



SOReg
SCANDINAVIAN OBESITY
SURGERY REGISTRY

SOReg Norway-Sweden
Third joint report: 2019 - 2021

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Background

Scandinavian Obesity Surgery Registry (SOReg) was launched as a national registry in Sweden in 2007. The ambition from the start was to include all Scandinavian countries. However, due to legal issues, mainly pertaining to transfer of patient data across borders, this was found to be difficult. Therefore, Denmark established a national registry (not included in SOReg), but Norway was able to establish a SOReg-based register in 2014. In June 2015, SOReg Norway (SOReg-N) received status as a national quality register for bariatric surgery and since then the number of participating hospitals has gradually increased. By August 2019 all public hospitals and four out of seven private hospitals performing bariatric surgery in Norway reported to SOReg-N. In Sweden, all hospitals including all private units have reported to SOReg-S since 2013.

SOReg uses an IT-platform design by UCR (Uppsala Clinical Research Center, Sweden) and the data is stored on a UCR server. An exact copy of SOReg is stored in Tromsø, Norway, where the same platform is used. An adaption to Norwegian system is done, including translation and connection to the Norwegian National Registry. Developments and changes to the register platform is made after agreements in a joint SOReg steering committee with representatives from both countries.

The Swedish and Norwegian version of SOReg have previously published their reports separately for 2019 and 2020 which can be found on the registries' respective web site. This report is the third joint report where we present and compare figures on the use of bariatric surgery in Sweden and Norway. We only present aggregated data on national levels.

Reported procedures, financing and referral logistics in public and private units

The acquisition rate (number of procedures registered in SOReg/national number of procedures) is estimated to be at least 98% in Sweden for 2019-2021. In Norway the acquisition rate for public hospitals was 89% in 2019, 88% in 2020 and estimated at \approx 90% in 2021, while for private hospitals the rate was 13% in 2019, 30% in 2020 and 39% in 2021.

The time from referral from physician to surgery seems to be shorter in public hospitals in Sweden than in Norway (Table 1). Swedish legislation provides the patient the right to see a specialist within three months and to have a planned operation within three months after the consultation, i.e., uncomplicated cases should be operated within six months of referral. Although the same principles are present in the legislation for prioritizing patients in the two countries, no such time limit exists in Norway regarding timing of surgery. Interpretation of these data should be made with caution, as there is an uncertainty on how the registration of referral date is applied in different centres.

Table 1. Number of procedures in public and private units and finance form in Norway and Sweden 2019-2021.

	Norway 2019	Norway 2020	Norway 2021	Sweden 2019	Sweden 2020	Sweden 2021
Public Hospitals						
Hospitals performing bariatric surgery, n	14	14	14	27	27	25
Hospitals reporting to SOReg, n	14	14	14	27	27	25
Operations reported to SOReg, n	1895	1346	1234	2872	1475	1363
Mean time from referral letter received to surgery, days (median)*	456 (356)	549 (420)	1234 (412)	370 (281)	442 (352)	501(435)
Missing data on time to surgery, n (%)	45 (2.4)	46 (3.4)	69 (5.6)	568 (19.8)	247 (16.7)	185 (14.2)
Private hospitals						
Hospitals performing bariatric surgery, n	6	6	5	11	11	10
Hospitals reporting to SOReg, n	4	4	3	11	11	10
Operations reported to SOReg, n	84	209	263	1920	1969	2615
Mean time from referral letter received to surgery*, days (median)	61 (35)	57 (41)	63 (38)	202 (154)	378(245)	321(285)
Missing data on time to surgery, n (%)	0 (0)	0 (0)	0 (0)	819 (28.5)	930 (47.2)	1088 (41.6)
Finance form for operations in private hospitals						
Public financing, n (%)	0	4 (1.9)	5 (1.9)	886 (46.1)	892 (45.3)	1253 (47.9)
Insurance, n (%)	0	0	0	0	2 (0.1)	4 (0.2)
Paid by patient, n (%)	84 (100.0)	205 (98.0)	258 (98.1)	1025 (53.4)	1032 (52.4)	1303 (49.8)
Missing data on financing, n (%)	0 (0)	0 (0)	0 (0)	9 (0.5)	43 (2.2)	55 (2.1)

* Calculated as the date of the operation minus the date of receiving the referral letter within specialized care, n; numbers.

Most operations are publicly financed in both countries. In Sweden, about half of the operations performed in private units are also publicly financed, while in Norway this is rare, despite the fact that the waiting time for bariatric surgery is longer in Norway. Operations financed by private insurance is non-existing in Norway and very rare in Sweden. Relevant for the interpretation of data is that registrations from public and private hospitals are not complete in Norway.

Bariatric centres, number and type of operations

In 2019, 47 operations per 100 000 inhabitants were performed in Sweden and 50 per 100 000 in Norway. In both countries, an unknown number of patients are operated abroad and not included in these estimates. The number of centres performing bariatric surgery per inhabitant seems comparable between Sweden and Norway (Table 2).

The most common surgical procedures used are presented in Table 2. For the past two decades, Roux-en-Y Gastric Bypass (RYGBP) has been the dominating procedure in Sweden. There has been a gradual increase in the number of Sleeve Gastrectomies (SG) for several years, but it has now stabilized around 50%. In Norway, SG and RYGBP are reported at comparable rates although the One Anastomosis Gastric Bypass (OAGB) constituted 8,5% of the primary procedures in 2021. As not all hospitals in Norway reported to SOReg in 2019-2021, the data may be slightly skewed as variations in the dominating procedure differs between hospitals.

The annual percentage of revisional surgery is low, about 4-7 % in both countries. Other uncommon procedures performed include reversal to normal anatomy, gastric plication, single anastomosis duodeno-ileal switch (SADI) and gastric banding.

Table 2. Bariatric centres and number and types of operations registered in Norway and Sweden 2019-2021.

	Norway 2019	Norway 2020	Norway 2021	Sweden 2019	Sweden 2020	Sweden 2021
Number of centres (n)	20	20	19	38	38	35
Reporting centres (n)	18	18	17	38	38	35
Tot number of operations (n)	1979	1556	1502	4791	3444	3978
Primary RYGBP, n (%)*	824 (41,6)	657 (42,2)	632 (42,1)	2263 (47,2)	1524 (44,3)	1942 (48,8)
Primary SG, n (%)*	913 (46,1)	702 (45,1)	637 (42,4)	2317 (48,4)	1725 (50,1)	1817 (45,7)
Primary OAGB, n (%)*	136 (6,9)	107 (6,9)	118 (7,9)	0	0	0
Primary Duodenal switch, n (%)*	0	0	0	18 (0,4)	0	0
Other procedures, n (%)*	1 (0,1)	1 (0,1)	8 (0,5)	2 (0,0)	0	1 (0,0)
Revisional procedures, n (%)*	106 (5,4)	89 (5,7)	107 (7,1)	191 (4,0)	195 (5,7)	218 (5,5)

*number (n) and percentage of total number of procedures.

RYGBP; Roux-en-Y gastric bypass, SG; sleeve gastrectomy, OAGB; one anastomosis gastric bypass

Demographics

In both countries the majority of patients are women (Table 3). This concurs with reports from most countries worldwide as well as the sixth IFSO Global Registry Report in 2021. The SOReg definition of an obesity-related disease or disorder is continuous pharmacological treatment (CPAP in sleep apnoea) for the respective diagnoses. Norwegian patients seem to be slightly older and with a higher BMI than Swedish patients, and all registered diseases seem to have a little higher prevalence in the Norwegian population except for depression. The percentage of patients with diabetes is low in both countries compared to most international reports. In a joint study on the two present SOReg-cohorts and the Dutch Audit for Treatment of Obesity (DATO), diabetes was present in 21.9% of the Dutch patients at baseline [1].

Table 3. Preoperative characteristics of patients operated with bariatric surgery in Norway and Sweden 2019-2021.

	Norway 2019	Norway 2020	Norway 2021	Sweden 2019	Sweden 2020	Sweden 2021
Age, years (SD)	42.7 (11.1)	43.4 (11.0)	42.9 (11.1)	41.0 (11.3)	40.9 (11.3)	41.1 (11.3)
Gender, m/f (% females)	522/1457 (73.6)	383/1172 (75.4)	376/1121 (74.9)	1063/3728 (77.8)	716/2728 (79.2)	751/3227 (81.1)
Preoperative weight, kg (SD)	123 (21.8)	121 (21.6)	122 (21.4)	116.7 (22.0)	115.5 (21.7)	116.2 (22.0)
Length, cm (SD)	170 (9.2)	170 (8.6)	170 (8.8)	168.6 (9.1)	168.4 (8.9)	168.4 (8.8)
BMI, kg/m ² (SD)	42.3 (5.7)	41.6 (5.8)	41.9 (5.8)	40.9 (5.9)	40.6 (5.8)	40.8 (6.0)
Patients with obesity-related disorders, n (%)	1386 (70.0)	1036 (66.6)	1011 (67.5)	2635 (55.0)	1911 (55.5)	2297 (57.7)
Sleep apnea, n (%)	367 (18.5)	287 (18.5)	308 (20.6)	521 (10.9)	335 (9.7)	422 (10.6)
Hypertension, n (%)	585 (29.6)	434 (27.9)	421 (28.1)	1150 (24.0)	778 (22.6)	840 (21.1)
Diabetes, n (%)	240 (12.1)	211 (13.6)	168 (11.2)	545 (11.4)	418 (12.1)	450 (11.3)
Dyslipidemia, n (%)	288 (14.6)	220 (14.1)	181 (12.1)	384 (8.0)	274 (8.0)	320 (8.0)
Dyspepsia, n (%)	351 (17.7)	282 (18.1)	299 (20.0)	495 (10.3)	329 (9.6)	472 (11.7)
Musculoskeletal pain, n (%)	713 (36.0)	483 (31.1)	439 (29.3)	803 (16.7)	497 (14.4)	783 (19.7)
Depression, n (%)	247 (12.5)	159 (10.2)	164 (11.0)	843 (17.6)	652 (18.9)	765 (19.2)

n; numbers, SD; standard deviation

Perioperative results

The laparoscopic approach dominates in both countries with very low conversion rates to laparotomy (Table 4). Perioperative findings, complication rates and postoperative hospital stay are similar, and few patients experience severe complications such as reoperations. The 30-day mortality rate was zero in Norway and 0.02 % in Sweden.

Table 4. Surgery and early complication data from Norway and Sweden 2019-2021.

	Norway 2019	Norway 2020	Norway 2021	Sweden 2019	Sweden 2020	Sweden 2021
Laparoscopy, n (%)	1973 (99.7)	1551 (99.7)	1493 (99.7)	4762 (99.4)	3426 (99.5)	3972 (99.8)
Conversions, n, (%)	1 (0.1)	2 (0.1)	2 (0.1)	11 (0.2)	4 (0.1)	1 (0.0)
Operative time, minutes (SD)	55.0 (26.0)	54.1 (28.6)	53.4 (29.6)	56.5 (30.5)	53.0 (29.8)	50.0 (28.5)
Length of hospital stay, days (SD)	1.7 (2.0)	1.6 (2.6)	1.7 (3.9)	1.5 (2.8)	1.5 (2.8)	1.4 (2.8)
All postop. complication*, n (%)	150 (7.6)	136 (8.8)	132 (8.8)	280 (6.1)	186 (5.5)	210 (5.5)
Leakage, n (%)	11 (0.6)	5 (0.3)	7 (0.5)	24 (0.5)	23 (0.7)	27 (0.7)
Bleeding, n (%)	37 (1.9)	20 (1.3)	23 (1.5)	62 (1.3)	48 (1.4)	51 (1.3)
Intraabdominal infection,(n (%)	11 (0.6)	8 (0.5)	7 (0.5)	15 (0.3)	13 (0.4)	14 (0.4)
Clavien-Dindo \geq 3B, n (%)	35 (1.8)	26 (1.7)	18 (1.2)	124 (2.7)	79 (2.4)	82 (2.2)
Reoperations, n (%)	76 (3.8)	70 (4.5)	84 (5.6)	130 (2.8)	80 (2.4)	86 (2.3)
30-days postop. mortality, n (%)	0	0	0	1	0	2

n; numbers, SD; standard deviation

Bariatric surgery during the COVID-19 pandemic

During 2020 and 2021 the number of patients operated and reported to SOReg are significantly reduced compared to previous reports, most likely due to the pandemic. More patients have been operated in private institutions in this period, and more so in Sweden than in Norway; in Sweden most patients were actually operated in private institutions in 2020 and 2021 (Table 1). Follow-up rates at two years post-surgery are comparable to the period before the pandemic in both countries; about 69% in Norway and 64% in Sweden (Table 6).

Postoperative results

Two-year results for weight and obesity-related diseases are given in table 6. The weight loss is similar for both countries and most diseases are, as expected, markedly lower at two years, except for depression in Sweden. The resolution rates seems to be somewhat higher in Norway.

Table 6. Results two years after surgery for patients operated during 2017-19.

	Norway preopdata 2017-19*	Norway 2 year follow-up 2019- 2021	Sweden preopdata 2017-19*	Sweden 2 year follow-up 2019- 2021
Follow up, n (%)	4268 (69.4)	4268 (69.4)	10312 (64.6)	10312 (64.6)
TWL, % (SD)	-	31.0 (9.7)	-	29.8 (9.7)
BMI, kg/m ² (SD)	42.6 (5.5)	29.3 (4.9)	41.0 (5.6)	28.7 (5.0)
Patients with obesity-related disorders, n (%)	2984 (69.9)	2073 (48.6)	5713 (55.4)	4815 (46.7)
Sleep apnea, n (%)	783 (18.3)	206 (4.8)	1145 (11.1)	404 (3.9)
Hypertension, n (%)	1299 (30.4)	650 (15.2)	2659 (25.8)	1809 (17.5)
Diabetes, n (%)	562 (13.2)	165 (3.9)	1287 (12.5)	595 (5.8)
Dyslipidemia, n (%)	609 (14.3)	313 (7.3)	998 (9.7)	691 (6.7)
Dyspepsia, n (%)	748 (17.5)	600 (14.1)	1022 (9.9)	1169 (11.3)
Musculoskeletal pain, n (%)	1628 (38.1)	838 (19.6)	1717 (16.7)	1192 (11.6)
Depression, n (%)	542 (12.7)	419 (9.8)	1670 (16.2)	1832 (17.8)

* Only patients that have a complete follow-up at two years are included in preoperative data
TWL; total weight loss, BMI; body mass index, SD; standard deviation, n; numbers.

Summary

There are many similarities between Norway and Sweden when it comes to health care. As the indications for bariatric surgery are identical, it is no surprise that we see many similarities between the two countries in this report.

However, in general the Norwegian patients seem to be slightly older, heavier, and have a higher prevalence of obesity-related disorders, except for depression.

Most operations are publicly funded in both countries. We see more publicly funded operations being performed in private units in Sweden than in Norway, where this is rare. In both countries waiting time is long; however, differences are probably explained by legal issues.

The laparoscopic approach dominates, with SG and RYGBP being the two dominant procedures in both countries. Both the conversion rate and prevalence of severe complications such as

reoperations within 30-days are low. The 30-day mortality rate is among the lowest reported in international literature.

High quality data in a registry is of paramount importance. Both registries are using the same system for auditing which include checking the database for strange and unusual data combinations and control of data between medical records and SOReg in randomly chosen patients. In Norway, the first audit has been completed and showed >90% correct data on clinical variables. In Sweden, the third complete audit during 2017-2018 showed >97% correct data [2].

A lower inclusion rate to the registry in Norway compared to Sweden may influence the Norwegian data findings. From September 2019, a new regulation in Norway imposing health care workers to report data to national quality registries, and a recent possibility to consider omitting written informed consent (“opt-out”), may increase the future inclusion rate to SOReg-N.

The similarities in demographics and results, combined with a similar auditing system and registry platform, provides a good foundation for future quality assurance projects and research based on joint registry data.

References:

[1] Poelmeijer YQM, Liem RSL, Vage V, Mala T, Sundbom M, Ottosson J, et al. Perioperative Outcomes of Primary Bariatric Surgery in North-Western Europe: a Pooled Multinational Registry Analysis. *Obes Surg*. 2018; 28: 3916-3922.

[2]. Sundbom M, Näslund I, Näslund E, Ottosson J. High acquisition rate and internal validity in the Scandinavian Obesity Surgery Registry. *Surg Obes Relat Dis*. 2021;17:606-614.

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