

ORGANIZATION OF RADIOTHERAPY AND CLINICAL ONCOLOGY IN SWEDEN

A historical review

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The organization of radiotherapy and oncology in Sweden is described, from the first small pioneer roentgen institutes, via the early Radiumhemmet and King Gustaf V's Jubilee Clinics, up to the present organization with its regional coordinating oncologic centres and departments of oncology and radiotherapy at the regional hospitals, as well as at some large central county hospitals. The great importance of Gösta Forssell's early organizing work and foresight for this development is underlined.

In this article the development of the way radiotherapy and oncology is organized in Sweden is sketched. The period up to 1946 is a part of history also for the author and the description is therefore based on reports by Elis Berven (1, 2) and Eva Gustavson-Kadaka (3). The review of the period from 1946 onwards has more of an 'insider' character because of the author's experience from Radiumhemmet in Stockholm and the department of oncology and the coordinating oncologic centre in Umeå. The author was also a member of the subcommittee, chaired by Sven Alsén, which mainly prepared the guidelines for the planning of oncology, issued by the National Board of Health and Welfare in 1974 (4); other members of this group included Jerzy Einhorn, Gustaf Giertz and Jan Waldenström. These guidelines still constitute the basis for the organization of oncology and radiotherapy in Sweden. The article concludes with some personal comments.

The early years

Two Swedish private practitioners, Thor Stenbeck and Tage Sjögren, pioneered and established two small roent-

gen institutes in Stockholm in 1898, a few years after Röntgen's discovery of x-rays. In 1899 they administered x-ray treatment to some patients with skin cancer, with promising primary results (4, 5). One of Stenbeck's cases was a woman of forty-nine with an extensive basal-cell carcinoma on the nose. She was treated with 99 fractions for about 3 months, with daily observation of the reaction. Despite the lack of a physical dosimetry the healing was uneventful and the case was presented at the 2nd International Congress of Radiology in Stockholm 1928 as probably the first cancer patient in the world cured by radiotherapy (2). In 1899 Thor Stenbeck recruited as assistant a young medical student, Gösta Forssell, who was to become the foremost organizer of Swedish radiology. In 1903 a small diagnostic x-ray department led by Forssell was established at the teaching hospital in Stockholm (Serafimer Hospital) and in 1908 it was extended to include a room for x-ray therapy.

Radiumhemmet ('The Radium Home')

Through the initiative of both the professor of surgery John Berg and Gösta Forssell Radiumhemmet was established in 1910, a small institute in Schéelegatan in Stockholm with one x-ray machine, 11 radium preparations totalling 120 mg, and 16 beds. In 1917 Forssell became professor of medical radiology at the Karolinska Institute and in 1936 professor of roentgen diagnostics at the same institute. During the early years he was head of both the

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radiology department at the Serafimer hospital and Radiumhemmet. He realized, very early, however, that diagnostic and therapeutic radiology had to develop as separate specialities and in 1913–1914 recruited two young doctors, Elis Berven and James Heyman, who became the actual leaders of the general and gynaecological divisions of Radiumhemmet. The location at Schéelegatan soon became too small and in 1916 Radiumhemmet moved to Fjällgatan in Stockholm (a place still worth a visit for its wonderful outlook over the sea approach to Stockholm). Forssell now affiliated to Radiumhemmet also the physicist Rolf Sievert and the pathologist Olle Reuterwall. Sievert became world famous for his work in radiation dosimetry and radiation protection, while Reuterwall became the real founder of clinical tumour histopathology in Sweden.

Radiumhemmet, which was initially a private institute that was generously supported by donors, but soon became a national institution receiving increasing support from official authorities such as the Stockholm city council and the Swedish government. In 1918 the parliament decided to allow patients without means free transportation to and from Radiumhemmet, which was an important benefit prior to the establishment of a general, compulsory insurance system. A follow-up system was early organized and this was of great importance to the understanding of the biology and behaviour of malignant tumours. A special statistics department was opened in 1921 and from that time a statistical analysis of cancer treatment results was published annually. Very early, James Heyman stressed the importance of clinical staging and elaborated a staging system for cervical cancer that in 1929 was accepted by the League of Nations as the international guideline. It is still used, though with some modifications, and has become the model for the TNM system now introduced for many types of cancer.

King Gustaf V Jubilee Clinics

The nation's gift to King Gustaf V on his 70th birthday in 1928, the result of a nation-wide collection, was of great importance for the organization of radiotherapy and oncology in Sweden. The king and his wife Queen Victoria had a deep interest in cancer care and, influenced by Gösta Forssell, decided that the gift should be used for cancer treatment and research. The result was the building of the 'King Gustaf V Jubilee Clinics' in Stockholm, Lund and Gothenburg, all integrated with general teaching hospitals. The first of these Jubilee Clinics (still known as Radiumhemmet) was inaugurated in 1937 as the first department of the new teaching hospital 'Karolinska sjukhuset'. Another interesting fact is that a certain amount of capital was reserved for a possible future unit in northern Sweden which, however, at that time had no hospital regarded as sufficiently differentiated for a Jubilee Clinic. The three

Jubilee Clinics had defined uptake regions with 2–3.5 million inhabitants in each and represented the first firmly organized regional acute health service in Sweden. The Cancer Society in Stockholm had previously been responsible for Radiumhemmet but the responsibility for the Jubilee Clinics was now taken over by the state and the county councils.

When examining the development of radiotherapy in Sweden one must admire Gösta Forssell's organizing ability and foresight. He early realized that radiotherapy should be developed as a separate speciality, and not only did he give it a strong clinical position but he also understood the importance of radiophysics and tumour pathology as supporting sciences. It was also prudent to integrate the Jubilee Clinics with the large general teaching hospitals, thus avoiding isolated 'radium institutes' or 'cancer hospitals', which would have fitted badly into the Swedish hospital system of today.

In many ways the Jubilee Clinics functioned more as oncology departments than purely radiotherapy institutions. Owing to the regionalization and the intimate collaboration with different surgical specialities they also played an important role in the development of cancer surgery in Sweden. The strong clinical orientation is mirrored in the monographic doctoral theses from Radiumhemmet in 1930–1960 concerning, for example, malignant tonsillar tumours (E. Berven), skin cancer (H. Magnusson), soft tissue sarcomas (G. Jönsson), mucous and salivary gland tumours (H. Ahlbom), lip cancer (B. Ebenius), tongue cancer (F. Jacobsson), skin sarcoma (H. Gentile), and breast cancer (B. Nohrman). These theses utilized the abundant patient material collected at Radiumhemmet and are primarily clinical and clinicohistopathologic studies even though radiotherapy aspects were especially considered. Olle Reuterwall and his successor Lars Santesson played an important role in many of these studies with their reclassification and grading of the histology; being very modest persons, however, their names usually appear only in the 'Acknowledgements'.

Regional hospital planning

Owing to the increasing specialization within clinical medicine, it became obvious during the 1950s that Sweden needed a hospital organization that could serve the whole country also with very specialized medical care. In 1956 the chief of the National Board of Health, Dr Arthur Engel, was appointed by the government to study this matter and give advice on a suitable organization. He defined some specialities which required a region of about one million inhabitants or more for a rational service from a medical and economic point of view (7, 8). At that time these specialities were dermatology, neurology, cardiology, rheumatology, urology, pediatric surgery, neurosurgery, thoracic surgery, radiotherapy/oncology, clinical physiol-

ogy and oral surgery centra. Units for dermatology, neurology and urology could, however, also be developed at county central hospitals. Based on these proposals the parliament in 1960 decided that Sweden should be divided into seven regions, each with a highly specialized s.c. regional hospital. Five of them were identical with the university hospitals in Lund, Gothenburg, Stockholm, Uppsala, and Umeå, while two were modelled on the county central hospitals in Linköping and Örebro. The consequences for radiotherapy during the 1960s were the establishment of a Jubilee Clinic in Umeå (the name motivated by the mentioned reservation in King Gustaf V Jubilee Fund) and the expansion of existing radiotherapy departments in Uppsala, Linköping, and Örebro to regional departments. By the end of the 1970s, however, the number of regions was reduced to six. The hospital in Linköping had now become a teaching hospital and after the revision the regional hospitals were identical with the university hospitals in Lund, Gothenburg (Sahlgrenska hospital), Linköping, Stockholm (Karolinska hospital), Uppsala and Umeå, each with a region containing c. 1–2 million inhabitants (9).

Oncology and coordinating oncologic centres at regional hospitals

As mentioned earlier, the Jubilee Clinics in practice functioned more as cancer departments than purely radiotherapy units. After the Second World War when cytotoxic and endocrine therapy gained increasing importance, such methods were widely used in the radiotherapy departments also. The rising incidence of cancer, the increasing importance of systemic treatment and the advances within cancer surgery and radiotherapy resulted in lively discussion of the organization of cancer control during the 1960s and 1970s. Official commissions analysed the question within WHO and in several countries such as USA, France, UK, Canada, Denmark and Norway. In Sweden two specific controversial issues came up toward the end of the 1960s. One was a plan requiring extreme organ specialization of oncology at the Karolinska Hospital, which would have converted Radiumhemmet to a service unit without its own beds and its own clinical responsibility. The other issue concerned plans to establish small radiotherapy departments at several hospitals in Stockholm. There was also some polemic concerning the organization of oncology in *Läkartidningen*, the journal of the Swedish Medical Association (10, 11).

In 1970 the National Board of Health and Welfare appointed a commission in order to study the question. The commission presented its report in 1972, and in 1974 after hearing about concerned authorities and societies, the National Board of Health and Welfare issued advice and guidelines on the planning of oncology (4). As a consequence the former radiotherapy specialities were converted

to 'general oncology' and 'gynaecological oncology', internal medicine was included in the basic training for these specialities, and special positions as consultants in internal medicine were established at the oncology departments as an intermediate step. The total resources for cancer care at a regional hospital should, according to the recommendations, be regarded as an oncologic centre. Some specific coordinating functions were defined for an oncologic centre such as regional cancer registration and statistics, elaboration of regional treatment and care programmes for cancer diseases, creation of suitable forms of interdisciplinary collaboration within the regional hospital, information about cancer diseases to doctors and hospitals within the region, advice concerning screening programmes and preventive cancer work, and so on. In order to administer some of these functions, special offices were established at all regional hospitals, usually headed by one oncologist and with a staff of statisticians, social workers and medical secretaries. These coordinating units are now generally called 'oncologic centres' even though this term originally meant the total cancer resources at the regional hospital.

Radiotherapy and oncology at county hospitals

In Sweden the county councils have an autonomous responsibility for the medical service, and the government and its organ the National Board of Health and Welfare can only give advice. There are 24 county councils including two larger cities (Gothenburg and Malmö) which have their own health administrations. Each county—except for some counties with a regional hospital—has at least one fairly differentiated central county hospital and as a rule also one or more smaller hospitals. Up until the 1970s all central county hospitals and also some smaller hospitals had s.c. undivided radiology departments with equipment for orthovoltage x-ray therapy. Because of the physical and technical development of radiotherapy and the dramatically reduced use of radiotherapy for non-malignant conditions this activity has almost completely ceased. However, special radiotherapy departments (later on changed to oncology departments) have since the 1940s been successively established at some large central county hospitals such as in southern Stockholm (Södersjukhuset), Malmö, Gävle, Örebro, Borås, Jönköping, Karlstad, Västerås and Eskilstuna. All these hospitals have now supervoltage equipment and departments for medical physics.

In Sweden the establishment of oncology/radiotherapy units outside the regional hospitals has always been somewhat controversial. The National Board of Health and Welfare has thus usually been negative towards such establishments because they might interfere with the regional hospital planning. In its 1974 guidelines the Board recommended employment of oncologists at county central hos-

pitals but without radiotherapy resources. This was later realized at some county central hospitals, while in others the need for oncologic expertise was met by consultants employed by the regional oncology departments who visited the county hospitals on a regular basis.

Regardless of these controversies, the oncology departments at county central hospitals play an important role and ensure that more cancer patients can be treated by specialists. They can also provide for the great need of palliative cancer treatment. General agreement usually exists between the county and the regional departments on which types of tumours should be centralized or treated at the county level. Through regional treatment and care programmes the county departments also become an integral part of the regional cancer control programme.

Huddinge hospital, the new large teaching hospital south of Stockholm, has experienced a unique problem. The plans for this hospital included a department of oncology with radiotherapy resources, but when the hospital was built around 1970 this department was for economic reasons postponed for an unspecified period. At present, however, plans have been advanced for such a department and also for a second professorship in oncology at the Karolinska Institute, with working place at this unit. When the unit is established it will probably serve as regional department for the southern part of the Stockholm region and take on the resources for oncology/radiotherapy at present existing at the Southern County Hospital in Stockholm (Södersjukhuset).

Comments

History and tradition play a great role in the organization of medical care. In Sweden a direct line can be traced from Gösta Forssell's organization of Radiumhemmet and later on the King Gustaf V's Jubilee Clinics up until today's regional oncology departments and coordinating oncologic centres. The cancer work at a general regional hospital can be described as a network of the resources for cancer control at the hospital, a network in which the oncology department and the coordinating oncologic centre serve as the cohesive agents. However, if a general regional hospital is to function as a cancer centre also, many specialists in other departments, e.g. general surgery, urology, head- and neck surgery, plastic surgery, haematology, pulmonary medicine and paediatrics, must concentrate their interest on cancer, which is also the case at present.

On the international scene there are many advocates of comprehensive cancer hospitals. It is often pointed out that one of the advantages of such hospitals is that all patients are treated by cancer specialists. Also, from a research point of view comprehensive cancer hospitals can offer some advantages. However, even in most countries with such hospitals most of the cancer patients are still taken care of at general hospitals. The advantages of

integrating oncology with large general teaching hospitals are that more doctors gain experience of cancer patients during their specialist training, that the patient material can be better used for the education of medical students, and that the system makes better use of the economic resources. In Sweden, as in the other small Nordic countries, comprehensive cancer hospitals have in modern times not been a realistic alternative. The Norwegian Radium Hospital in Oslo can be regarded as an exception with a historical background. It is without doubt a well-functioning hospital with impressive resources for cancer treatment and research. However, if these resources were to be established today they would almost certainly be integrated with the large national teaching hospital in Oslo.

In Sweden the present speciality 'oncology' is an integration of radiotherapy and medical oncology. The organization in the other Nordic countries is very similar. In Denmark the speciality is also called 'oncology', while in Finland and Norway it is called 'oncology and therapeutic radiology'. The existence of this speciality does not of course mean that all the systemic cancer therapy within the hospital is performed by oncology departments. It ensures, however, that one category of physicians can concentrate fully on cancer diseases and their non-surgical treatment. Since the change of name there has also been an influx to these departments of young doctors with basic training in internal medicine and with a special interest in systemic cancer treatment. There are, to the author's knowledge, at present no plans in the Nordic countries to split up the speciality into radiation oncology and medical oncology. However, Denmark, Finland and Sweden are now members of the European Union and most countries in the EU have 'medical oncology' as a speciality. If this, perhaps in combination with the increasing complexity of systemic treatment (for instance, s.c. biological methods), were to lead to a subspecialization into radiation oncology and medical oncology also in the Nordic countries—the author hopes not—these specialists would preferably work in the same departments.

The speciality 'gynaecological oncology' seems to be unique to Sweden. It has, however, a strong historical background and is also rational as the examination and treatment methods require special gynaecological training. In some departments of gynaecological oncology extensive cancer surgery is also performed, which is possible because the heads of the departments have an extensive training in surgery and gynaecology. At other departments, however, this surgery has been transferred to departments of general gynaecology where it is performed by persons specialized in gynaecological cancer surgery.

It may seem strange that a country that can cite names such as Gösta Forssell, Elis Berven, James Heyman, Hans-Ludvig Kottmeier, Hugo Ahlbom, and Magnus Strandqvist no longer has a speciality called 'radiotherapy'. In Sweden when the name changed from 'radiother-

apy' to 'oncology' there was also some concern that the quality of routine radiotherapy and research and development within radiotherapy and clinical radiobiology would suffer. As far as the author can judge this has not been the case and in all university hospitals there are groups of oncologists working within these fields. All radiophysics departments in the university hospitals have special divisions for dosimetry and clinical dose-planning which play an important role in both the routine work and research. Also of importance are the therapeutic radiographers (in Sweden now called oncology nurses) who are trained at all the university hospitals.

Despite the remarkable success of systemic treatment methods for some types of malignancy, surgery and radiotherapy are still the most important means for curative treatment of localized malignant tumours. Of the about 40% of cancer patients who become relapse-free after the primary treatment, about one-third can be attributed to radiotherapy or radiotherapy in combination with other methods (surgery, systemic treatment). If palliative treatment is included, 50–60% of all cancer patients need radiotherapy at some stage of the disease (cf. 12). The indications for radiotherapy have varied considerably with time but there are at present no signs that the need for radiotherapy will diminish within the foreseeable future. Wilhelm Conrad Röntgen's discovery of ionizing radiation 100 years ago will probably continue to have a great importance for the treatment of cancer for a long time to come.

REFERENCES

1. Berven E. The first fifty years. Radiumhemmet 1910–1937 and King Gustaf V Jubilee Clinic 1938–1960. *Acta Radiol* 1965; (Suppl. 250): 11–56.
2. Berven E. The development and organization of therapeutic radiology in Sweden. *Radiology* 1962; 79: 829–41.
3. Gustavson-Kadaka E. Konung Gustaf V's Jubileumsklinik i Stockholm. David Broberg AB, Stockholm, 1988. (In Swedish).
4. Råd och anvisningar från socialstyrelsen: Planering av onkologisk sjukvård. (Advice and guidelines from the National Board of Health and Welfare: Planning of oncology). Socialstyrelsen, Stockholm, 1974. (In Swedish).
5. Stenbeck T. Fall av hudkräfta, läkt med behandling av röntgenstrålar. (Case of skin carcinoma cured by treatment with x-rays). *Hygiea* 1990; 62: 18–20. (In Swedish).
6. Sjögren T, Sederholm E. Beitrag zur therapeutischen Verwertung der Röntgenstrahlen. *Fortschr Röntgenstr* 1990–1901; 4: 145–70.
7. Regionsjukvården. (Regional medical services). Report from a governmental commission. SOU 1958: 26. Ministry of Health and Welfare. (In Swedish).
8. Engel A. The Swedish regionalized hospital system. In: Tottie M and Janzon B, eds. *Regional hospital planning*, p 14–28. Nordiska Bokhandeln, Stockholm, 1967.
9. Regionsjukvården (Regional medical services). Report from a governmental commission. SOU 1978: 70. Liberförlag, Stockholm. (In Swedish with an English summary).
10. Kjellgren O. Gynekologisk onkologi. *Läkartidningen* 1969; 66: 1235–41. (In Swedish).
11. Einhorn J, Larsson L-G. Cancersjukvårdens och radioterapis organisation. *Läkartidningen* 1970; 67: 1181–93. (In Swedish).
12. Lote K, Möller T, Nordman E, Overgaard J, Sveinsson T. Resources and productivity in radiation oncology in Denmark, Finland, Iceland, Norway and Sweden during 1987. *Acta Oncol* 1991; 30: 555–61.