNOK while the cost of care is calculated to be approximately 150 MNOK. Furthermore, the loss of productivity for the society, (cost of working days lost), makes up about the same as the combined costs of the health and care services (600 MNOK).

Due to aging of the population, the number of new cases of skin cancer is expected to increase in Norway in the coming years. A simple prediction of the costs associated with health and care and the costs for the society suggests costs of 1 BNOK and 11.5 BNOK respectively in the year 2034. 2034 is the last year the prognostic model has estimates for.

If the proposed measures result in an achievement of the goal of a 25% reduction in the increase in incidence of skin cancer by the year 2034 (i.e. earlier than the goal of a 25% reduction by the year 2040), the corresponding costs will be 750 MNOK (health and care costs) and 8.7 BNOK (costs to the society), respectively. This comprises a reduction in the costs for the year 2034 of 250 MNOK and 2.8 BNOK, respectively. The reduced health care costs can be retrieved through lower expenditure or by providing improved health care services to other patients. In the same way, reduced sick leave and fewer disability benefits will provide a saving for both the business world and for the Norwegian Labour and Welfare Administration (NAV). Reduced mortality is of great value to the society but is not apparent from public accounts.

Cost estimates include costs related to melanoma, squamous cell carcinoma and basal cell carcinoma. There is a lot of uncertainty associated with all types of costs connected to squamous cell carcinoma and basal cell carcinoma. This is due to the fact that reliable estimates are not available for the annual incidence rate of basal cell carcinoma. Furthermore, a data registry for the cost of treatment is not available. With regard to melanoma, there is also an amount of uncertainty connected to medical treatment and care. This is because the statistics do not distinguish between the use of drugs to treat different types of cancers. The effect of treatment and the cost of using new expensive life-prolonging drugs, can be underestimated in the analyses since new treatment methods is introduced and increases in use. Furthermore, the costs will be underestimated because the report includes the number of patients that are annually diagnosed with melanoma and not the number of cases (as given in table 1 in the strategy). Some patients experience more than one diagnosis of skin cancer within the same year. Diagnoses and treatment of in situ cases (pre-cancer lesions) are also not included in the calculations.

The different measures that are proposed in the strategy will to a various degree have both administrative and economic consequences. The majority of the proposed measures may be carried out within the existing budgets and do not assume any administrative changes. The consequences associated with some of the measures will first become apparent in the investigative and implementation phases.

The intention is that DSA will have a central role in the implementation and follow-up of the skin cancer strategy. This will include coordination and management of the development of information products, training material and guidelines, communication of knowledge to other administrative bodies, schools/teachers and interest groups, organize courses and meeting arenas, campaigns, active

communication and media follow-up, communicate measurement and monitoring results from UV radiation, evaluation of measures etc.

2 Sub-strategies

2.1 Prevention in the administrative sector

Goal 1 – Prevention of skin cancer through Governmental, county and municipal administration

In order to reverse the trend of increasing incidence of skin cancer, systematic and long-lasting measures are required in the administration of the regulations for health, planning and building, working environment and education. Countries such as Denmark, Australia and New Zealand have chosen a long-lasting strategy by developing a systematic "sun policy". Several decades after the introduction of the sun policy, the incidence rates of skin cancer have decreased in Australia.

Those who will perform this work at the various administrative levels (ministries, directorates, counties and municipalities) require access to quality-controlled knowledge about UV radiation and prevention as well as the resources to follow up and carry out the work. They also require access to examples of relevant preventive measures, as well as training and guidance material for, among other things, assessing risk and prioritizing in each individual municipality. This can for example be the significance of geography, seasons, weather conditions and other possible local conditions. Various public health networks already exist, and the preventive skin cancer work should build upon and strengthen their competence with respect to UV radiation and health effects.

Considering that both the Act on Radiation Protection and the Regulations on Radiation Protection have a legal basis that covers the objective of this strategy, the establishment of a group with interdisciplinary competence and led by DSA, would be natural. The group's task would be to communicate the relevant regulations; quality-assured knowledge, information and experience to the various administrative levels. This also includes the communication of and use of results and measurement data from the National UV Monitoring Network. When it comes to increasing knowledge and awareness about the prevention of skin cancer in the population, a similar need is expected. Likewise, it is natural that the group stays updated about research on UV radiation connected to prevention of skin cancer and can identify challenges facing the research and its needs.

The Public Health Act, the Planning and Building Act and the Working Environment Act with associated regulations, including the Regulation on Environmental Health Care, the Regulation on Environmental Health Care in Kindergartens and Schools, Regulations on Technical Requirements for Construction Works and Internal Control Regulations, provide sufficient and appropriate legal basis to accommodate the prevention of skin cancer from a public health perspective. It is, however, a challenge that guidelines, circulars, and national expectations to local planning associated with these Acts and Regulations, only to a small degree emphasize or give advice on how protection against the Sun's UV radiation should be assessed or facilitated in practical administration. Work with prevention against harmful UV radiation should be embedded in and put into operation at several administrative levels. It should be a part of the local planning processes for areas such as schools, kindergartens, urban spaces, sport facilities, leisure areas, beaches, parks, work places and outdoor arrangements etc.

The overlying National Cancer Strategy has pointed to the significance of cooperation between various administrative levels and academic communities and has established "Partnerskap mot kreft" ("Partnership against cancer") as a platform. This cooperation should include this strategy for additional coordination.

Access to shade, reduced exposure time in intense sun, protective clothing and use of sunscreen reduces the amount of UV radiation to the skin and give reduced risk for sunburn and other sun damage. This will reduce the risk for DNA damage in the skin, reduced immune response, changes due to skin aging and skin cancer. Availability of sun protection can influence the use. The coordination group should consider

incentives to increase the use of sun protection for example through regulations and certification (for example Blue Flag, Green Key etc.)

Administration of regulations for sunbeds

A considerable exposure situation for UV radiation is the use of sunbeds for cosmetic purposes. Regulations for sunbed use were introduced in 1983. In the course of the previous years, new requirements for reducing UV exposure have been introduced. These include an 18-year age limit (from 1st July 2012), age verification (1st January 2017), competency requirements for those involved in the sunbed business (from 1st January 2016) and stricter obligation to inform customers about the risks connected to sunbed use (1st January 2015).

There is widespread availability of sunbeds in Norway, with approximately 5500 sunbeds registered in use in DSA's register as of May 2018. The NCS' survey on sun habits and youth survey showed that every tenth Norwegian had used a sunbed at least once in the course of the past year and one in four in the age group 15-24.

Experience from inspections of sunbeds has shown that the sunbed industry only complies with regulation requirements to a limited extent. Inspections carried out in 1998-99, 2003 and 2008 uncovered substantial use of illegal and/or too strong radiation sources despite the fact that the requirements to radiation sources have existed since 1983. The requirements to age verification have currently only been implemented to a limited extent. The results from the inspection of 460 businesses in the autumn of 2017, showed that 45% lacked a satisfactory age-verification system and that 51% did not fulfil the competency requirements. Violations of age requirements are regarded as serious, and sanctions that are more effective should be considered. Inspections also reveal that sunbed users receive conflicting information. On the one hand they are warned by the authorities against the use of sunbeds, while on the other hand they are informed by those owing tanning salons about the positive effects of sun, for example as a source of vitamin D and as a means of preparing the skin before traveling to sunny destinations.

The first recommendations regarding the regulation of the use of sunbeds were published by WHO in 2003. In 2009, The International Agency for Research on Cancer (IARC) classified sunbeds as carcinogenic. Later studies have confirmed IARC's conclusions. The risk of developing skin cancer is seen to be highest when sunbed use begins at a young age and this risk increases the more frequently sunbeds are used. In 2017, WHO updated its recommendations. The updated recommendations included a description of several options for regulation – from a ban to varying degrees of restrictions (advertisement ban, introduction of fees, etc.). An EU report from 2016 determined that sunbeds were the cause of a significant number of melanoma cases amongst those who were under 30 years of age. The report concluded that UV radiation from sunbeds both initiates and promotes development of cancer in the skin, that there is no threshold neither for UV radiation (irradiance) nor for UV exposure (dose), and that there is therefore no safe lower limit for the use of sunbeds. As of 2017, over 40 countries have introduced national regulations for sunbeds with a ban for the younger age groups (as in Norway) or a complete ban (as in Australia and Brazil). A complete ban effectively reduces UV exposure and eliminates the current need for resource- and competency demanding administration of sunbed legislation (approvals, announcements, guidance, inspections). At the same time, a complete ban will remove the economic basis for sunbed businesses.

Measures and participants

Measure 1.1	Establish a national interdisciplinary coordination group in 2019, which will follow up the strategy under the leadership of the Norwegian Radiation and Nuclear Safety Authority (DSA).

Measure 1.2 Include prevention of skin cancer in the cooperation forum “Partnership against cancer”.

Measure 1.3 Consider revising guidelines, circulars and national expectations associated with relevant legislation to ensure that prevention of skin cancer is included within the year 2020.

Measure 1.4 Facilitate inclusion of skin cancer prevention in local systematic public health work within the year 2021.

Measure 1.5 Bring skin cancer prevention on the agenda and increase the competence about skin-cancer prevention within network and cooperation fora for public health at local, regional and national levels.

Measure 1.6 Change the Act on Radiation Protection by adding a legal basis for demanding closure if requirements connected to age verification are violated.

2.2 Knowledge and awareness about prevention

Goal 2 – Increased knowledge and awareness about prevention of skin cancer in the population

Knowledge, reflection and skills are systematically acquired by the population through the educational pathway.

That a high level of competency exists in Norwegian universities, research environments and administration, is of significance for the effective implementation of the strategy. Research is important in terms of filling the knowledge gaps, which are required for specific and targeted prevention. Relevant research areas may include, e.g. clarifying the causal relationships behind the high incidence and mortality of skin cancer in Norway, clarifying the measures that have an effect, as well as mapping the potential bottlenecks with respect to diagnostics.

Experience from other countries (including Australia, Denmark and New Zealand) shows that the population’s knowledge about skin cancer prevention has been increased through the general educational pathway. In particular measures targeted towards kindergartens, primary schools, outdoor workers, outdoor leisure activities and tourism have shown good results. Individually directed communication to raise awareness and knowledge, adapted with respect to time, location and target group (e.g., smart phone applications with UV forecasting and prevention guidance, etc.) has also demonstrated good results. Further effects are achieved by combining individually directed strategies (e.g., educational) with environmental and policy changes (e.g., creating shade areas, using school-based policies to restrict outdoor activities during peak UV radiation hours).

Knowledge about the significance of one’s own tanning behaviour and harmful health effects are important to communicate to the general population, as well as to risk groups and their caretakers. Risk groups include persons with increased risk of skin cancer and persons who may experience overexposure to UV radiation at work or in their leisure time. Institutions and organizations with such responsibility can be:

- → leisure and sports organizations that include outdoor activities for children and adolescents
- → tour operators and other businesses within tourism
- → employers with environment, health and safety (EHS) responsibility for employees who fully/partially work outdoors
- → Volunteer organizations (NGOs).

The importance of one's own tanning behaviour can be crucial for patients using medications with increased risk of skin cancer as a known side effect, e.g., immunosuppressant medications. Doctors prescribing such medications must become familiar with these possible adverse side effects and they must inform their patients about the effects.

Development of applications with positioning, artificial intelligence and machine learning may enable individually directed preventive measures. Examples include UV forecasting for your present location, individually adapted sun protection guidance and information about suspicious lesions with signs of skin cancer. Development of high-quality camera technology, artificial intelligence and machine learning for image analyses, opens new possibilities for detecting skin cancer within the near future.

It is important to evaluate to which extent the proposed measures meet the aims of the strategy and have the expected effect. Changes in incidence and mortality rates are registered by the Cancer Registry of Norway (CRN). However, it takes longer time than the five-year time frame of this strategy to see any such changes. Therefore, the coordination group must evaluate and measure temporary changes. Periodic population surveys can be used to monitor tanning behaviour, extent of sunburns, and use of sun protection measures, as these are indicators for future development of skin cancer and hence whether or not the strategy meets its aims. The Norwegian Research Centre for Health Services may be asked to perform literature search with respect to evidence-based measures. CRN has established a clinical registry for melanoma, which contains comprehensive high-quality data for diagnostic measures, therapy, and follow-up. To find more detailed causes to melanoma initiation, progression and recurrence, it is essential to also implement patient-reported outcome measures, PROMs.

Measures and participants

Measure 2.1	DSA should cooperate with childcare, schools and other relevant occupational sectors to contribute to increase knowledge about skin cancer prevention in children and the relevant occupations.
Measure 2.2	Prepare clear and targeted communication about skin cancer prevention for the general population and particular risk groups.
Measure 2.3	Implement information campaigns regarding primary and secondary skin cancer prevention.
Measure 2.4	Facilitate development and use of apps and other technology for personalized skin cancer prevention, for example for UV forecasting and personalized sun protection guidelines.
Measure 2.5	Perform regular monitoring of available research regarding preventive skin cancer measures, and follow trends in exposure, knowledge and behaviour among the public.
Measure 2.6	The coordination group is given the assignment to identify research needs and challenges related to skin cancer prevention.
Measure 2.7	Establish PROMs (Patient Reported Outcome Measures) for melanoma
Measure 2.8	DSA should stimulate Norwegian researchers to apply for research grants from the Norwegian Research Council and the Framework program for research and innovation from EU to achieve more precise and targeted skin cancer prevention.

2.3 Earlier detection

Goal 3 – Targeted and earlier detection of skin cancer

Early identification of a lesion can lead to less extensive treatment (simple surgery). For melanoma, early detection is vital with respect to survival. Detection and treatment of skin cancer usually takes place in one operation by the regular GP, i.e., this is the situation for more than half of the melanoma cases. Lesions suspicious of malignancy are always to be sent to histological examination for confirmation. If melanoma is confirmed, further treatment takes place at the specialist health services.

CRN's statistics show the highest incidence rates of melanoma in the age group above 70 years, in particularly for men, who are diagnosed with more advanced disease and have the highest mortality rate. Some forms of melanoma show particularly aggressive development. It necessitates measures at all stages to achieve earlier detection and potential for curative treatment, (i.e., attention regarding signs of skin cancer in the population and among the GPs, as well as short waiting time at the specialist health services).

Every person is herself/himself the key factor for her/his own health. It is essential to increase awareness and knowledge about signs and symptoms of skin cancer in her/his own skin or of her/his relatives, by periodic self-examinations. On the other hand, one should avoid creating "health anxiety" in the population. Many persons have a large number of moles that will never develop into skin cancer. It is often the one mole that changes or appears very different than the surrounding moles ("ugly duckling") one should focus on.

Prevention and treatment of skin cancer are already included in the proposal for new guidelines for medical education, and medical students learn about the topic as part of their education. Furthermore, it is presupposed that learning objectives with respect to prevention and treatment of skin cancer are implemented in the relevant specialist training programs. DSA should pay attention to how this is followed up and possibly assist the universities in improving the training.

In 2014, Norwegian dermatologists initiated participation in the European campaign Euromelanoma, including a low-threshold skin examination offer. This attention campaign was carried out in cooperation with the Norwegian Cancer Society in the years 2014 to 2017, and with high participation and broad media coverage. Information campaigns on prevention or on early detection of skin cancer have so far not been initiated or implemented by the health authorities.

It can be difficult to make the correct diagnosis. The Norwegian Directorate of Health has recently released a diagnosis guide for melanoma aimed for GPs. However, it needs to become better known to the doctors. The guide covers the most common type of melanoma, i.e., those with classic characteristics (ABCDE-rule):

A. Asymmetrical, irregular shape or two halves that look very different
B. Border, irregular or jagged
C. Colour, uneven or black parts
D. Diameter, larger than 6 mm
E. Evolving, changed during the past weeks/months, itches, bleeds.

The diagnosis guide is less clear when it comes to a more aggressive type of melanoma with other characteristics («the ugly duckling»; EFG-rule):

E. Elevated

F. Firm

G. Growth.

Systematic challenges are the low availability of dermatologists, the limited competence about skin cancer among the GPs, as well as a closer dialogue between the GP and the dermatologist. There is a need for raising doctors' awareness about skin cancer and lower the threshold for performing skin examinations, along with a need to inform about healthy sun habits, photosensitizing drugs and signs of skin cancer. When skin examination is an additional task during a GP consultation, there are tariffs that can cover the extra time it takes.

It has been evaluated whether melanoma screening should be introduced in Norway, for the entire population or by risk groups (see Attachment 1). This evaluation conclude that screening is neither an appropriate nor feasible measure. Screening with systematic and regular clinical examination of healthy individuals, e.g. annually or biannually, could improve the mortality marginally. An important prerequisite for such screening is that the benefits (reduced mortality) must clearly exceed the disadvantages (such as overdiagnosis and over-treatment). However, studies from Germany among other countries have not proven any reduction in mortality due to melanoma screening and at the same time suggested an overdiagnosis of as much as 30%. Overdiagnosis and over-treatment of melanoma will place a significant burden on both patient and society. The patient is subjected to unnecessary worries, unnecessary treatment and unnecessary follow-up, and the society incurs great costs.

New technological tools are also being developed within dermatology based on modern communication technology. Teledermatology combines dermatoscopy (examination of skin with optical device), telemedicine and e-health applications (smartphone, tablet and the like). Such solutions can solve capacity problems, especially in areas with low specialist coverage, and at the same time contribute to the dissemination of knowledge from specialists to GPs.

Inadequate or incomplete referral practices appear to be a general problem in the interaction between the primary and the specialist health service, according to a survey by the Office of the Auditor General of Norway in 2017 (OAG 2017). Experience with referral practice for skin cancer also shows that lack of clarification of indication (melanoma versus other types of skin cancer) and inaccuracies regarding mandatory patient information may give rise to delays in treatment and further follow-up. This can represent a significant barrier to being included in the more structured Cancer pathway for melanoma. The large volume of skin cancer, other than melanoma, along with limited availability of dermatologists, lead to longer waiting time before treatment.

Increased focus on earlier detection of melanoma will result in increased pressure on pathology capacity. Increased focus is also needed on the quality and quality assurance of the pathological methods and procedures. Relevant measures have already been mentioned in the National Cancer Strategy "Leve med kreft. Nasjonal kreftstrategi (2018-2022)". ("Living with Cancer, National Cancer Strategy (2018-2022)"), Target Area 2, Sub-target: "Establish adequate capacity in pathology, imaging (CT, MRI, PET-CT) and endoscopy through recruitment, proper staffing and task distribution, enhanced specialist expertise and up-to-date equipment".

Measures and participants

Measure 3.1 Increase knowledge and awareness about potential malignant lesions and responsibility for own skin health through reliable and easy understandable information and use of evidence-based communication measures.

Measure 3.2 Increase knowledge and awareness about potential malignant lesions among general practitioners and employees in the health and care services.

Measure 3.3 Ensure that necessary and precise information is included in the referrals to specialists (pathologist, dermatologist, surgeon) to reduce delay in diagnosis and treatment.

Measure 3.4 Assess possibilities of implementing teledermatology/dermatoscopy as an alternative part of the referral process.

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dsa@dsa.no
+47 67 16 25 00
dsa.no

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