KCE REPORT 329S

Federaal Kenniscentrum voor de Gezondheidszorg
Centre Fédéral d'Expertise des Soins de Santé
Belgian Health Care Knowledge Centre

BARIATRIC SURGERY IN BELGIUM: ORGANISATION AND PAYMENT OF CARE BEFORE AND AFTER SURGERY

SUPPLEMENT





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HEALTH SERVICES RESEARCH

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SUPPLEMENT

KOEN VAN DEN HEEDE, BELINDA TEN GEUZENDAM, DORIEN DOSSCHE, SABINE JANSSENS, PETER LOUWAGIE, KIRSTEN VANDERPLANKEN, PASCALE JONCKHEER

COLOPHON

Title:	Bariatric surgery in Belgium: organisation and payment of care before and after surgery – Supplement
Authors:	Koen Van den Heede (KCE), Belinda Ten Geuzendam (IMA), Dorien Dossche (KCE), Sabine Janssens (BSM Management), Peter Louwagie (Former KCE), Kirsten Vanderplanken (Former Tempera), Pascale Jonckheer (KCE)
Information specialist:	Nicolas Fairon (KCE)
Project facilitator:	Nathalie Swartenbroeckx (KCE)
Senior supervisor:	Koen Van den Heede (KCE)
Reviewers:	Jef Adriaenssens (KCE), Jens Detollenaere (KCE), Marijke Eyssen (KCE)
External experts & Stakeholders:	Filip Ameye (RIZIV – INAMI - Rijksinstituut voor ziekte- en invaliditeitsverzekering – Institut national d'assurance maladie-invalidité), Marie Barea Fernandez (Erasme ULB, BBAHS - Belgian Bariatric Allied Health Society), Lise Boddaert (AZ Herentals), Els Boekaerts (Jessa ziekenhuis, Hasselt, Obesitas centrum), Wim Bouckaert (Jessa ziekenhuis, Hasselt, Obesitas centrum), Charline Bronchain (Maison Médicale de Ransart), Sabine Buntinx (UGIB – AUVB - Union Générale des Infirmiers de Belgique – Algemene Unie van Verpleegkundigen van België), Dany Burnon (CHIREC - Centre Hospitalier Interrégional Edith Cavell), Marie Capacchi (médecin généraliste/huisarts), Fadi Charara (CHU Tivoli), Laurence Claes (KU Leuven, Eetexpert), Véronique de Brouckère (CHU Tivoli), Paul De Cort (ACHG – Academisch Centrum Huisartsgeneeskunde, KU Leuven, Eetexpert), Paul De Munck (GBO – Cartel), Hilde De Nutte (Zorgnet –Icuro), Ri De Ridder (Dokters van de Wereld), Nick De Swaef (RIZIV – INAMI, FOD Volksgezondheid – SPF Santé Publique, FAGG – AFMPS - Federaal agentschap voor geneesmiddelen en gezondheidsproducten – Agence fédérale des medicaments et des produits de santé), Nele De Wert (AZ Nikolaas), Ann De Zitter (AXXON – Beroepsvereniging voor kinesitherapeuten), Didier Deltour (UNESSA), Bart Demyttenaere (NVSM – UNMS - Nationaal Verbond van Socialistische Mutualiteiten – Union Nationale des Mutualités Socialistes, Solidaris), Mieke Devadder (UZ Leuven), Bruno Dillemans (AZ Sint-Jan), Vera Eenkhoorn (Sint Jozefkliniek Bornem), Valérie Fabri (NVSM – UNMS - Solidaris), Marc Geboers (Zorgnet - Icuro), Jean-Marc Gillardin (Sint-Lucas, Brugge), Vinciane Goessens (CHU de Liège), Alexandre Haumann (CHU de Liège), Leo Hendrickx (ZNA - Ziekenhuis Netwerk Antwerpen), Isabelle Heyens (UZ Gent), Jacques Himpens (CHIREC Delta Ziekenhuis, Oudergem), Yves Hoebeke (GHDC - Grand Hôpital de Charleroi), Lucien Hoekx (RIZIV – INAMI), Pierre Hourlay (Jessa Ziekenhuis Hasselt), Rozemarijn Jeannin (Eetexpert), Laurent Kohnen (CHU de Liège), Nikos Kotzampassakis (Centre Hospitalier Regional de la Citadelle, Liège), Thierry Lafullarde (Sint Dimpna ziekenhuis Geel, BeSOMS - Belgian Section of Obesity and Metabolic Surgery), Catherine Laminne (GHDC), Matthias Lannoo (UZ Leuven), Jean-Marc Legrand (CHR Huy, BeSOMS), Barbara Lembo (BBAHS - Belgian Bariatric Allied Health Society), Pascal Meeus (INAMI – RIZIV - Institut national d'assurance maladie-invalidité –

	Rijksinstituut voor ziekte- en invaliditeitsverzekering), Nicole Mertens (UPPCF - Union Professionnelle des Psychologues Cliniciens Francophones & Germanophones), Benoît Navez (St Luc - Bruxelles, BeSOMS), Thomas Organ (SSMG - Société Scientifique de Médecine Générale), Jeannin Rozemarijn (Eetexpert), Jean-Pierre Saey (CHR Mons, BESOMS), Jean-Paul Thissen (Cliniques universitaires St. Luc, UCL - Université Catholique de Louvain), Ilse Ulens (Eetexpert), Jody Valk (ZNA), Bart Van der Schueren (UZ Leuven, BASO – Belgian Association for the Study of Obesity), Luc Van Gaal (UZA - Universitair Ziekenhuis Antwerpen), Chris Van Hul (ML – OZ - Mutualités Libres – Onafhankelijke Ziekenfondsen), France Van Lippevelde (SLBO - Clinique St. Luc Bouge), Etienne Van Vyve (Clinique St. Jean, Bruxelles), An Vandeputte (Eetexpert), Wout Vanderborght (UZ Leuven), Yves Vannieuwenhove (UZ Gent), Johan Vanoverloop (Intermut, IMA – AIM - InterMutualistisch Agentschap – Agence InterMutualiste), An Verrijken (UZA - Universitair Ziekenhuis Antwerpen), Annemie Vlaeyen (FOD Volksgezondheid - SPF Santé Publique), Ilse Weeghmans (Vlaams Patiëntenplatform vzw)
External validators:	Ellen Coeckelberghs (KU Leuven), Virginie Hainaut (HIS – IZZ - Hôpitaux Iris-Sud – Iris Zuid ziekenhuizen), Simon Nienhuijs (Catharina ziekenhuis, Nederland)
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1. APPENDIX TO CHAPTER 2

1.1. Topic list site visits

Doel van dit gesprek is om inzicht te krijgen in het lokaal zorgpad van patiënten die bariatrische heelkunde ondergaan. We willen zowel best-practices als knelpunten capteren. We zijn geïnteresseerd in klinische ijkpunten, benodigde expertise alsook in de organisationele en financiële aspecten (terugbetaling, patiënten aandeel).

PRE-BARIATRIE

A. Hoe wordt de beslissing genomen om tot een heelkundige ingreep over te gaan?

Welk traject heeft een patiënt doorlopen in voorbereiding op zijn operatie? Welke disciplines zijn hierbij betrokken? Zijn er verbeterpunten?

B. **Hoe wordt de beslissing genomen voor een bepaald type ingreep, en welke zijn hierbij de belangrijkste onderliggende factoren?**

C. In volgorde van frequentie, kan u ranken welke van volgende types ingrepen in uw centrum thans meest en minst vaak worden uitgevoerd :
RY-Gastric Baypass :
Sleeve Gastrectomie :
Lap-Adjustable Gastric Banding :

EVALUATIE

A. Wat zijn volgens u de belangrijkste problemen waarmee iemand die bariatrische heelkunde ondergaat (wenst te ondergaan) mee geconfronteerd wordt?

a. Welke 3 komt u het vaakste tegen?
b. Welke 3 zijn het meest ingrijpend?
c. Voor welk probleem zou er volgens u het meest urgent een oplossing moeten komen?

B. Bent u tevreden met de actuele organisatie van het zorgpad, of ziet u aspecten die beter zouden kunnen? Welke?

d. Wat zijn de problemen die het herstel van een patiënt vertragen of zelfs verhinderen?
e. Wat is er nodig om tot die verbetering te komen?

C. Sluit het huidige zorgpad aan op de problemen die u ziet, wordt rekening gehouden met de eventuele fasen?

a. Zijn er gebieden die momenteel niet in de voorafgaande multi-disciplinaire evaluatie of in de nazorg aan de orde komen maar waar u wel problemen ziet?
b. Hoe zou dit opgelost kunnen worden, en wie zou wat kunnen dat doen?
c. Rol van de huisarts voorafgaand aan de beslissing tot bariatrische chirurgie en rol van/samenwerking met de huisarts in de vroeg- en laattijdige follow-up na bariatrische chirurgie

D. Wat zou het zorgpad voor elke patiënt minimaal moeten inhouden?

E. Wordt dat minimum vandaag de dag voor iedereen verzekerd? Wat ontbreekt er?

F. Op basis van uw ervaring, in welke gevallen (patiëntenkenmerken) of situaties (contextkenmerken) verloopt het zorgpad zeer moeizaam?

G. Heeft u opmerkingen bij de levenstijl-aanpassingen die patiënten zelf moeten implementeren voorafgaand en volgend op de bariatrische ingreep.

H. Hoe vaak wordt u geconfronteerd met vragen tot bariatrische ingreep bij jonge personen

a. Personen tussen 18-25 j
b. Personen tussen 16-18 j : indien ja, hoe staat u hier globaal tegen over, en welke bedenkingen heeft u hierover

Rol van het bariatrisch centrum/eerste lijn in het nazorgtraject

Ik zou nu vragen willen stellen over de rol van uw centrum binnen het nazorgtraject.

A. Eens een patiënt terug naar huis is, hoe wordt deze verder opgevolgd? Hoe lang? Waarvoor? Door wie wordt die nog gezien, op welke tijdstippen?

a. Zijn er grote verschillen tussen patiëntengroepen (type ingreep/ zwangere/ comorbiditeiten ..)?
b. Wat is volgens u de ideale follow-up termijn?

B. Wat gebeurt er als een patiënt niet op de afspraak aanwezig is?

a. Wat zijn meestal de onderliggende redenen voor patiënten om af te haken?
b. Hoe kan dat voorkomen worden?

C. Kunnen patiënten na ontslag nog beroep doen op de dienstverlening van de multidisciplinaire equipe (diëtiste; psycholo(o)g(en) en sociaal assistent(en), of andere team leden ?

D. Hoe zit het met de (terug-)betaling?

E. Hoe ziet u de rol van het bariatrisch centrum in het nazorgtraject? (centrale rol, of zou andere instantie dit moeten overnemen bijv. huisarts) Vanaf welk moment wordt zorg (best) overgedragen aan eerste lijn?

a. Naast de opvolging door het bariatrisch centrum, zijn er doorgaans nog andere zorgverleners in het nazorgtraject betrokken? Welke?
b. Heeft het centrum goede contacten of afspraken met zorgverstrekkers in de thuiszorg, zoals huisartsen, diëtisten of kinesisten? Beschikt u over een netwerk in de thuiszorg (diëtisten, kinesisten, psychologen) waarnaar u patiënten kan doorverwijzen?
c. Hoe is uw ervaring met de thuiszorg? Is er voldoende kennis over bariatrische heelkunde aanwezig?
    i. Indien niet voldoende kennis, hoe zou dat opgelost kunnen worden?
d. Moeten de patiënten zelf afspraken maken met zorgverstrekkers extern aan het ziekenhuis? Indien ja, lukt dat? Indien neen, wie organiseert/coördineert dat?
e. Vindt u dat er voldoende financiële ondersteuning is voor mensen die een bariatrische ingreep ondergaan? Worden mensen wel eens geconfronteerd met hoge facturen? Waardoor komt dit? Zou dit anders kunnen? Wat wel en wat niet? Hoe oplossen, door wie?
f. Wat is de rol van patiëntenverenigingen?

F. Wie is volgens u de aangewezen persoon om de nazorg te coördineren (bijv. de behandelend arts, de huisarts, patiënt zelf, …)

Beschikken patiënten over voldoende informatie om hun nazorg zelf te organiseren?

G. Hoe denkt u over referentiecentra? Is dit nodig (alle of subgroepen van patiënten)?. Wat zou (een) toegevoegde waarde(n) kunnen zijn van referentie centra ? aan welke criteria zouden deze moeten voldoen?

H. Wordt het zorgpad geëvalueerd? Worden er kwaliteitsindicatoren opgevolgd (bv. patiënten tevredenheid)?

Algemeen:

- Van welke landen kunnen we iets leren? Waarom?
- Wat zou het KCE zeker moeten bestuderen/aanbevelen volgens u ?

1.2. Analyses IMA-AMI data: supplementary info

Table 1 – Number of bariatric surgeries per year, by type and annual increase (2007-2017, all based on first surgeries per year)

YEAR	SLEEVE	LAGB	RYGB	MBS	% SLEEVE	% LAGB	% BYPASS	% yearly increase SLEEVE	% yearly increase LAGB	% yearly increase RYGB	% yearly increase MBS
2007	85	361	641	1 087	7,82%	33,21%	58,97%				
2008	448	1 701	3 738	5 887	7,61%	28,89%	63,50%	427,06%	371,19%	483,15%	441,58%
2009	824	1 658	5 070	7 552	10,91%	21,95%	67,13%	83,93%	-2,53%	35,63%	28,28%
2010	1 187	1 343	5 960	8 490	13,98%	15,82%	70,20%	44,05%	-19,00%	17,55%	12,42%
2011	1 569	1 073	7 542	10 184	15,41%	10,54%	74,06%	32,18%	-20,10%	26,54%	19,95%
2012	2 040	882	8 079	11 001	18,54%	8,02%	73,44%	30,02%	-17,80%	7,12%	8,02%
2013	2 624	572	8 168	11 364	23,09%	5,03%	71,88%	28,63%	-35,15%	1,10%	3,30%
2014	3 335	476	8 211	12 022	27,74%	3,96%	68,30%	27,10%	-16,78%	0,53%	5,79%
2015	3 775	366	8 079	12 220	30,89%	3,00%	66,11%	13,19%	-23,11%	-1,61%	1,65%
2016	4 683	334	8 509	13 526	34,62%	2,47%	62,91%	24,05%	-8,74%	5,32%	10,69%
2017	4 714	168	8 464	13 346	35,32%	1,26%	63,42%	0,66%	-49,70%	-0,53%	-1,33%

Table 2 – Number of bariatric surgeries per year and quarter and by type

YEAR & QUARTER	SLEEVE	LAGB	RYGB	Bariatric
200704	85	361	641	1 087
200801	116	483	833	1 432
200802	104	431	863	1 398
200803	114	387	969	1 470
200804	114	400	1 073	1 587
200901	193	437	1 298	1 928
200902	206	424	1 255	1 885
200903	193	410	1 231	1 834
200904	232	387	1 286	1 905
201001	294	334	1 475	2 103
201002	264	381	1 431	2 076
201003	308	331	1 440	2 079
201004	321	297	1 614	2 232
201101	410	306	1 943	2 659
201102	389	302	1 915	2 606
201103	360	235	1 800	2 395
201104	410	230	1 884	2 524
201201	494	258	2 161	2 913
201202	469	228	1 893	2 590
201203	513	202	1 964	2 679
201204	564	194	2 061	2 819
201301	675	181	2 307	3 163
201302	604	152	2 054	2 810
201303	645	120	1 878	2 643
201304	700	119	1 929	2 748
201401	855	136	2 186	3 177
201402	812	115	1 975	2 902
201403	793	112	1 987	2 892
201404	875	113	2 063	3 051
201501	961	97	2 180	3 238
201502	897	87	2 021	3 005
201503	874	93	1 862	2 829
201504	1043	89	2 016	3 148
201601	1316	99	2 298	3 713
201602	1175	84	2 136	3 395
201603	1092	76	1 998	3 166
201604	1100	75	2 077	3 252
201701	1321	61	2 307	3 689
201702	1157	55	2 118	3 330
201703	1077	40	1 884	3 001
201704	1159	12	2 155	3 326

Table 3 – Number of bariatric surgeries by region, and yearly increase in number of bariatric surgeries (all based on first surgery per year)

Aprest	SLEEVE BXL	LAGB BXL	RYGB BXL	MBS BXL	SLEEVE FL	LAGB FL	RYGB FL	MBS FL	SLEEVE WAL	LAGB WAL	RYGB WAL	MBS WAL
2007	19	33	27	79	35	125	370	530	23	185	202	410
2008	65	176	163	404	140	636	2 124	2 900	209	828	1 198	2 235
2009	97	210	219	526	242	529	2 904	3 675	439	855	1 638	2 932
2010	148	173	250	571	360	421	3 498	4 279	616	698	1 890	3 204
2011	162	154	334	650	461	347	4 434	5 242	875	538	2 464	3 877
2012	201	123	390	714	469	257	4 797	5 523	1 289	465	2 622	4 376
2013	250	86	407	743	508	177	4 941	5 626	1 769	293	2 566	4 628
2014	339	102	409	850	600	139	5 031	5 770	2 318	223	2 610	5 151
2015	419	99	464	982	637	114	5 065	5 816	2 652	150	2 436	5 238
2016	500	65	572	1 137	809	138	5 328	6 275	3 325	127	2 528	5 980
2017	490	32	478	1 000	918	75	5 405	6 398	3 276	60	2 533	5 869
Yearly increase												
2009	49,23%	19,32%	34,36%	30,20%	72,86%	-16,82%	36,72%	26,72%	110,05%	3,26%	36,73%	31,19%
2010	52,58%	-17,62%	14,16%	8,56%	48,76%	-20,42%	20,45%	16,44%	40,32%	-18,36%	15,38%	9,28%
2011	9,46%	-10,98%	33,60%	13,84%	28,06%	-17,58%	26,76%	22,51%	42,05%	-22,92%	30,37%	21,00%
2012	24,07%	-20,13%	16,77%	9,85%	1,74%	-25,94%	8,19%	5,36%	47,31%	-13,57%	6,41%	12,87%
2013	24,38%	-30,08%	4,36%	4,06%	8,32%	-31,13%	3,00%	1,86%	37,24%	-36,99%	-2,14%	5,76%
2014	35,60%	18,60%	0,49%	14,40%	18,11%	-21,47%	1,82%	2,56%	31,03%	-23,89%	1,71%	11,30%
2015	23,60%	-2,94%	13,45%	15,53%	6,17%	-17,99%	0,68%	0,80%	14,41%	-32,74%	-6,67%	1,69%
2016	19,33%	-34,34%	23,28%	15,78%	27,00%	21,05%	5,19%	7,89%	25,38%	-15,33%	3,78%	14,17%
2017	-2,00%	-50,77%	-16,43%	-12,05%	13,47%	-45,65%	1,45%	1,96%	-1,47%	-52,76%	0,20%	-1,86%
AVG0917	26,25%	-14,33%	13,78%	11,13%	24,94%	-19,55%	11,58%	9,57%	38,48%	-23,70%	9,53%	11,71%
AVG1017	23,38%	-18,53%	11,21%	8,75%	18,95%	-19,89%	8,44%	7,42%	29,53%	-27,07%	6,13%	9,28%

Table 4 – *Number of bariatric, sleeve, LAGB and RYGB (first surgeries per 10.000 beneficiairies in the year of surgery period 2007-2017)*

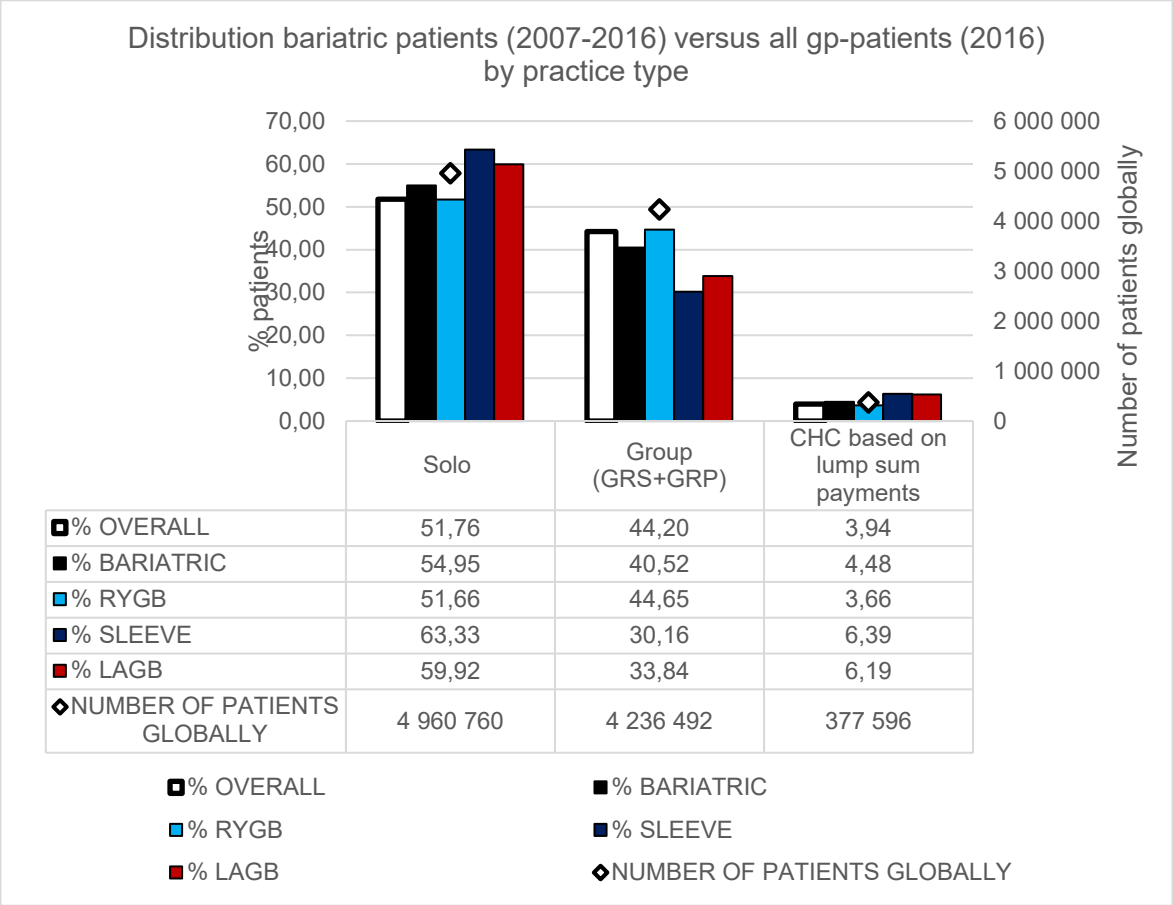
Aprest	SLEEVE BXL	LAGB BXL	RYGB BXL	MBS BXL	SLEEVE FL	LAGB FL	RYGB FL	MBS FL	SLEEVE WAL	LAGB WAL	RYGB WAL	MBS WAL
2007	0,19	0,33	0,27	0,79	0,06	0,20	0,60	0,87	0,07	0,55	0,60	1,21
2008	0,65	1,75	1,62	4,02	0,23	1,03	3,45	4,71	0,62	2,44	3,53	6,59
2009	0,94	2,04	2,13	5,11	0,39	0,85	4,68	5,93	1,29	2,50	4,80	8,58
2010	1,41	1,65	2,39	5,46	0,58	0,67	5,60	6,85	1,79	2,03	5,50	9,33
2011	1,51	1,44	3,12	6,07	0,73	0,55	7,04	8,32	2,53	1,56	7,12	11,21
2012	1,85	1,13	3,60	6,58	0,74	0,41	7,57	8,72	3,71	1,34	7,55	12,60
2013	2,29	0,79	3,72	6,80	0,80	0,28	7,76	8,84	5,07	0,84	7,36	13,27
2014	3,09	0,93	3,72	7,74	0,94	0,22	7,87	9,02	6,62	0,64	7,46	14,72
2015	3,79	0,90	4,20	8,88	0,99	0,18	7,88	9,05	7,56	0,43	6,95	14,94
2016	4,52	0,59	5,17	10,28	1,25	0,21	8,24	9,71	9,47	0,36	7,20	17,03
2017	4,43	0,29	4,32	9,04	1,41	0,12	8,31	9,84	9,31	0,17	7,20	16,67
Yearly increase												
2009	45,97	16,71	31,42	27,35	71,61	-17,42	35,74	25,81	108,72	2,61	35,86	30,36
2010	49,95	-19,04	12,19	6,69	47,64	-21,02	19,54	15,56	39,48	-18,85	14,69	8,62
2011	6,96	-13,01	30,55	11,24	27,07	-18,21	25,78	21,56	41,12	-23,42	29,52	20,22
2012	22,52	-21,13	15,30	8,47	1,13	-26,38	7,54	4,73	46,66	-13,95	5,94	12,37
2013	23,40	-30,63	3,54	3,24	7,79	-31,46	2,50	1,37	36,72	-37,23	-2,51	5,36
2014	34,90	17,99	-0,03	13,81	17,56	-21,84	1,34	2,08	30,59	-24,15	1,37	10,92
2015	22,81	-3,56	12,72	14,79	5,60	-18,42	0,14	0,26	14,15	-32,89	-6,88	1,46
2016	19,28	-34,37	23,22	15,73	26,35	20,44	4,66	7,34	25,22	-15,44	3,65	14,02
2017	-1,98	-50,76	-16,42	-12,03	12,80	-45,98	0,84	1,35	-1,72	-52,87	-0,05	-2,10
AVG0917	24,87	-15,31	12,50	9,92	24,17	-20,03	10,90	8,90	37,88	-24,02	9,07	11,25
AVG1017	22,23	-19,31	10,14	7,74	18,24	-20,36	7,79	6,78	29,03	-27,35	5,72	8,86

Table 5 – Number of bariatric, sleeve, LAGB and RYGB patients (*2007-2017, alive and insured in 2017), directly and per 1000, per province

		Bariatric	Sleeve	LAGB	RYGB	MBS /1000	Sleeve /1000	LAGB /1000	RYGB 1000 /
Brussels	Brussels	8 556	3 142	1 273	4 141	8	3	1	4
Flanders	Antwerp	17 179	1 044	767	15 368	9	1	0	8
	East Flanders	12 596	1 758	747	10 091	8	1	0	7
	Flemish Brabant	8 825	1 655	751	6 419	8	1	1	6
	Limburg	7 640	640	538	6 462	9	1	1	8
	West Flanders	11 440	1 002	216	10 222	10	1	0	9
Wallonia	Hainaut	20 344	8 389	1 985	9 970	15	6	1	8
	Liège	15 554	6 770	1 121	7 663	14	6	1	7
	Luxembourg	2 617	883	338	1 396	12	4	2	6
	Namur	6 580	1 914	556	4 110	13	4	1	8
	Walloon Brabant	3 520	1 520	463	1 537	9	4	1	4
ALL	**BELGIUM**	**114 851**	**28 717**	**8 755**	**77 379**	**10**	**3**	**1**	**7**

Figure 1 – Global distribution of bariatric patients (with a surgery in 2007-2016, alive and insured in 2016) attributed to a general practitioner practice in 2016, by practice type

Cfr. Solo= practice with one general practitioner, Group= practice with multiple general practitioners, CHC: Community Health Centres (Medisch Huis, Maison Medical), either with patient attribution based on lump sum payments, or by other acts with gp's that worked at least partly in an CHC during that year.



	Solo	Group (GRS+GRP)	CHC based on lump sum payments
% OVERALL	51,76	44,20	3,94
% BARIATRIC	54,95	40,52	4,48
% RYGB	51,66	44,65	3,66
% SLEEVE	63,33	30,16	6,39
% LAGB	59,92	33,84	6,19
NUMBER OF PATIENTS GLOBALLY	4 960 760	4 236 492	377 596

Table 6 – Distribution and amount of practices by practice type and province in 2016 based on the correspondence address of the practice

		Solo	GR-S	GR-P	CHC	Group (GRS+GRP) total	Group + CHC (GRS+GRP+CHC) total	ALL
Brussels	Brussels	1 048	71	17	68	88	156	1204
Flanders	Antwerp	894	315	44	11	359	370	1264
	East Flanders	881	243	40	14	283	297	1178
	Flemish Brabant	727	197	23	6	220	226	953
	Limburg	372	183	25	6	208	214	586
	West Flanders	649	215	41	1	256	257	906
Wallonia	Hainaut	1 173	79	25	17	104	121	1294
	Liège	1 017	82	21	35	103	138	1155
	Luxembourg	236	20	9	2	29	31	267
	Namur	471	53	26	4	79	83	554
	Walloon Brabant	414	32	13	3	45	48	462
Other	Address Unknown	7	0	0	0	0	0	7
ALL	**BELGIUM**	**7 889**	**1 490**	**284**	**167**	**1774**	**1941**	**9830**

Table 7 – Number of bariatric patients period of surgery 2007-2016, alive, insured and attributed to a practice in 2016

	Practice type	Attributed BS patients by practice type		Number of practices with attributed BS patients	Number of practices Total**	Number of gp's with attributed BS patients	Gp's total	Average number of BS patients by practice	Average number of BS patients by gp –only considering gp-practices with at least one attributed BS patient	BS patients by all gp's
		N	%	N	N	N	N	N	N	N
a	Solo	47 494	(54,95)	5 560	7 889	5 560	7 889	6	9	6
b	Group (GRS+GRP)	35 019	41	1 742	1 774	4 385	4 609	20	8	8
	Group 1 location	28 224	(32,65)	1 463	1 490	3 659	3 850	19	8	7
	Group multiple locations	6 795	(7,86)	279	284	726	759	24	9	9
c	CHC based on lump sum payments	3 874	(4,48)	160	167	731**	748***	24	6	6
x	CHC based on other contacts	47	(0,05)	[32]	[151]	[32]	[450]	*	*	*
	Total (a, b and c)	86 434	(100)	7 462	9 830	10 105	13 110	12	9	7

*Remark: the numbers within square parentheses [] are not included in the totals per column.*The numbers per CHC based on other contacts are not considered, the amount of attributed bariatric patients is and their classification is difficult as they don't clearly fit into one of the categories solo, group, of CHC. **Number of CHC-practices total is the number with at least 1 attributed BS-patient.***The number of gp's active in a CHC in 2016 is 748 according to the reference NIHDI table.*
Additionally when we consider a minimal activity of 200 contacts per year per gp, then the following means are found. Herein 'contacts' are defined as being all regular contacts, out-of-hours contacts at night, during weekends and during legal holidays, visits at home or in care homes, and contacts for advice.

Table 8 – Number of bariatric patients period of surgery 2007-2016, alive, insured and attributed to an active practice in 2016.

	Practice type	Attributed BS patients by practice type only active practices	Number of active practices with attributed BS patients	Number of active practices Total**	Number of gp's with attributed BS patients in active practices	Gp's total in active practices	Average number of BS patients by active practice	Average number of BS patients (=all BS-patients in active practices) by active gp's in active practices	BS patients by all gp's
a	Solo	47 378	5 471	6 662	5 471	5 471	7	9	6
b	Group (GRS+GRP)	35 018	1 743	1 767	4 466	4 506	20	8	7

REMARK: Herein active solo practices are practices with a gp that have minimally 200 contacts per year. Active group practices are group practices with at least one gp with 200 contacts per year. Community Health Centres are not considered here because the minimal activity cannot be directly defined as contacts are not billed.
To calculate the average of bariatric patients per gp in a group practice, the total number of bariatric patients in active group practices is divided by the total number of active gp's in active group practices. As such this gives a slightly higher approximation of the mean average number of Bariatric Patients per group practices than is the case in reality.

In conclusion adding a minimal activity threshold of 200 contacts per gp per year does not greatly affect the outcomes. In adding this threshold 89 solo practices with 116 Bariatric patients are excluded, and no group practices with bariatric patients were excluded.

Table 9 – Number of general practitioner patients (alive and insured) by practice type in 2016.

	Practice type	Number of overall patients attributed	Number of practices Total	Number of gp's total	Percentage of overall patients attributed	Average number of patients by practice	Average number of patients by gp
		N	N	N	%	N	N
a	Solo	4 960 760	7 889	7 889	(51,76)	629	629
b	Group (GRS+GRP)	4 236 492	1 774	4 609	(44,20)	2 388	919
	Group 1 location	*3 491 485*	*1 490*	*3 850*	*(36,43)*	*2 343*	*907*
	Group multiple locations	*745 007*	*284*	*759*	*(7,77)*	*2 623*	*982*
c	CHC based on lump sum payments	377 596	167	612	(3,94)	2 261	617
x	EXTRA: CHC based on other contacts	8 652	[151]	[450)]	[0,09]	-	-
	Total (considering a, b and c)	9 583 500	9 830	13 110	(100)	974	73

Remark: the numbers in squared parentheses are not included in the totals per column.

Table 9 B

		N pract	Mean	p5	p10	p25	p50	p75	p90	p95	p99	
	Bariatric patients 2016											
a	Solo	7 889	6	0	0	0	3	9	16	21	35	
b	Group	1 774	20	2	4	9	16	26	39	48	76	
	Group 1 location	1 490	19	3	5	12	24	40	60	77	70	
	Group multiple locations	284	24	2	4	12	25	42,5	62	82	105	
c	CHC based on lump sums	167	23	2	5	11	20	30	48	59	75	
x	CHC based on other contacts	151	6	0	0	0	0	0	0	1	2	
	Total (considering a, b and c)	9 830	9	0	0	1	5	13	23	30	52	
		N pract	**-**	**0-p5**	**p5-p10**	**p10-p25**	**p25-p50**	**p50-p75**	**p75-p90**	**p90-95**	**p95+**	**Row total**
	Number of bariatric patients											
a	Solo	7 889	-	0	0	0	2 708	11 259	14 290	7 339	11 900	47 496

b	Group	1 774	-	33	178	1 633	5 147	9 345	8 910	3 791	5 982	35 019
	Group 1 location	1 490	-	71	266	1 508	4 703	7 524	6 656	3 023	4 473	28 224
	Group multiple locations	284	-	12	38	293	1 075	1 810	1 599	741	1227	6 795
c	CHC based on lump sums	167	-	1	25	202	635	1 020	903	426	662	3 874
x	CHC based on other contacts	151	-	0	0	0	0	0	0	9	38	47
	Total (considering a, b and c)	9 830	-	851	2 36	11 872	19 126	22 696	15 295	5 485	8 528	86 389
	% bariatric patients per type											
a	Solo	7 889	-	0,0	0,0	0,0	3,1	13,0	16,5	8,5	13,8	54,9
b	Group	1 774	-	0,1	0,3	2	6,6	10,8	9,5	4,4	6,6	40,3
	Group 1 location	1 490	-	0,1	0,3	1,7	5,4	8,7	7,7	3,5	5,2	32,6
	Group multiple locations	284	-	0,0	0,0	0,3	1,2	2,1	1,8	0,9	1,4	7,7
c	CHC based on lump sums	167	-	0,0	0,0	0,2	0,7	1,2	1,0	0,5	0,8	4,4
x	CHC based on other contacts	151	-	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0
	Total (considering a, b and c)	9 830	-	0	0	2	10	25	27	13	21	100

Extra: Distribution of general practitioner patients (alive, insured and attributed) in 2016 by practice.

		N pract	Mean	p5	p10	p25	p50	p75	p90	p95
A	Solo	7 889	629	3	9	91	509	984	1 433	1 756
B	Group	1 774	2 388	639	916	1 449	2 168,5	3 021	4 139	4 901
	Group 1 location	*1 490*	*2 343*	*667*	*939,5*	*1 433*	*2 158,5*	*2 977*	*3 997*	*4 600*
	Group multiple locations	*284*	*2 623*	*525*	*728*	*1 529,5*	*2229*	*3 310,5*	*5 097*	*5 942*
C	CHC based on lump sums	167	2 261	398	601	1 447	2012	2 905	3 968	5 570
X	CHC based on other contacts	151	19	1	1	3	8	17	38	79
	Total (considering a, b, c)	9 830	974	4	14	169	705	1 351	2 293	3 041

Table 10 – Distribution of bariatric patients (* surgery period 2007-2016, alive, insured and attributed to a gp-practice in 2016) by type of surgery and type of gp-practice (considered over all practices –no minimum activity per practice)

	Practice type	N pract	N bariatric patients	N RYGB patients	N sleeve patients	N LAGB patients	total number of patients	%bariatric by pract	% RYGB by pract	%sleeve by pract	% LAGB by pract
a	Solo	7 889	47 494	30 871	11 879	4 746	4 960 760	0,96	0,62	0,24	0,10
b	Group	1 774	35 019	26 681	5 658	2 680	4 236 492	0,83	0,63	0,13	0,06
	Group 1 location	*1 490*	*28 224*	*21 875*	*4 275*	*2 074*	*3 491 485*	*0,81*	*0,63*	*0,12*	*0,06*
	Group multiple locations	*284*	*6 795*	*4 806*	*1 383*	*606*	*745 007*	*0,91*	*0,65*	*0,19*	*0,08*
c	CHC based on lump	167	3 874	2 186	1 198	490	377 596	1,03	0,58	0,32	0,13
X	CHC based on other	151	47	21	22	4	8 652	0,54	0,24	0,25	0,05
	Total (a,b,c)	9 830	86 387	59 738	18 735	7 916	9 574 848	0,90	0,62	0,20	0,08
	Total	9 981	86 434	59 759	18 757	7 920	9 583 500	0,90	0,62	0,20	0,08

Table 11 – Delivery nomenclature*

code	startdate	description
422225	1/07/1996	Supervision and implementation of delivery by a midwife on a working day
422656	1/10/2001	Delivery by a midwife on a working day
422671	1/10/2001	Delivery performed by a midwife in the context of a day admission on a working day
423010	1/04/1985	Normal or complicated delivery, including the fees for any anaesthesia, excluding anaesthesia by doctors and anaesthesia specialists
423021	1/04/1985	Normal or complicated delivery, including the fees for any anaesthesia, excluding anaesthesia by doctors and anaesthesia specialists
423500	1/07/2010	Delivery performed by a midwife in the context of a day admission during the weekend or a holiday
423651	1/10/2001	Delivery at home performed by a midwife in the context of a day admission during the weekend or a holiday
423673	1/10/2001	Delivery performed by a midwife in the context of a day admission on a working day during the weekend or a holiday
424012	1/04/198	Normal or complicated delivery, including the fees for any anaesthesia, excluding anaesthesia by doctors and anaesthesia specialists
424023	1/04/1985	Normal or complicated delivery, including the fees for any anaesthesia, excluding anaesthesia by doctors and anaesthesia specialists
424071	1/04/1985	Delivery requiring embryotomy
424082	1/04/1985	Delivery requiring embryotomy

424093	1/04/1985	Delivery by caesarean section
424104	1/04/1985	Delivery by caesarean section

*When this nomenclature happened within 3 months of a previous delivery it was excluded from the analysis because of uncertainty about the quality of these registations (810 records were omitted).

1.3. Evaluating the use of diagnostic tests before and after BS in Belgium

1.3.1. Method

All patients with a first bariatric surgery in the period 2009-2011 were considered (n=26 226), hereafter mentioned as cohort patients. Different diagnostic tests were chosen for the analysis: some for which it is assumed that they are recommended for all types of bariatric surgery (complete blood count, iron/transferrine, vitamin B12, vitamin D, Ca, PTH, Glucose, liver and renal tests), some that are considered only in certain situations (e.g. albumin/prealbumin in postoperative phase, vitamin A in post-operative if malabsorptive surgery) and one not routinely recommended (TSH). All diagnostic tests within 1 year pre until 5 years postoperatively were considered.

1.3.2. Outcomes for Belgium

In table XX the number and proportion of patients with minimally one test are shown for the following periods: within 1 year pre surgery, 0-<2 years, and 2-5 years post-surgery.

General volume

- Proportions were generally high (>90%) for blood counts, liver function tests, iron studies, lipid panels, calcium and TSH.
- Proportions were generally low (<30%) for, PTH, vitamin A, and copper. Except PTH, they are however not recommended for all patients but only after malabsorptive surgeries (vit B9, vit A, zinc and copper).

Before surgery

According to the literature pre-op labs tests consistently quoted to be routinely performed are blood type, complete blood count, coagulation profile, iron/ferritin/transferrin, fasting blood glucose, lipid panel, liver function test, renal function, vitamin B9 (ac folic), vitamin B12, vitamin D, calcium, PTH and pregnancy tests for all female patients of childbearing age (Weak).

When we look at the evidence for Belgium in Table 12 we observe:

- Good adherence to this guideline for complete blood count (97%), liver function (95%), lipid panel (around 90% except from LDL), calcium (88%) and iron/ferritin/transferrin (75%).
- Less adherence for vit B12 and folic acid (63%), renal function (45%), vit D (32%) and PTH (18%)
- TSH was not especially recommended but nevertheless was performed in high proportions of patients

Table 12 – Number of Diagnostic tests per period before and after BS for the cohort 2009-2011

Treated as	Nr	Description	Pre-op	%	0-2 years post	%	2-5 years post	%
Blood count	1	mbc	25 853	98,6	25 473	97,1	24 132	92,0
	2	leukocyte	25 799	98,4	25 418	96,9	24 083	91,8
	3	thrombocyte	25 550	97,4	25 278	96,4	23 869	91,0
	GR1	*CBC*	25 516	97,3	25 262	96,3	23 846	90,9
Albumin/ pre albumin	4	albumin	8 142	31,0	11 934	45,5	8 884	33,9
	5	prealb	2 797	10,7	4 069	15,5	3 137	12,0
	GR2	*pre-albumin & albumin*	863	3,3	3 223	12,3	2 349	9,0
Liver function	6	AST&ALT	25 505	97,3	24 738	94,3	23 650	90,2
	7	GGT	25 084	95,6	24 266	92,5	23 235	88,6
	GR3	*AST&ALT &GGT*	25 046	95,5	23 194	95,5	92	88,4
Vitb12 & folic acid	8	vitB12	4 799	18,3	8 480	32,3	8 335	31,8
	9	vitB12&folic acid	15 171	57,8	20 142	76,8	18 381	70,1
	10	folic acid	5 005	19,1	7 071	27,0	6 107	23,3
	GR4	*vit B12 & folic acid*	16 704	63,7	21 348	81,4	19 235	73,3
Renal function	11	creatinin	6 795	25,9	1 860	7,1	2 643	10,1
	12	electrolytes	7 283	27,8	14 824	56,5	15 730	60,0
	GR5	*creatinin or electrolytes*	11 861	45,2	15 333	58,5	16 186	61,7
Blood glucose	13	glucose	*	*	*	*	*	*
Iron studies	14	iron	17 755	67,7	21 449	81,8	20 292	77,4
	15	ibc	6 399	24,4	6 112	23,3	5 495	21,0
	16	ferritin	21 391	81,6	22 562	86,0	21 922	83,6
	GR6	*Iron or ibc*	21 730	82,9	23 248	88,6	21 550	82,2
	GR7	*Iron, ibc, ferritin*	19 666	75,0	21 802	83,1	20 620	78,6
Calcium	17	calcium	23 137	88,2	23 265	88,7	20 406	77,8

Pth	18	pth	4 741	18,1	7 193	27,4	5 775	22,0
Vitd	19	vitD	8 410	32,1	16 581	63,2	18 339	69,9
Vita	20	vitA	2 103	8,0	6 303	24,0	4 738	18,1
Copper	21	copper	2 040	7,8	3 091	11,8	2 320	8,8
Zinc	22	zinc	5 328	20,3	9 619	36,7	6 861	26,2
Lipid panel	23	totchol	24 830	94,7	23 152	88,3	22 081	84,2
	24	LDL	2 123	8,1	1 968	7,5	2 145	8,2
	25	HDL	23 361	89,1	22 065	84,1	21 182	80,8
	26	TG	24 842	94,7	22 943	87,5	21 849	83,3
	GR8	*total lipids*	1 211	4,6	1 443	5,5	1 650	6,3
Tsh	27	TSH	22 803	86,9	21 027	80,2	22 102	84,3
Pregtest	28	pregtest	1 772	13,9**	3 636	28,6**	4 383	35,5**

*Remark: * The glucose nomenclature gave very small results, maybe the nomenclature used was not complete. Algorithms for the group tests: GR1: cbc=mbc and leukocytes and thrombocytes, GR2: pre-alb & alb= alb and prealbumin, GR3: AST, ALT & GGT = AST&ALT or GGT, GR4: vitB12 & folic acid = codes with vitB12 & folic acid or vit B12 and folic acid, GR5: electrolytes: creatinin or electrolytes GR6: iron or ibc= iron or ibc, GR7: iron, ibc, ferritin= (Iron or ibc) and ferritin, GR8: total lipids= totchol, LDL, HDL, and TG. **The percentages for the pregnancy tests are taken as numerator=all cohort women with tests, denominator= all women aged 18-45 years at time of BS.*

After BS surgery

According to the literature post-op regular assessment should be proposed routinely of complete blood count, iron/ferritin/transferrin, albumin/prealbumin, vitamin B12, vitamin D, Ca, PTH, plasma glucose, liver function tests and renal function whatever the type of surgical procedure (Weak). Patients who have undergone malabsorptive surgical procedure (i.e. RYGB, BPD and BPD/DS) should have vitamin B9 (folic acid), vitamin A, zinc and copper levels followed at least every 6 months (Weak).

When we look at the evidence for Belgium in table xx we observe:

- Good adherence to this guideline for complete blood count(96%), liver function (96% 0-<2 yrs. post, 88% 2-<5 years post), , calcium (89%, 78%) and iron/ferritin/transferrin (83%,78%).
- Less adherence for vit B12 and folic acid[a] (81%, 73%), renal function (59%, 62%), vit D (63%, 70%), PTH (27%, 22%) and pregnancy tests (14%,17%).
- Lipid panel is measured relatively often (around 85%, 83%, except from LDL) since it is not routinely recommended by the literature.

[a] Frequently measured together

- Among vitamin and mineral recommended in case of malabsorptive surgery, zinc is measured in a higher proportion of patients (37%, 26%), than vit A (24%, 18%) and copper (12%, 9%).

Pregnancy tests

As stated earlier 26 226 people underwent BS in the period 2009-2011, of which 18 857 were female and 12 712 female between 18 and 45 years old (and 2 723 gave birth within 5 years after BS). If we take the number of 12 712 as denominator, 1 in 7 fertile women have a pregnancy test the year before the bariatric surgery, 2 in 7 fertile women have a pregnancy test in the period 0-2 years after BS and 1 in 3 fertile women have one after 2-5 years.

1.3.3. Number of tests per patient

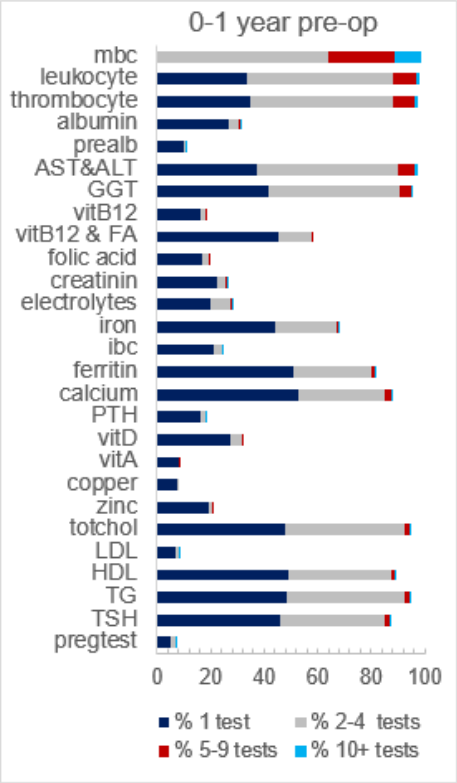
The number of tests per patient have been classified according to 1, 2-4, 5-9 or 10+ tests in the following periods: one year pre-op, 0-2 years post-op, and 2-5 years post operatively.

The number of tests per patient is highest in the period 2-5 years post op > 0-2 yrs post > within 1 year pre-op. As the length of these periods is not the same going from 3 year, 2 year, 1 year periods this seems to imply a relatively stable amount of tests annually.

Some tests are performed several times per patients which is especially for blood count, with 70% of patients receiving more than 5 tests both 0-2 year post op and 2-5 years post op. Also the liver function tests AST&ALT and GGT are performed relatively much often?

Most tests that are performed on a proportion of BS patients higher than 30% are also performed multiple times per period on these patients.

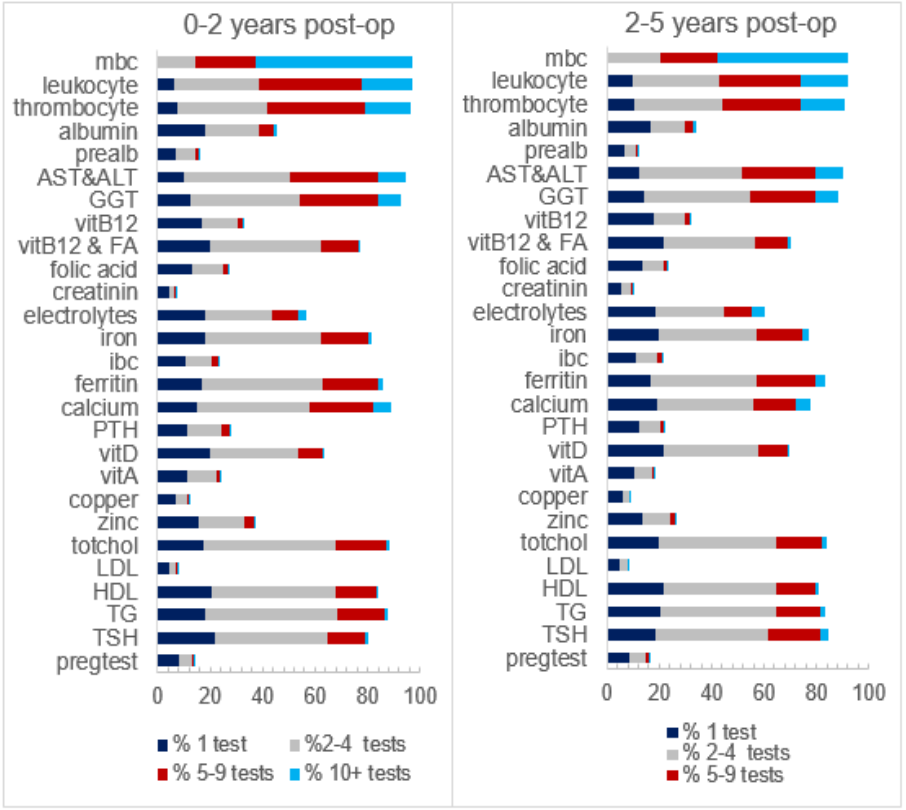
Figure 2 – Percentage of patients with 1, 2-4, 5-9 or 10+ tests respectively during the period within 1 year pre-op



REMARK: Glucose has been excluded from the graph.

Post operatively it is remarkable that there is a relatively large spread between the number of tests per patient. It is clear that most patients had multiple tests for these periods when they had at least one test of the type done. Exceptions are creatinin, prealbumin, and copper which were only performed once in the majority of cases.

Figure 3 – Percentage of patients with 1, 2-4, 5-9 or 10+ tests respectively during the periods within 2 years post-op (LEFT) or 2-5 years post operatively (RIGHT)



Hospital analysis

University/non university

- There are tests that are performed much more frequently for patients who were operated in university hospitals than in general hospitals. Those are especially albumin, PTH, vit A, copper, zinc and total cholesterol
- There are 2 tests that are performed less in patients operated in university hospitals: pre-albumin and LDL.

REMARK: Glucose has been excluded from the graph.

1.3.4. Detailed information

Table 13 – Average proportion of patients with at least one test per hospital

		0-1 pre-op		0-2 post-op		2-5 yr post-op	
	description	General Hospital	University hospital	General Hospital	University hospital	General Hospital	University hospital
1	mbc	99,4	99,7	99,8	99,2	99,7	99,2
2	leukocyte	99,3	99,4	99,6	99,1	99,5	98,8
3	thrombocyte	98,2	99,2	98,9	99,0	98,3	98,4
4	albumin	21,6	49,2	38,7	62,9	30,8	50,3
5	prealb	6,5	4,8	13,5	9,5	10,7	11,9
6	AST&ALT	97,7	98,3	95,6	96,8	97,9	97,1
7	GGT	95,6	97,1	93,1	95,4	96,6	95,8
8	vitB12	16,0	24,3	28,2	39,3	32,8	38,1
9	vitB12&folic acid	51,9	48,7	74,9	72,0	74,9	69,5
10	folic acid	16,8	26,2	24,2	33,7	23,2	30,9
11	creatinin	20,9	45,5	6,2	16,3	10,0	18,5
12	electrolytes	24,8	31,2	53,7	63,1	65,3	70,1
14	iron	68,2	78,1	81,4	83,3	84,6	82,2
15	ibc	19,1	24,7	20,4	26,1	22,3	23,2
16	ferritin	76,5	90,0	85,4	89,2	90,1	89,0
17	calcium	83,9	90,3	87,9	88,8	84,5	85,8
18	PTH	12,7	31,3	22,0	34,8	20,0	33,1
19	vitD	25,4	35,9	59,5	61,7	73,9	74,0
20	vitA	3,4	16,0	18,2	34,1	16,1	26,7
21	copper	2,6	23,5	7,4	21,7	7,2	15,6
22	zinc	8,1	18,4	24,4	42,6	23,0	35,8

23	totchol	94,2	96,0	88,3	91,2	91,7	90,0
24	LDL	7,3	5,4	7,4	8,5	8,9	10,7
25	HDL	89,7	90,6	84,6	88,0	88,3	87,1
26	TG	93,6	95,8	87,5	90,3	90,8	89,3
27	TSH	88,3	90,0	82,5	86,3	92,1	91,3
28	pregtest	8,1	6,8	14,2	13,4	19,2	16,4

Table 14 – Absolute and relative difference in average proportion of patients with at least one test per hospital

		0-1 pre-op	0-2 post-op	2-5 yr post-op	0-1 pre-op	0-2 post-op	2-5 yr post-op
		absolute % diff GH vs UH	absolute % diff GH vs UH	absolute % diff GH vs UH	relative % diff GH vs UH	relative % diff GH vs UH	relative % diff GH vs UH
1	mbc	0,3	-0,6	-0,5	0,3	-0,6	-0,5
2	leukocyte	0,1	-0,5	-0,7	0,1	-0,5	-0,7
3	thrombocyte	1,0	0,1	0,1	1,0	0,1	0,1
4	albumin	27,6	24,1	19,5	56,1	38,4	38,7
5	prealb	-1,7	-4,0	1,3	-34,9	-42,7	10,5
6	AST&ALT	0,7	1,2	-0,9	0,7	1,2	-0,9
7	GGT	1,5	2,3	-0,8	1,6	2,4	-0,9
8	vitB12	8,4	11,1	5,3	34,3	28,3	13,8
9	vitB12&folic acid	-3,2	-2,9	-5,3	-6,7	-4,1	-7,7
10	folic acid	9,3	9,5	7,8	35,6	28,1	25,1
11	creatinin	24,6	10,1	8,5	54,1	62,0	46,0
12	electrolytes	6,4	9,4	4,8	20,5	14,9	6,8
14	iron	9,9	1,9	-2,4	12,7	2,3	-3,0
15	ibc	5,6	5,7	0,9	22,6	22,0	4,0
16	ferritin	13,5	3,8	-1,2	15,0	4,3	-1,3

17	calcium	6,4	0,9	1,3	7,1	1,0	1,5
18	PTH	18,6	12,8	13,1	59,5	36,8	39,5
19	vitD	10,5	2,2	0,1	29,2	3,6	0,2
20	vitA	12,6	15,8	10,6	78,7	46,5	39,8
21	copper	20,9	14,2	8,4	88,9	65,6	53,8
22	zinc	10,3	18,2	12,8	56,1	42,7	35,9
23	totchol	1,8	2,9	-1,7	1,9	3,2	-1,8
24	LDL	-1,9	1,1	1,8	-36,1	13,3	16,5
25	HDL	0,8	3,4	-1,2	0,9	3,8	-1,4
26	TG	2,2	2,8	-1,4	2,3	3,1	-1,6
27	TSH	1,6	3,8	-0,8	1,8	4,4	-0,9
28	Pregtest	-1,3	-0,8	-2,8	-19,2	-5,7	-16,8

Formula absolute difference General Hospital (GH) versus University Hospital (UH): UH- value minus GH-value
Formula relative difference General Hospital (GH) versus University Hospital (UH):
*(UH-value-GH-value)/GH value *100*

Nomenclature of all the diagnostic tests (only vitA codes 541516 and 541520 have an enddate on 30/11/2001)

Nomen	Short_descr	PixeIt	Start	Nomen_desc_nl
123012	mbc	1	1/03/1995	Dosing hemoglobin by electrophotometric method (Maximum 1)
123023	mbc	1	1/03/1995	Dosing hemoglobin by electrophotometric method (Maximum 1)
123034	mbc	1	1/03/1995	Counting of erythrocyts and/or hematocrite (Maximum 1)
123045	mbc	1	1/03/1995	Counting of erythrocyts and/or hematocrite (Maximum 1)
127013	mbc	1	1/03/1995	Dosing hemoglobin by electrophotometric method (Maximum 1)
127024	mbc	1	1/03/1995	Dosing hemoglobin by electrophotometric method (Maximum 1)
127035	mbc	1	1/03/1995	Counting of erythrocyts and/or hematocrite (Maximum 1)
127046	mbc	1	1/03/1995	Counting of erythrocyts and/or hematocrite (Maximum 1)
123056	leukocyte	2	1/03/1995	Counting of leucocytes (Maximum 1)
123060	leukocyte	2	1/03/1995	Counting of leucocytes (Maximum 1)
127050	leukocyte	2	1/03/1995	Counting of leucocytes (Maximum 1)
127061	leukocyte	2	1/03/1995	Counting of leucocytes (Maximum 1)
123115	thrombocyte	3	1/03/1995	Counting of thrombocytes (Maximum 1)
123126	thrombocyte	3	1/03/1995	Counting of thrombocytes (Maximum 1)
127116	thrombocyte	3	1/03/1995	Counting of thrombocytes (Maximum 1)
127120	thrombocyte	3	1/03/1995	Counting of thrombocytes (Maximum 1)
540131	albumin	4	1/03/1995	Dosing of albumin (Maximum 1) (Cumulative rule 11)
540142	albumin	4	1/03/1995	Dosing of albumin (Maximum 1) (Cumulative rule 11)
540993	prealb	5	1/03/1995	Dosing of prealbumin (transthyretin) with an immunological method (Maximum 1)
541004	prealb	5	1/03/1995	Dosing of prealbumin (transthyretin) with an immunological method (Maximum 1)
120131	AST & ALT	6	1/03/1995	Dosing of aspartate aminotransferases and alanine aminotransferases (Maximum 1) (Cumulative rule 2)
120142	AST & ALT	6	1/03/1995	Dosing of aspartate aminotransferases and alanine aminotransferases (Maximum 1) (Cumulative rule 2)
120094	AST&ALT	6	1/03/1995	Dosing of aspartate aminotransferases (Maximum 1) (Cumulative rule 2)
120105	AST&ALT	6	1/03/1995	Dosing of aspartate aminotransferases (Maximum 1) (Cumulative rule 2)

120116	AST&ALT	6	1/03/1995	Dosing of alanine aminotransferases (Maximum 1) (Cumulative rule 2)
120120	AST&ALT	6	1/03/1995	Dosing of alanine aminotransferases (Maximum 1) (Cumulative rule 2)
125090	AST&ALT	6	1/03/1995	Dosing of aspartate aminotransferases (Maximum 1) (Cumulative rule 2)
125101	AST&ALT	6	1/03/1995	Dosing of aspartate aminotransferases (Maximum 1) (Cumulative rule 2)
125112	AST&ALT	6	1/03/1995	Dosing of alanine aminotransferases (Maximum 1) (Cumulative rule 2)
125123	AST&ALT	6	1/03/1995	Dosing of alanine aminotransferases (Maximum 1) (Cumulative rule 2)
125134	AST&ALT	6	1/03/1995	Dosing of aspartate aminotransferases and alanine aminotransferases (Maximum 1) (Cumulative rule 2)
125145	AST&ALT	6	1/03/1995	Dosing of aspartate aminotransferases and alanine aminotransferases (Maximum 1) (Cumulative rule 2)
541892	GGT	7	1/03/1995	° Dosing of the gammaglutamyltransferases (Maximum 1)
541903	GGT	7	1/03/1995	° Dosing of the gammaglutamyltransferases (Maximum 1)
541494	vitB12	8	1/03/1995	Dosing of vitamin B12 with non isotopes-method (Maximum 1) (Cumulative rule 303) (Diagnosisrule 154)
541505	vitB12	8	1/03/1995	Dosing of vitamin B12 with non isotopes-method (Maximum 1) (Cumulative rule 303) (Diagnosisrule 154)
541391	vitB12&folic acid	9	1/03/1995	Dosing of vitamin B12 and folic acid, with non isotopes-method (Maximum 1) (Cumulative rule 303) (Diagnosisrule 154)
541402	vitB12&folic acid	9	1/03/1995	Dosing of vitamin B12 and folic acid, with non isotopes method (Maximum 1) (Cumulative rule 303) (Diagnosisrule 154)
541435	folic acid	10	1/03/1995	Dosing of folic acid in the serum with non isotopes method(Maximum 1) (Cumulative rule 303)
541446	folic acid	10	1/03/1995	Dosing of folic acid in the serum with non isotopes method(Maximum 1) (Cumulative rule 303)
541450	folic acid	10	1/03/1995	Dosing of folic acid in the erythrocytes non isotopes method (Maximum 1) (Cumulative rule 304)
541461	folic acid	10	1/03/1995	Dosing of folc acid in the erythrocytes with non isotopes method (Maximum 1) (Cumulative rule 304)
543255	creatinin	11	1/03/1995	Dosing of creatinin (Maximum 1) (Cumulative rule 8,343)
543266	creatinin	11	1/03/1995	Dosing of creatinin (Maximum 1) (Cumulative rule 8,343)
542872	electrolytes	12	1/10/2010	Dosing of sodium, of potasium, of chlorides and of bicarbonates in the plasma of the serum (Maximum 1) (Cumulative rule 335)
542883	electrolytes	12	1/10/2010	Dosing of sodium, of potasium, of chlorides and of bicarbonates in the plasma of the serum (Maximum 1) (Cumulative rule 335)
547072	glucose	13	1/03/1995	Dosing of glycoles of higher alcohols en theri metabolites with a chromatographic method (Maximum 1)(Diagnosisrule 49)

547083	glucose	13	1/03/1995	Dosing of glycoles of higher alcohols en theri metabolites with a chromatographic method (Maximum 1)(Diagnosisrule 49)
540551	iron	14	1/03/1995	Dosing of iron (Maximum 1) (Cumulative rule 15)
540562	iron	14	1/03/1995	Dosing of iron (Maximum 1) (Cumulative rule 15)
540573	ibc	15	1/03/1995	Dosing of iron en determination of the iron binding capacity (Maximum 1) (Cumulative rule 15, 16)
540584	ibc	15	1/03/1995	Dosing of iron en determination of the iron binding capacity (Maximum 1) (Cumulative rule 15, 16)
541472	ferritin	16	1/03/1995	Dosing of ferritin with non isotopes method (Maximum 1) (Cumulative rule 305)
541483	ferritin	16	1/03/1995	Dosing of ferritin with non isotopes method (Maximum 1) (Cumulative rule 305)
540190	calcium	17	1/03/1995	Dosing of calcium (Maximum 1) (Cumulative rule 12)
540201	calcium	17	1/03/1995	Dosing of calcium (Maximum 1) (Cumulative rule 12)
559274	PTH	18	1/12/2001	Dosing of intact parathormone (Maximum 1) (Cumulative rule 117, 235)
559285	PTH	18	1/12/2001	Dosing of intact parathormone (Maximum 1) (Cumulative rule 117, 235)
559311	vitD	19	1/12/2001	Dosing of 25-hydroxy vitamin-D (Maximum 1)(Cumulative rule 214)
559322	vitD	19	1/12/2001	Dosing of 25-hydroxy vitamin-D (Maximum 1)(Cumulative rule 214)
541516	vitA	20	1/03/1995	Dosing of vitamin A (Maximum 1) (Cumulative rule 19) Klasse 9
541520	vitA	20	1/03/1995	Dosing of vitamin A (Maximum 1) (Cumulative rule 19) Klasse 9
541531	vitA	20	1/03/1995	Dosing of vitamin A by HPLC (Maximum 1) (Cumulative rule 19)
541542	vitA	20	1/03/1995	Dosing of vitamin A by HPLC (Maximum 1) (Cumulative rule 19)
543314	copper	21	1/03/1995	Dosing of copper by atomabsorption spectrometry (Maximum 1)
543325	copper	21	1/03/1995	Dosing of copper by atomabsorption spectrometry (Maximum 1)
540396	copper	21	1/03/1995	Dosing of copper by atomabsorption spectrometry (Maximum 1)
540400	copper	21	1/03/1995	Dosing of copper by atomabsorption spectrometry (Maximum 1)
540411	copper	21	1/03/1995	Dosing of ceruloplasmin with an immunological method and of copper by atomabsorption spectrometry (Maximum 1) (Cumulative rule 14)
540422	copper	21	1/03/1995	Dosing of ceruloplasmin with an immunological method and of copper by atomabsorption spectrometry (Maximum 1) (Cumulative rule 14)
541575	zinc	22	1/03/1995	Dosing of zinc by atomabsorption spectrometry (Maximum 1)
541586	zinc	22	1/03/1995	Dosing of zinc by atomabsorption spectrometry (Maximum 1)

547330	zinc	22	1/07/1999	Retrieval and Dosing of erythrocytic zincprotoporfyrin (Maximum 1) (Diagnosisrule 49, 61)
547341	zinc	22	1/07/1999	Retrieval en Dosing of erythrocytic zinkprotoporfyrin (Maximum 1) (Diagnosisrule 49, 61)
540271	totchol	23	1/03/1995	Dosing of total cholesterol (Maximum 1)
540282	totchol	23	1/03/1995	Dosing of total cholesterol (Maximum 1)
542231	LDL	24	1/07/1999	Dosing of LDL-cholesterol, with exlusion of calculation methods (Maximum 1)(Cumulative rule 13) (Diagnosicrule 54)
542242	LDL	24	1/07/1999	Dosing of LDL-cholesterol, with exlusion of calculation methods (Maximum 1)(Cumulative rule 13) (Diagnosicrule 54)
540293	HDL	25	1/03/1995	Dosing of HDL-cholesterol (Maximum 1) (Cumulative rule 13)
540304	HDL	25	1/03/1995	Dosing of HDL-cholesterol (Maximum 1) (Cumulative rule 13)
541376	TG	26	1/03/1995	Dosing of triglycerides (Maximum 1)
541380	TG	26	1/03/1995	Dosing of triglycerides (Maximum 1)
546173	TSH	27	1/03/1995	Dosing of thyroid stimulating hormone (TSH) (Maximum 1) (Cumulative rule 218, 311, 322)
546184	TSH	27	1/03/1995	Dosing of thyroid stimulating hormone (TSH) (Maximum 1) (Cumulative rule 218, 311, 322)
546195	pregtest	28	1/03/1995	Dosing of human choriogonadotrophines (hCG) (Maximum 1) (Cumulative rule 37, 322) (Diagnostic rule 6)
546206	pregtest	28	1/03/1995	Dosing of human choriogonadotrophines (hCG) (Maximum 1) (Cumulative rule 37, 322)(Diagnostic rule 6)

2. APPENDICES TO CHAPTER 3

2.1. Toestemmingsformulier[b]

Informatie voor de patiënt:

Project:

Organisatie en financiering van een zorgpad voor obesitaschirurgie

Beschrijving en doel van het project.

Het Federaal Kenniscentrum voor de Gezondheidszorg (KCE) en BSM-Management/Tempera nodigen u uit om deel te nemen aan een studie die wil nagaan welke positieve ervaringen en/of problemen patiënten die obesitaschirurgie ondergaan hebben ondervonden hebben. Tijdens een interview zal gevraagd worden naar uw ervaringen in de periode voor de ingreep en tijdens de nazorg (d.w.z. na uw ziekenhuisopname). Er zal ook gevraagd worden op welke manier deze zorg zou kunnen worden verbeterd.

Voordat u al dan niet aanvaardt om deel te nemen, willen wij u graag op de hoogte brengen van de organisatorische aspecten, voordelen en eventuele risico's, zodat u met kennis van zaken een beslissing kunt nemen.

Gelieve aandachtig de informatie hieronder te lezen en aarzel niet om al uw vragen te stellen. Indien u bijkomende informatie wenst, kan u ook contact opnemen met Mevr. Kirsten Vanderplanken van Tempera (tel: 03-270.38.08 ; e-mail: kirsten.vanderplanken@tempera.be).

Dit document bevat 2 delen: in het eerste deel vindt u informatie die belangrijk is om uw beslissing tot deelname te kunnen nemen, en in het tweede wordt gevraagd uw geschreven geïnformeerde toestemming te ondertekenen indien u beslist deel te nemen.

Wat gebeurt er wanneer ik deelneem?

Indien u beslist tot deelname, wordt u verzocht telefonisch of via de voorgefrankeerde omslag uw intentie tot deelname kenbaar te maken. Er worden enkele gegevens (geslacht, type chirurgische ingreep, ziekenhuis waar u geopereerd werd, aantal maanden die verstreken zijn na de ingreep) om na te gaan of u in aanmerking komt voor het onderzoek. Indien u deze intentie tot deelname kenbaar maakt zal het verloop van het onderzoek er concreet als volgt uitzien:

- Een medewerker van Tempera/ BSM-management zal u contacteren gedurende de maand oktober-november 2018 om een afspraak te maken voor een éénmalig gesprek waarin de onderzoeker vragen zal stellen en naar uw verhaal en ervaring met obesitaschirurgie luistert. U kan zelf uw voorkeur aangeven waar en wanneer het gesprek zal plaatsvinden. Het gesprek zal maximaal anderhalf uur duren.
- Indien er meer kandidaten zijn dan het maximum aantal mensen dat kan worden geïnterviewd, wordt u op de reservelijst geplaatst. In dat geval wordt u dit meegedeeld (telefonisch of via e-mail).
- Indien u niet in aanmerking komt voor dit onderzoek zal dit u via e-mail, brief of telefonisch contact worden meegedeeld.

[b] French version available upon request

Toestemming en weigering

Bij aanvang van het gesprek zal de onderzoeker de informatie die vermeld staat in deze brief met u overlopen. U het volste recht hebt om te weigeren aan dit onderzoek mee te werken of zelfs om tijdens het onderzoek af te zien van verdere medewerking zonder verder opgave van reden. U kan daarbij gerust zijn dat uw eventuele weigering de zorgverlening door uw hulpverleners geenszins zal beïnvloeden.

Als u toestemt, wordt u gevraagd het toestemmingsformulier te tekenen.

Voordelen

- U zult geen onmiddellijk voordeel hebben van uw deelname aan het onderzoek. Wel hopen wij dat we mede door uw deelname aan deze studie beter te begrijpen welke de noden zijn van patiënten die obesitaschirurgie ondergaan en hoe deze patiënten in de toekomst beter ondersteund kunnen worden.
- Kosten: Uw deelname aan de studie brengt geen bijkomende kosten mee voor u, maar biedt ook geen financieel voordeel.
- Risico's en verzekering: Deze studie werd goedgekeurd door een onafhankelijke Commissie voor Medische Ethiek verbonden aan UZ Gent, en zal worden uitgevoerd volgens de richtlijnen voor de goede klinische praktijk (ICH/GCP) en de verklaring van Helsinki[c] opgesteld ter bescherming van mensen deelnemend aan klinische studies. Deze gegevensverzameling wordt uitgevoerd onder supervisie van dr. Koen Van den Heede, verpleegkundige en senior onderzoeker verbonden aan het Federtaal Kenniscentrum voor de Gezondheidszorg (www.kce.fgov.be) .

  De experimentenwet van 7/05/2004[d] verplicht ons om een verzekering af te sluiten om onze aansprakelijkheid (zelfs zonder fout) te dekken in geval van schade toegebracht aan de deelnemers die direct of indirect gerelateerd is aan het onderzoek.
  De waarschijnlijkheid dat u door deelname aan deze studie enige schade ondervindt, is extreem laag. Indien dit toch zou voorkomen, wat echter zeer zeldzaam is, werd er een verzekering afgesloten conform de Belgische wet van 7 mei 2004, die deze mogelijkheid dekt.
- Vertrouwelijkheid: Als u akkoord gaat om aan deze studie deel te nemen, zullen uw persoonlijke en klinische gegevens tijdens deze studie worden gecodeerd (de gegevens kunnen enkel nog door een code teruggekoppeld worden naar uw persoonlijk dossier).

  Uw gegevens worden verwerkt in overeenstemming met de Belgische wet van 8 december 1992 en de Belgische wet van 22 augustus 2002 en de Verordening (EU) 2016/679 van 27 april 2016 die vanaf 25 mei 2018 in werking treedt betreffende de bescherming van natuurlijke personen in verband met de verwerking van persoonsgegevens en betreffende het vrije verkeer van die gegevens. Als de resultaten van de studie worden gepubliceerd, zal uw anonimiteit aldus verzekerd zijn. De eindresultaten van de analyses zullen worden gepubliceerd en voor iedereen toegankelijk zijn op de KCE-website (www.kce.fgov.be).

  U heeft inzagerecht in uw gegevens. Hiervoor kan u eenvoudig contact opnemen met het KCE als verwerkingsverantwoordelijke via info@kce.fgov.be of via brief naar KCE, Kruidtuinlaan 55, 1000 Brussel. Tempera/BSM management zamelt de gegevens in en treedt op als verwerker.

  Mocht u vragen of opmerkingen hebben over de verwerking van uw gegevens, kan u steeds contact met ons opnemen. De KCE Data protection Officer kan u desgewenst meer informatie verschaffen over de bescherming van uw persoonsgegevens. U kan hem contacteren op:

  kce_dpo@kce.fgov.be

  DPO KCE

[c] Verklaring van Helsinki uitgewerkt door de World Medical Association – Ethische principes voor medisch onderzoek op mensen

[d] Wet van 7 mei 2004 inzake experimenten op de menselijke persoon

Kruidtuinlaan 55

1000 Brussel

Als dit niet voldoende zou blijken kan u een klacht indienen over hoe uw informatie wordt behandeld, bij de Belgische toezichthoudende instantie die verantwoordelijk is voor het handhaven van de wetgeving inzake gegevensbescherming:

Gegevensbeschermingsautoriteit (GBA)

Drukpersstraat 35,

1000 Brussel

Tel. +32 2 274 48 00

e-mail: contact(at)apd-gba.be

Website: www.gegevensbeschermingsautoriteit.be

Toestemmingsverklaring

- ☐ Ik verklaar hierbij op een voor mij begrijpelijke wijze mondeling en schriftelijk te zijn ingelicht over de aard, de methode en het doel van deze studies.
- ☐ Ik stem erin toe deel te nemen aan het wetenschappelijk onderzoek.
- ☐ Ik verklaar me akkoord dat er een audio-opname van het interview gebeurt.
- ☐ Ik ben er mij van bewust dat dit project ter beoordeling en controle aan het Ethisch Comité van het UZ Gent werd voorgelegd en ik deze goedkeuring niet moet beschouwen als een motivatie tot deelname aan deze studie.
- ☐ Ik ben ervan op de hoogte dat deelname aan deze studies geen bijkomende kosten meebrengen en dat er geen financieel voordeel aan verbonden is.
- ☐ De patiënt kan zich op elk moment terugtrekken tot op het ogenblik dat de gegevens in de database worden bewaard zonder hiervoor een verklaring te hoeven afleggen en zonder dat dit op enigerlei wijze gevolg zal hebben voor mij.
- ☐ Ik begrijp dat mijn gegevens vertrouwelijk worden ingezameld en geregistreerd, en dat de hoofdonderzoeker hun vertrouwelijkheid garandeert.

Gelezen en goedgekeurd,

Naam onderzoeker:	Naam Patiënt
Datum:	Datum:
Handtekening	Handtekening

2.2. Interview Gids voor patiënten[e]

VOORAF: Introductie door de interviewer

Uitleg interview: voordat we met het interview van start gaan, zal ik u het verloop van het interview uitleggen

- Wat we met het interview te weten willen komen, is welke positieve ervaringen en/of problemen mensen die obesitas-chirurgie (bariatrische heelkunde) kunnen hebben in de periode voorafgaand aan de operatie en tijdens na ontslag uit het ziekenhuis, hoe de nazorg was, en op welke punten de nazorg misschien verbeterd kan worden.
- Het interview omvat **veel vragen** die vrijwel allemaal te maken hebben met mogelijke problemen die u hebt ondervonden.
- Het bestaat uit een **aantal onderdelen** (bv. belangrijkste problemen, fysieke en psychologische problemen). Elke keer als we naar een ander onderwerp gaan zal ik dat aangeven.
- Als u daarvoor toestemming geeft, nemen we het interview op band op. Het interview wordt later uitgeschreven op papier. Dat is om er zeker van te zijn dat we geen informatie kwijtraken.
- Uw naam zal daarbij nergens voorkomen en zal niet terug te vinden zijn in het rapport.
- Wanneer u behoefte heeft aan een pauze, geeft u dat dan gerust aan. Ook als u ergens niet over wilt praten, kunt u dat aangeven. U kan ook steeds het interview stopzetten indien u dit wenst.

NOOT voor de interviewer: de stippen die volgen op een vraag, zijn aspecten die we graag in het antwoord van de respondent zouden terugvinden en waarnaar eventueel moet doorgevraagd worden.

2.2.1. Openingsvraag

Voor we aan het interview beginnen, mag ik van u enkele gegevens noteren?

Op papier invullen: geslacht, leeftijd, burgerlijke staat, datum van de operatie, opleidingsniveau, ziekenhuis waar u werd geopereerd, wanneer werd u geopereerd (aantal maanden of datum), BMI, lengte en gewicht voor de operatie, BMI en gewicht 6 maanden na operatie, BMI en gewicht op moment van interview, type ingreep (bypass/sleeve gastrectomy/ev. ander type ingreep). (basisgegevens die we willen verzamelen)

< Hier start opnemen gesprek >

2.2.2. Inleidingsvraag: verhaal en achtergrond van de patiënt

NOOT voor de interviewer: we willen iets weten over de fase voor de operatie. Hoe is zorg tijdens deze fase verlopen, werden patiënten voldoende geïnformeerd, betrokken in de keuze voor de operatie en voorbereid op de gevolgen (aanpassing levensstijl, nevenwerkingen, complicaties).

A. Voor we over de periode na de operatie gaan praten, zou u eerst iets kunnen vertellen de periode voorafgaand aan de operatie? Hoe werd de beslissing genomen om tot een heelkundige ingreep over te gaan?

- Wie heeft hierbij een belangrijke rol gespeeld (zorgverleners: huisarts, chirurg, coördinator obesitascentrum, psycholoog, diëtist, …; anderen: vrienden en familie, kennissen die een gelijkaardige ingreep hebben ondergaan, media, …)?
- Werd u voldoende geïnformeerd over de operatie en voorbereid op de (potentiële) gevolgen (zowel op korte als op lange termijn): medische complicaties, nevenwerkingen, levensstijlaanpassingen

[e] French version available upon request

(eetgewoonten, dieet, beweging, …), eventuele psychologische aspecten/impact?

- Onder welke vorm kreeg u de informatie: tijdens een consultatie (welke zorgverleners?), tijdens een informatiemoment georganiseerd door het ziekenhuis (hoe verliep dit), via een filmpje/website/informatiebrochure van het ziekenhuis? Andere?

- Bent u rechtstreeks naar het ziekenhuis/de chirurg gegaan of werd u verwezen door uw huisarts of andere zorgverlener? Wat heeft de keuze voor dit ziekenhuis bepaald? Heeft u ook andere chirurgen/ziekenhuizen geraadpleegd?
- Hoeveel tijd is er verstreken tussen het eerste contact met het ziekenhuis/de chirurg en de operatie? Wat vindt u van deze periode (te lang/te kort)?
- Zijn er verbeterpunten voor de voorbereidende fase?
- Had u een BMI van > 40 voor de ingreep, of had u een lagere BMI (35-40) die wel samenging met andere problemen zoals : diabetes, slaapapnoe, moeilijk te behandelen hoge bloeddruk, …
- Was er qua eetgewoonten voor de ingreep sprake van een eetstoornis, of was u in uw drijfveer om te eten een 'emotionele eter' (bv ingegeven door negatieve gevoelens zoals verdriet, stress, angst of verveling, of was er vaak een onweerstaanbare drang om te eten of te snoepen…)

B. Voor we over de nazorg gaan praten, kan u mij vertellen hoe de ziekenhuisopname verlopen is

- Hoe lang hebt u in het ziekenhuis gelegen?

NOOT: Dit is iets waar mensen vaak lang over kunnen vertellen. Na ongeveer 10 min zouden deze vragen moeten afgerond zijn. Het is dus van belang dat de interviewer er op toeziet dat bovenstaande informatie in het antwoord vervat zit en indien nodig de respondent onderbreekt en terugbrengt naar de inleidingsvragen, om vervolgens te kunnen overgaan naar de vragen over nazorg.

2.2.3. Sleutelvragen:

NOOT voor de interviewer: we komen met deze vragen tot het hoofddoel van het interview, nl. de behoeften/noden/problemen/sharing of best practices (goede ervaringen, 'tips') in kaart brengen die patiënten die een bariatrische ingreep ondergaan hebben ervaren hebben.

Ik ga nu vragen stellen over problemen die u mogelijks ervaren hebt sinds uw operatie (periode na ontslag uit het ziekenhuis).

DEEL 1: BELANGRIJKSTE PROBLEMEN EN/OF POSITIEVE ZAKEN ERVAREN DOOR DE PATIËNT

A. Wat is de impact van de interventie?

- Heeft de ingreep geleid tot een groot gewichtsverlies (of gewenst)?
- Wanneer de ingreep meer dan 2 jaar geleden plaatsvond: is het gewichtsverlies hetzelfde gebleven of is er sprake van gewichtstoename? (in dat geval, wat kan hiervan, volgens u, de reden van zijn?)
- Indien u reeds type-2 diabetes had voor de ingreep : heeft de ingreep een positieve impact gehad op uw diabetes? (zo ja, kan u kort uitleggen wat deze positieve impact inhield)
- Indien u reeds last had van een hoge bloeddruk, hoge cholesterol, slaapapnoe : heeft de ingreep verbetering gebracht bij deze gezondheidsproblemen?(zo ja, kan u dit even uitleggen)

B. In de periode tussen het ontslag uit het ziekenhuis en vandaag, wat zijn de belangrijkste problemen (lichamelijk, psychologisch, sociaal, financieel, verslaving) die u ervaren heeft?

- Welke van deze problemen/elementen hebben de grootste impact gehad (bv. dagelijks leven, sociaal contact, werk, …)?
- Tijdens welke periode (bv. onmiddellijk na ontslag, <6 maand na ontslag; 6-12 maand na ontslag; 12-24 maand na ontslag; >24 maand

na ontslag) kwamen deze problemen voor en hoe lang hebben ze geduurd?

- Had de ingreep een duidelijke (of de gewenste) gewichtsdaling tot gevolg?
- Zo u al meer dan 2 jaar na de ingreep ver bent: bleef de initieel gerealiseerde gewichtsdaling grotendeels behouden, of trad er een herval op? (in dit laatste geval: wat zouden volgens u reden tot herval kunnen zijn?)
- Indien u voorafgaandelijk aan de ingreep leed aan diabetes type 2, had de ingreep een gunstige invloed op het verdere verloop van de diabetes (en zo ja, leg kort nader uit)
- Indien u voorafgaandelijke aan de ingreep leed aan ernstige hypertensie, te hoge cholesterol, of last had van slaap-apnoe syndroom, had de ingreep een gunstige invloed op het verdere verloop hiervan (en zo ja, leg kort nader uit)
- Hoe was de zorg voor deze problemen?
- Bij wie (welke zorgverleners) kon u terecht voor [vul type probleem in]
- Doorvragen:
  - Denk aan chirurg/andere arts van het ziekenhuis, huisarts, psycholoog (centrum of ambulant), diëtist (centrum of ambulant), kinesist, …
- Om de hoeveel tijd ging u op controle (huisarts of centrum[bij welke zorgverleners: chirurg/internist, verpleegkundige, psycholoog, diëtist, kinesist])? Was dat genoeg? Had u toegang tot de zorgverleners die u nodig had? Was de nazorg voldoende? Werd er naast klassieke consultaties nog tijdens andere momenten hulp aangeboden (bv. terugkomdagen met andere patiënten al dan niet begeleid door zorgverleners; sportsessies; telefonische consultaties, ..)?
- Beschikte je over voldoende informatie over waar je terecht kon voor welke zorg?
- Waar schoot de nazorg te kort?
- Heeft u ook bij niet zorgverleners hulp gezocht voor deze problemen (zelfhulpgroepen, websites, anderen…)?
- Hadden deze problemen (en de zorg die hiermee verband houdt: bv. consultaties, medicatie, ..) ook financiële gevolgen? Hebben deze financiële gevolgen een rol gespeeld in het al dan niet hulp zoeken voor uw problemen (bv. niet naar vervolgafspraken gaan omdat ze niet terugbetaald worden, geen vitamine-supplementen nemen)
- Hier op terug kijkend, wat had u zelf beter of anders kunnen doen om eventuele problemen te vermijden?
- Als u alles in ogenschouw neemt, zou u de ingreep opnieuw laten uitvoeren? en zou u de anti-obesitas operatie (of het type van operatie) ook aan anderen (die voor zo een ingreep in aanmerking komen) aanraden? (leg ook nader uit waarom u dit zou aanraden, of afraden)

DEEL 2: LICHAMELIJKE PROBLEMEN

Ik zou nu willen overgaan naar mogelijke lichamelijke gevolgen voor u.

A. Tijdens de periode na het ontslag uit het ziekenhuis en vandaag, welke (ander) problemen had u op LICHAMELIJK gebied?

NOOT voor de interviewer: Mogelijks zijn er bij de belangrijkste problemen al lichamelijke problemen gerapporteerd. In deze sectie is het de bedoeling om door te vragen naar eventueel andere lichamelijke problemen. Denk aan complicaties (pijn, bloedingen, …), nevenwerkingen (dumping, hypoglycemie, ..) en andere (bv. huidoverschot, gewrichtspijnen, ... Bij vrouwen die na hun operatie zwanger zijn geweest dient hierop doorgevraagd te worden (opvolging, kennis huisarts en gynaecoloog, ..)

Doorvragen:

- Hadden deze problemen een grote impact (bv. dagelijks leven, sociaal contact, werk, …)?
- Tijdens welke periode (bv. onmiddellijk na ontslag, <6 maand na ontslag; 6-12 maand na ontslag; 12-24 maand na ontslag; >24 maand na ontslag) kwamen deze problemen voor en hoe lang hebben ze geduurd?
- Hoe was de nazorg voor deze problemen?
- Bij wie (welke zorgverleners) kon u terecht voor [vul type probleem in]
- Doorvragen:
  - Denk aan chirurg/internist van het ziekenhuis, huisarts, diëtist (centrum of ambulant), kinesist, …
- Om de hoeveel tijd ging u op controle? Was dat genoeg?, heeft u zelf altijd de aanbevolen controles op het aangeraden tijdstip laten uitvoeren?
- Was de nazorg voldoende?
- Beschikte je over voldoende informatie over waar je terecht kon voor welke zorg?
- Waar schoot de nazorg te kort?
- Hoe had u volgens u beter gekund?

Doorvragen:

> u hebt het vooral over [vul type probleem in,], zijn er nog andere lichamelijke problemen die u had? Bent u zwanger geweest in de periode na de operatie? (of heeft u concrete plannen om in nabije toekomst opnieuw zwanger te worden?)

B. Als u denkt aan uw situatie op dit moment, zijn er dan *op dit moment* nog LICHAMELIJKE problemen die te maken hebben met de operatie?

> Zo ja, dewelke?
> Indien ja, heeft u daarvoor nazorg nodig? Wie? Waar?

Doorvragen:

- Hoe is de nazorg voor deze problemen?
- Bij wie (welke zorgverleners) kunt u terecht voor [vul type probleem in]
- Doorvragen: Denk aan chirurg, huisarts, thuisverpleging, diëtist, kinesist, …
- Om de hoeveel tijd gaat u op controle? Is dat genoeg?
- Beschikte je over voldoende informatie over waar je terecht kon voor welke zorg?
- Is de nazorg voldoende?
- Waar schiet de nazorg te kort?
- Hoe zou het volgens u beter kunnen?

C. Hadden deze lichamelijke problemen ook financiële gevolgen (bv. niet terugbetaalde zorgen en complicaties, werkverlies, ..) voor u?

D. Behalve de nazorg in de ziekenhuizen wordt ook nazorg door de huisarts en andere ambulante zorgverleners aangeboden (diëtist; psycholoog)? Heeft u daar gebruik van gemaakt? Ziet u verbeterpunten (bv. kennis over de ingreep, communicatie met het ziekenhuis, etc.)?

DEEL 3: PSYCHOLOGISCH

Dan zou ik nu willen overgaan naar andere problemen die mensen die obesitaschirurgie ondergaan hebben kunnen ervaren na ontslag uit het ziekenhuis. Veel mensen ervaren dit als een ingrijpende gebeurtenis (verandering levensstijl, verandering zelfbeeld, verandering sociale positie, …). Dit leidt vaak tot positieve gevoelens (bv. opgewekter, positiever zelfbeeld, sociaal actiever, ervaring of gevoel van een verbeterde situatie op het werk/arbeidsmarkt) maar bij sommige mensen leidt dit ook tot depressieve gevoelens en stress klachten.

A. Als u terugdenkt aan de periode tussen ontslag uit het ziekenhuis en vandaag, heeft u last gehad van negatieve gedachten en gevoelens gelinkt aan obesitas en/of de ingreep?

Doorvragen:

- Heeft u nazorg gezocht/gekregen voor deze problemen?
- Indien NEE,
  - Waarom heeft u dit niet gedaan? (vond zelf niet nodig, gebrek aan info, financieel)
  - Heeft u er wel eens met een psycholoog, huisarts, obesitas-coordinator of andere arts of hulpverlener over gesproken?
- Indien ja,
  - Hoe was de nazorg voor deze problemen?
  - Bij wie (welke zorgverleners) kon u terecht voor [vul type probleem in]
  - Doorvragen:
  - Denk aan obesitascoordinator, huisarts, psycholoog ziekenhuis, psycholoog elders
  - Hoe lang duurde de behandeling/ hoeveel gesprekken gehad?
  - Is het nu afgerond of nog steeds in behandeling?
  - Heeft het u geholpen? Eventueel, waarom niet?
  - Was dit voldoende?
- Waar schoot de nazorg te kort?
- Hoe had u volgens u beter gekund?

Doorvragen:

U heeft het vooral over [vul type probleem in,], zijn er nog andere problemen die u had op psychologisch gebied?

B. Had dit ook financiële gevolgen voor u?

DEEL 4. SOCIAAL

Ik zou nu willen overgaan naar het laatste onderwerp, namelijk de mogelijke sociale en financiële gevolgen voor u.

A. Als u terugdenkt aan de periode tussen ontslag uit het ziekenhuis en vandaag, had u toen moeite om uw dagelijks functioneren terug op te nemen?

Doorvragen:

- Kwam u gemakkelijk terug onder de mensen?
- Was u bang voor reacties van anderen, in uw naaste omgeving of gewoon op straat?
- Was de relatie tot uw partner/kinderen veranderd? Zo ja, in welke opzichten?
- Hoe zouden zorgverstrekkers (e.g. artsen, sociaal werkers, psychologen, verpleegkundigen, kinesisten etc.) daarbij kunnen helpen?

B. INDIEN RELEVANT: Bent u reeds terug aan het werk? Indien ja, hoe heeft u de terugkeer naar uw werk ervaren?

We weten dat mensen na obesitasheelkunde soms facturen krijgen omdat niet alles wordt terugbetaald. Daarover zou ik het met u willen hebben.

C. Wat waren de financiële gevolgen van uw ingreep (en nazorg)? Hoe zou dit vermeden kunnen worden?

Doorvragen:

- Medicijnen gebruikt na de operatie / of minder gebruik van medicijnen na de ingreep (t.o.v. voorheen)
- Consultaties (psycholoog, diëtist)
- Vitamine en mineraal supplementen
- Voedingsproducten
- Werkonbekwaam en dus minder inkomsten

2.2.4. Uitleiding (globale kijk op)

We hebben het nu gehad over lichamelijke problemen, psychische problemen en financiële problemen (eventueel werk en sociale problemen). Als u nu in z'n geheel terugkijkt op dit periode na de operatie

A. In het begin van het gesprek heeft u de belangrijkste problemen benoemd. Na afloop van dit gesprek, welke van de problemen die we besproken hebben, waren voor u het meest storend, hadden de meeste invloed op uw leven (indien zelfde als bij begin van het gesprek, hier niet verder op doorvragen)?

B. Na uw ontslag uit het ziekenhuis, op welke manier zou de zorgverlening beter gekund hebben? Wat hebt u gemist?

C. Was u in het algemeen voldoende op de hoogte van alle nazorgmogelijkheden?

D. Welke personen hebben u het meest geholpen? Aan wie heeft u de meeste steun gehad? (kan familie, vrienden, professionals zijn)

2.2.5. Algemeen afsluitend

A. Zijn er onderwerpen waarvan u vindt dat ze besproken zouden moeten worden, maar nog niet aan de orde zijn geweest?

B. We hebben voornamelijk gesproken over problemen die u ervaren heeft. Terugkijkend op de ingreep en de periode na de ingreep, zou u er opnieuw voor kiezen obesitaschirugie te laten uitvoeren? en zou u zo ook aanraden aan andere personen met ernstige obesitas? Waarom wel/niet/ onder welke voorwaarden?

C. Zijn er nog zaken die u graag zou willen toevoegen aan dit gesprek?

Afsluiten en bedanken

3. APPENDICES TO CHAPTER 4

3.1. Search strategy for guidelines in bariatric surgery

The search strategy for guidelines was performed in February 2018 and focused on guidelines published after 1st January 2009. Several search engines were used.

Table 15 – Number of guidelines related to bariatric surgery by search engines consulted

Date	9 February 2018	
Search engine	**Search term**	**Number of hits**
EBPracticenet from Belgium: https://www.ebpnet.be	Bariatrique	7
GIN – Guidelines international network: http://www.g-i-n.net	Bariatric surgery	8
AHRQ - Agency for Healthcare Research and Quality from US: http://www.guideline.gov/	Bariatric surgery	31
NICE - National Institute for Health and Care Excellence from UK: http://www.nice.org.uk/	Bariatric surgery / clinical guideline Bariatric surgery / Interventional procedures guidance	5 4
SIGN - Scottish Intercollegiate Guidelines Network: http://www.sign.ac.uk/	Digestive system	1
NHMRC - National Health and Medical Research Council from Australia: http://www.nhmrc.gov.au/	Bariatric surgery	1
Ministry of Health Library from New Zealand: http://www.moh.govt.nz/notebook/nbbooks.nsf/mohwebsearch?readform	Bariatric surgery	0
ICSI - Institute for Clinical Systems Improvement from US: https://www.icsi.org/guidelines__more/find_guidelines/	Bariatric surgery Obesity	0 2
ACP - American college of physicians: https://www.acponline.org/clinical_information/guidelines/	full list of guidelines	0
CMA - Canadian Medical association: https://www.cma.ca/En/Pages/clinical-practice-guidelines.aspx	Bariatric surgery	1 (for <18 years)
HAS - Haute Autorité de Santé: http://www.has-sante.fr/portail/jcms/c_1101438/fr/tableau-des-recommandations-de-bonne-pratique	full list of guidelines	4
Trip Database	Bariatric surgery	44
Cochrane database of systematic reviews: http://www.cochranelibrary.com/cochrane-database-of-systematic-reviews/index.html	Bariatric surgery	11

Medline:	((bariatric surgery[MeSH Terms]) AND guidelines[MeSH Terms]) AND ("2013/01/01"[Date - Publication] : "3000"[Date - Publication]	140

3.2. Search strategy for care pathways

The search strategy for care pathways was performed in March 2018 in three databases: OVID MEDLINE, EMBASE and COCHRANE.

3.2.1. OVID MEDLINE

Database: Ovid MEDLINE(R) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily, Ovid MEDLINE and Versions(R) <1946 to March 21 2018>

Search Strategy:

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1 exp obesity/ (182858)
2 weight loss/ (31307)
3 Bariatrics/ (242)
4 Bariatric medicine/ (61)
5 obesity management/ (23)
6 1 or 2 or 3 or 4 or 5 (198078)
7 over eating.ab,ti,kw,kf,ot. (341)
8 overeating.ab,ti,kw,kf,ot. (2133)
9 (weight adj2 loss).ab,ti,kw,kf,ot. (76253)
10 (weight adj2 reduc*).ab,ti,kw,kf,ot. (22242)
11 (obese? or obesity).ab,ti,kw,kf,ot. (253190)
12 7 or 8 or 9 or 10 or 11 (318077)
13 6 or 12 (362151)
14 gastroplasty/ (3994)
15 gastric bypass/ (7623)
16 Anastomosis, Roux-en-Y/ (3225)
17 gastrectomy/ (31862)
18 14 or 15 or 16 or 17 (43049)
19 (gastric adj3 bypass*).ab,ti,kw,kf,ot. (9498)
20 (antiobesity adj3 surg$).ab,ti,kw,kf,ot. (29)
21 (obesity adj3 surg$).ab,ti,kw,kf,ot. (3704)
22 (restrictive adj3 surger*).ab,ti,kw,kf,ot. (294)
23 gastroplast*.ab,ti,kw,kf,ot. (1897)
24 (gastrogastrostomy or gastro gastrostomy).ab,ti,kw,kf,ot. (54)
25 gastrointestinal diversion$.ab,ti,kw,kf,ot. (5)
26 (gastric adj3 band$).ab,ti,kw,kf,ot. (3623)
27 silicon band$.ab,ti,kw,kf,ot. (37)
28 (sleeve? adj3 gastrectomy).ab,ti,kw,kf,ot. (3726)
29 gastric sleeve.ab,ti,kw,kf,ot. (176)
30 LAGB.ab,ti,kw,kf,ot. (1037)
31 (stomach adj3 stapl$).ab,ti,kw,kf,ot. (57)

32 lap band$.ab,ti,kw,kf,ot. (266)
33 lapband$.ab,ti,kw,kf,ot. (28)
34 malabsorptive surg$.ab,ti,kw,kf,ot. (37)
35 mason$ procedure.ab,ti,kw,kf,ot. (24)
36 Roux-en-Y.ab,ti,kw,kf,ot. (9143)
37 (roux adj3 bypass).ab,ti,kw,kf,ot. (292)
38 malabsorptive procedure$.ab,ti,kw,kf,ot. (152)
39 duodenal switch$.ab,ti,kw,kf,ot. (663)
40 gastrectom*.ab,ti,kw,kf,ot. (27951)
41 or/19-40 (44068)
42 18 or 41 (59331)
43 13 and 42 (17057)
44 bariatric surgery/ (7229)
45 Obesity/su (4635)
46 Gastroenterostomy/ (3346)
47 limit 46 to yr="2000-2005" (157)
48 43 or 44 or 45 or 47 (23034)
49 algorithms/ (222056)
50 Critical Pathways/ (5885)
51 triage/ (9973)
52 Patient Care Team/ (60002)
53 Delivery of Health Care, Integrated/ (10713)
54 triage.ab,ti,kw,kf. (14155)
55 stratified care.ab,ti,kw,kf. (84)
56 algorithm?.ab,ti,kw,kf. (199389)
57 pathway?.ab,ti,kw,kf. (929873)
58 "process of care".ab,ti,kw,kf. (2242)
59 ((care or clinical or critical) adj2 path?).ab,ti,kw,kf. (1229)
60 case management plan?.ab,ti,kw,kf. (26)
61 care map?.ab,ti,kw,kf. (127)
62 or/54-61 (1140211)
63 or/49-53 (304967)
64 62 or 63 (1342259)
65 48 and 64 (709)
66 limit 65 to yr="2000-2018" (691)
67 limit 66 to systematic reviews (51)
68 randomized controlled trial.pt. (456440)
69 controlled clinical trial.pt. (92268)
70 randomized.ti,ab. (437922)
71 placebo.ti,ab. (192638)
72 clinical trials as topic/ (183061)
73 randomly.ti,ab. (288238)
74 trial?.ti. (241331)
75 68 or 69 or 70 or 71 or 72 or 73 or 74 (1169604)
76 exp animal/ not humans/ (4437414)
77 75 not 76 (1077954)
78 66 and 77 (33)
79 33 not 67 (28)
80 66 not (67 or 79) (639)
81 remove duplicates from 80 (637)

3.2.2. EMBASE

Embase Session Results (28 Mar 2018)

No.	Query	Results
#66	#63 NOT (#64 OR #65)	**566**
#65	#63 AND (random*:ab,ti OR placebo*:de,ab,ti OR ((double NEXT/1 blind*):ab,ti))	**71**
#64	#63 AND ('meta-analysis'/exp OR 'meta-analysis' OR 'systematic review'/exp OR 'systematic review')	**35**
#63	#62 NOT ([conference abstract]/lim OR [conference paper]/lim OR [conference review]/lim OR [editorial]/lim)	**665**
#62	#61 NOT [medline]/lim	**1712**
#61	#60 AND [2000-2018]/py	**3795**
#60	#44 AND #59	**3873**
#59	#49 OR #58	**2183162**
#58	#50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57	**1415812**
#57	'care map':ab,ti,kw OR 'care maps':ab,ti,kw	**186**
#56	'case management plan':ab,ti,kw OR 'case management plans':ab,ti,kw	**29**
#55	((care OR clinical OR critical) NEAR/2 (path OR paths)):ab,ti,kw	**1684**
#54	'process of care':ab,ti,kw	**2649**
#53	pathway:ab,ti,kw OR pathways:ab,ti,kw	**1159189**
#52	algorithm:ab,ti,kw OR algorithms:ab,ti,kw	**241012**
#51	'stratified care':ab,ti,kw	**131**
#50	triage:ab,ti,kw	**21536**
#49	#45 OR #46 OR #47 OR #48	**947326**
#48	'delivery of health care, integrated'/exp	**9524**
#47	'patient care team'/exp	**697233**
#46	'critical pathways'/exp	**7574**
#45	'algorithms'/exp	**246408**
#44	#42 OR #43	**46389**
#43	'bariatric surgery'/exp	**33379**

#42	#12 AND #41	**32500**
#41	#17 OR #40	**89740**
#40	#18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39	**63894**
#39	gastrectom*:ab,ti,kw	**36678**
#38	(duodenal NEAR/2 switch*):ab,ti,kw	**1324**
#37	(malabsorptive NEAR/2 procedure*):ab,ti,kw	**353**
#36	(roux NEAR/3 bypass):ab,ti,kw	**886**
#35	'roux en y':ab,ti,kw	**15509**
#34	(mason* NEAR/2 procedure):ab,ti,kw	**35**
#33	(malabsorptive NEAR/2 surg*):ab,ti,kw	**191**
#32	lapband*:ab,ti,kw	**83**
#31	(lap NEAR/2 band*):ab,ti,kw	**594**
#30	(stomach NEAR/3 stapl*):ab,ti,kw	**150**
#29	lagb:ab,ti,kw	**2133**
#28	gastric AND sleeve:ab,ti,kw	**6994**
#27	(sleeve* NEAR/3 gastrectomy):ab,ti,kw	**9165**
#26	(silicon NEAR/2 band*):ab,ti,kw	**89**
#25	(gastric NEAR/3 band*):ab,ti,kw	**6888**
#24	(gastrointestinal NEAR/2 diversion*):ab,ti,kw	**19**
#23	(gastrogastrostomy:ab,ti,kw OR gastro:ab,ti,kw) AND gastrostomy:ab,ti,kw	**377**
#22	gastroplast*:ab,ti,kw	**2743**
#21	(restrictive NEAR/3 surger*):ab,ti,kw	**524**
#20	(obesity NEAR/3 surg*):ab,ti,kw	**7521**
#19	(antiobesity NEAR/3 surg*):ab,ti,kw	**41**
#18	(gastric NEAR/3 bypass*):ab,ti,kw	**17905**
#17	#13 OR #14 OR #15 OR #16	**73123**
#16	'gastrectomy'/exp	**53860**

#15	'roux y anastomosis'/exp	**11106**
#14	'gastric bypass surgery'/de	**16539**
#13	'gastroplasty'/de	**3762**
#12	#5 OR #11	**650626**
#11	#6 OR #7 OR #8 OR #9 OR #10	**472939**
#10	obese*:ab,ti,kw OR obesity:ab,ti,kw	**375163**
#9	(weight NEAR/2 reduc*):ab,ti,kw	**31233**
#8	(weight NEAR/2 loss):ab,ti,kw	**119749**
#7	overeating:ab,ti,kw	**2873**
#6	'over eating':ab,ti,kw	**471**
#5	#1 OR #2 OR #3 OR #4	**540615**
#4	'obesity management'/exp	**58**
#3	'bariatrics'/de	**252**
#2	'body weight loss'/de	**150679**
#1	'obesity'/exp	**437728**

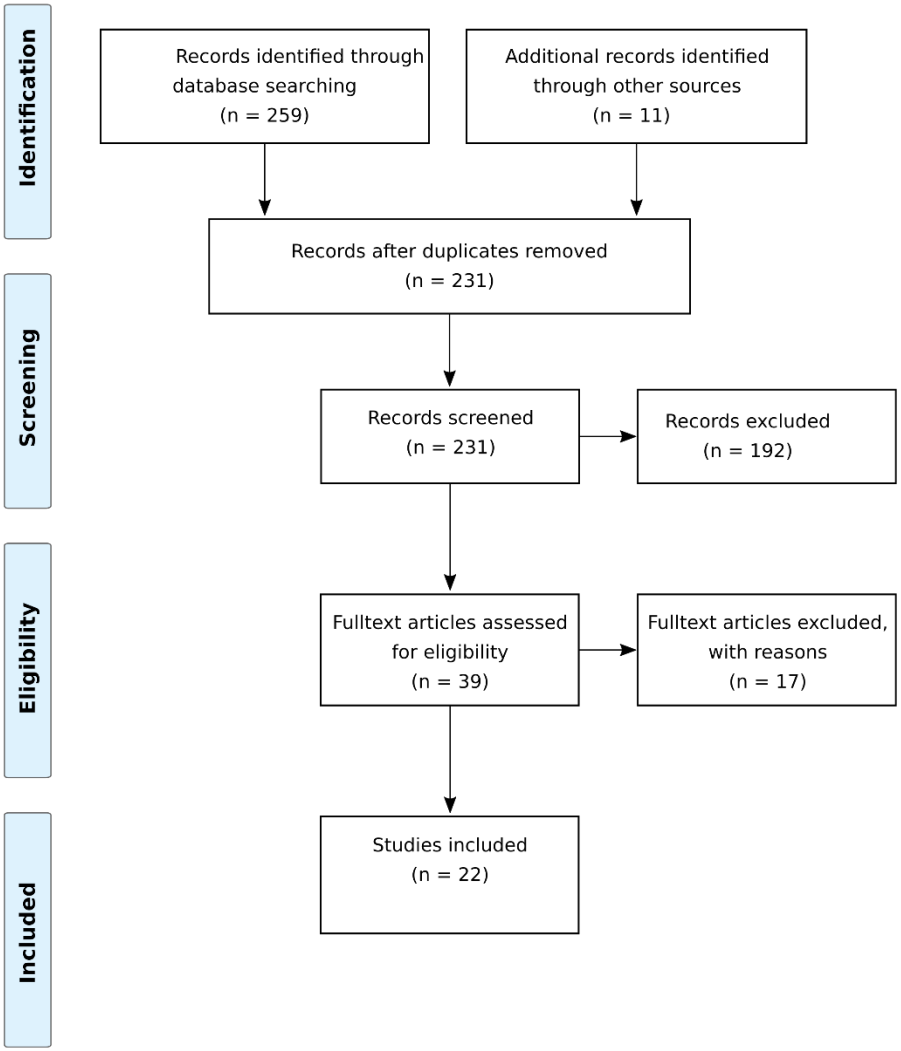
3.2.3. COCHRANE

Date Run: 28/03/18 23:09:26.727

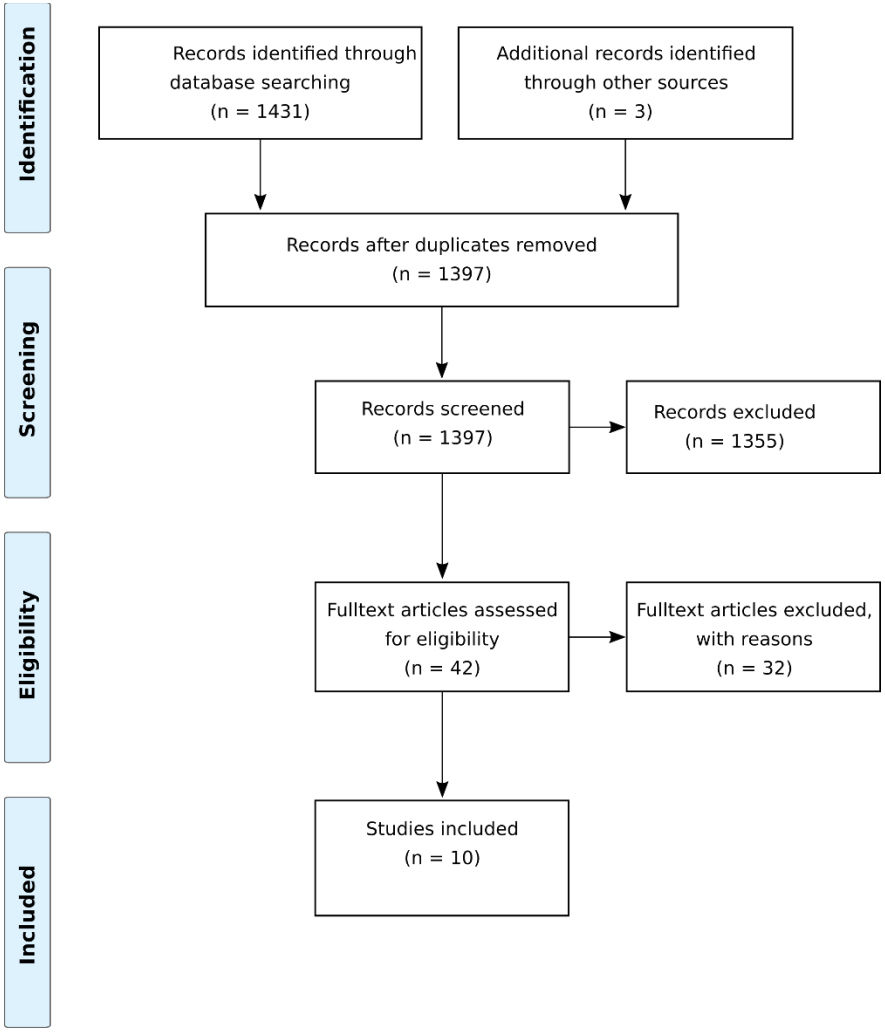
ID	Search	Hits
#1	[mh obesity]	11026
#2	[mh ^"weight loss"]	4832
#3	[mh ^Bariatrics]	6
#4	[mh ^"Bariatric medicine"]	1
#5	[mh ^"obesity management"]	5
#6	#1 or #2 or #3 or #4 or #5	12714
#7	"over eating":ab,ti	40
#8	"overeating":ab,ti	206
#9	(weight near/2 loss):ab,ti	10865
#10	(weight near/2 reduc*):ab,ti	3664
#11	(obese or obeses or obesity):ab,ti	21067
#12	#7 or #8 or #9 or #10 or #11	27663
#13	#6 or #12	29575
#14	[mh ^gastroplasty]	264
#15	[mh ^"gastric bypass"]	512
#16	[mh ^"Anastomosis, Roux-en-Y"]	151
#17	[mh ^gastrectomy]	1016
#18	#14 or #15 or #16 or #17	1661

#19 (gastric near/3 bypass*):ab,ti 958
#20 (antiobesity near/3 surg*):ab,ti 0
#21 (obesity near/3 surg*):ab,ti 230
#22 (restrictive near/3 surger*):ab,ti 33
#23 gastroplast*:ab,ti 129
#24 (gastrogastrostomy or gastro gastrostomy):ab,ti 18
#25 gastrointestinal diversion*:ab,ti 46
#26 (gastric near/3 band*):ab,ti 287
#27 silicon band*:ab,ti 8
#28 (sleeve* near/3 gastrectomy):ab,ti 438
#29 gastric sleeve:ab,ti 317
#30 LAGB:ab,ti 78
#31 (stomach near/3 stapl*):ab,ti 1
#32 lap band*:ab,ti 34
#33 lapband*:ab,ti 6
#34 malabsorptive surg*:ab,ti 33
#35 "mason procedure":ab,ti or "masons procedure":ab,ti 1
#36 Roux-en-Y:ab,ti 751
#37 (roux near/3 bypass):ab,ti 56
#38 "malabsorptive procedure":ab,ti or "malabsorptive procedures":ab,ti 8
#39 duodenal switch*:ab,ti 50
#40 gastrectom*:ab,ti 1805
#41 #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36 or #37 or #38 or #39 or #40 3135
#42 #18 or #41 3516
#43 #13 and #42 1534
#44 [mh ^"bariatric surgery"] 325
#45 [mh ^Obesity/SU] 220
#46 [mh ^Gastroenterostomy] Publication Year from 2000 to 2005 5
#47 #43 or #44 or #45 or #46 1816
#48 [mh ^algorithms] 3674
#49 [mh ^"Critical Pathways"] 320
#50 [mh ^triage] 349
#51 [mh ^"Patient Care Team"] 1777
#52 [mh ^"Delivery of Health Care, Integrated"] 384
#53 triage:ab,ti 1056
#54 "stratified care":ab,ti 19
#55 algorithms:ab,ti or algorithm:ab,ti 6514
#56 pathway:ab,ti or pathways:ab,ti 11126
#57 "process of care":ab,ti 219
#58 ((care or clinical or critical) near/2 (path or paths)):ab,ti 47
#59 "case management plan":ab,ti or "case management plans":ab,ti 0
#60 care map:ab,ti or care maps:ab,ti 985
#61 #48 or #49 or #50 or #51 or #52 6337
#62 #53 or #54 or #55 or #56 or #57 or #58 or #59 or #60 19686
#63 #61 or #62 24257
#64 #47 and #63 23

3.3. Flowchart for guidelines



3.4. Flowchart for pathways



3.5. Quality assessment of guidelines

Authors	Criteria	Comments	Global QA
AACE/TOS/ASMBS 2013 (Mechanick)	Literature review: Yes with no details but 403 references QA /Level of evidence: Yes with quality assessment Consensus process: Yes, obtained for each recommendation Grading of recommendations : Yes according to more factors than GRADE	USA Update of the 2008 CPG Sleeve (LSG), By-pass (RYGB) and Band (LAGB) Comprehensive	High
ASMBS 2017 (Telem)	Literature review: Yes (Pubmed & Embase) LoE: Yes utilizing the 2010 American Association of Clinical Endocrinologists Protocol for Production of CPG. Consensus among experts: Yes in case of limited evidence Grading of recommendations : Yes, based on criteria from the American Association to Clinical Endocrinologists Protocol for Production of Clinical Practice Guidelines	USA ONLY SLEEVE Pre and intra/immediate post-operative The entire pathway is available online at www.asmbs.org, in the members-only section	High
Agnetti 2011	Literature review : Scientific and grey lit in French and English but without details LoE: No Consensus process: • Working group • Groupe de lecture et de cotation pluriprof (surgeons, endocrinologists-nutritionists, dietitians) Grading of recommendations : Yes but without explanation	France Pre and post-op Specific for dietitians Standardisation for Reference Centers of Assistance Publique-Hôpitaux de Paris	Low/Moderate
BASO 2014	Literature review: ? LoE: No Consensus process:? Grading: No	Belgium No methodology	Very Low
BOMSS 2014 (O'Kane)	Literature review: Based on other GL+ Medline and Embase LoE: No Consensus process: Yes Grading: No	UK Biomonitoring and supplementation pre & post	Low

EASO 2017 (Busetto)	Literature review: No information LoE: Yes Consensus process: GDG but without info Grading: Yes (LoE & applicability to the target population)	European Post-op Medical management	Moderate/High
Ebpracticenet 2018 (based on DUODECIM guidelines 2017)	Literature review: Yes in several databases (not EMBASE) LoE: Yes but not available Consensus process: Yes, panel members Grading: Yes, according to GRADE in the global methodology but not available for this specific guideline	Finish Adapted to Belgium Pre & Post-surgery	Low (The methods are described in the DUODECIM general manual but there is no description on how this was applied it in the case of the bariatric guideline)
Farmaka 2016	Literature review: Guidelines via CEBAM portal, RCTs via Medline; June 2016, transparentiefiche Obesitas LoE: No Consensus process:? Grading: No	Belgium Post-op long term FU included	Low
HAS 2009	Literature review: Yes, including grey literature but without details LoE: Yes, based on study design Consensus process: Yes Grading: Yes based on the LoE	France Pre and post-op	Moderate and old
Heber 2010	Literature review: Yes but with no details LoE: Yes Consensus process: Yes, Task force Grading: GRADE approach	USA (Endocrine society) Post-op (mostly nutritional and complications management)	High
IFSO-EC/EASO 2017 (Fried)	Literature review: Medline, Cochrane Library May 2013) LoE: Yes, Oxford Centre for EBM classification syst. Consensus process: key opinion leaders from 3 international organisations Grading: No	European General recommendations mainly on lab assessment and psychological support pre and post-op	Moderate
Mc Grice 2015	Narrative review without methodology description	Australia, 2 authors Nutrition plus enterprises (dietitian group)	Very Low

		https://www.nutritionplus.com.au/ Post-op program	
Mancini 2014	Literature review: Pubmed last 10 years LoE: No Consensus process: No Grading: No	Brazil, one author Quoted Fried 2014, Mechanick 2013 Mainly post-op	Low
Mingrone 2018	Literature review: Yes in Medline LoE: No Consensus process: No Grading: No	Three authors, Italy, UK, Germany Aim to maximise benefit and reduce long term risks Pre and post-op	Low
NICE 2014	Literature review: Yes, Appendix F LoE: Yes, GRADE table Appendix O Consensus process: Yes with GDG Grading: Yes (formulation of recommendations after 2006)	UK Updated guidelines on obesity, some recommendations on surgery and follow-up	Very high
O'Kane 2016	Literature review: Based on existing GL but no detailed LoE: Yes Consensus process: Yes (patient representatives included) Grading: Yes (GRADE approach) but not provided if recommendations come directly from NICE or NCEPOD	UK NHS England Obesity Clinical Reference Group Postoperative (long term included)	Moderate/High
OMA 2016	Literature review: ? LoE: No Consensus process: ? Grading: No	USA Update of 2013 guidelines	Lack of info
Paretti 2015	Literature review: Yes without details LoE: ? Consensus process: Yes Grading: No	UK Royal College of GPs Nutrition Group & BOMSS Postoperative (long term) Band, by-pass and BPD (not sleeve) For primary care	Low
SIGN 2010	https://www.sign.ac.uk/assets/sign50_2011.pdf Literature review: Yes in minimum Cochrane Library, Embase, Medline, NHS Economic Evaluations Database LoE: Yes, MERGE technique Consensus process: Yes, GDG	Scotland Guidelines on obesity, some recommendations on surgery	High but old

	Grading: Yes, LoE & direct applicability		
Sogg 2016	Literature review: Yes 3 searchs in pubmed LoE: ? Consensus process: Yes Grading: No	USA ABMS guidelines Pre-operative psychosocial evaluation	Low
Welbourn 2018	Literature review: Yes (NICE guideline + broad SR) LoE: No details Consensus process: Yes, GDG including many stakeholders Grading: Yes (formulation: recommend or consider)	UK NICE 2014 revision by 22 UK royal colleges and professional organisations Management of obesity, All ages Organisational aspects Normally long version foreseen	Moderate
Welbourn 2016	Literature review: Yes (NICE guideline + broad SR) LoE: No details Consensus process: Yes, 17 individuals and 3 organisations Grading: No	UK Specifications for Tier 2 or Tier 3 weight management services Management of obesity Organisational aspects	Low

3.6. Quality assessment of literature on care pathway

Authors	Criteria	Comments	Global QA
Aird 2017	Selection bias: Yes, consent (8043/12777) Confounding: Possible? Detection bias: No Attrition bias: No	Canada Retrospective cohort study of the Ontario bariatric registry database between April 2010 and March 2015.	Low
Baccara-Dinet 2010	Literature review: Yes but without details QA: Not mentioned Analysis of pathway: Yes but process indicators & feed-back Limitation analysis: Not mentioned	France Experience of the CHRU Montpellier	Low
BASO 2016	Literature review: ? QA: ? Consensus among experts: ? Limitation: ?	Belgium No methodology Only algorithms	No info
Dumon 2011	Selection bias: No All surgical patients included	USA	Low

	Confounding: Possible, poorly mentioned Detection bias: Routine outcomes Attrition bias: Not mentioned	Prospective cohort study of RYGB Outcomes: average length of stay, 30-day readmission rates, mortality, overall complication rates during 6 years	
Funnell 2005	Literature review: No details, 12 references in total QA: No Analysis of pathway: Narrative Limitation: Not mentioned	USA Narrative review, no methodology Self-empowerment post-operative	Very Low
Hood 2016	Literature review: Yes in PubMed (79 articles included) QA: No Analysis of pathway: Analysis of adherence Limitation: Yes	USA Systematic review on adherence to FU	Low/Moderate
Kalarchian 2018	Literature review: Yes without details QA: No Analysis of pathway: Yes without details Limitation: Not mentioned	USA Stepped care Narrative review	Very Low
Lamore 2017	Literature review: Yes but without details QA: ? Analysis of pathway: Yes professionals experience Limitation: Yes	France Experience of psychologists and psychiatrists of specialised obesity centers	Low
Montastier 2018	Literature review: Yes without details QA : Not mentioned Analysis of pathway: No Limitation: Not mentioned	France LONG-TERM follow-up Literature review	Very low
Petrick 2015	Literature review: OVID Medline + American guidelines QA: ? Consensus among experts: Yes with clinical specialists Analysis of pathway: Pre and post implementation analysis of outcomes until 4 years of implementation Limitation: Yes (observed effects and secular trends, motivation of practitioners, payment structure)	USA ProvenCare Bariatric program List of Best practice elements Roux-en-Y bypass Pre and limited post-operative aspects	Low/Moderate

3.7. Criteria used for grading key interventions

GRADE of key interventions	Criteria
Strong	• Strong recommendation or High Evidence level in at least 1 high quality guideline, meta-analysis or systematic review published maximum 5 years ago • Strong recommendation or High Evidence level in at least 2 moderate quality guidelines, meta-analysis or systematic review
Weak	• Weak recommendation or Moderate/Low level of evidence in at least 1 high quality guideline, meta-analysis or systematic review published maximum 5 years ago (and no strong recommendation in other high quality guideline, meta-analysis or systematic review) • Weak recommendation or Moderate/Low level of evidence in at least 2 moderate quality guidelines, meta-analysis or systematic review (and no strong recommendation in other high/moderate quality guideline) • Overall consistency throughout all low quality guidelines, meta-analysis or systematic reviews~~?~~
Good practice points / Consensus-based (if Belgian experts agree)	• Recommendation based on low level of evidence in guidelines, meta-analysis or systematic reviews without strength of recommendation • Consensus-based recommendation

3.8. Categorization used by authors for the Level of evidence and/or the Strength of recommendation

3.8.1. ASMBS 2016 & AACE/TOS/ASMBS 2013 – Key to evidence statements and grades of recommendations

LEVELS OF EVIDENCE	
1 Strong evidence	Meta-analysis of randomized controlled trials (MRCT) Randomized controlled trial (RCT)
2 Intermediate evidence	Meta-analysis of nonrandomized prospective or case-controlled trials (MNRCT) Nonrandomized controlled trial (NRCT) Prospective cohort study (PCS) Retrospective case-control study (RCCS)
3 Weak evidence	Cross-sectional study (CSS) Surveillance study (registries, surveys, epidemiologic study) (SS) Consecutive case series (CCS)

	Single case reports (SCR)
4 No evidence	No evidence (theory, opinion, consensus, or review) (NE)

GRADES OF RECOMMENDATION*

Best evidence level (BEL)	Subjective factor impact	Two-thirds consensus	Mapping	Recommendation grade
1	None	Yes	Direct	**A**
2	Positive	Yes	Adjust up	**A**
2	None	Yes	Direct	**B**
1	Negative	Yes	Adjust down	**B**
3	Positive	Yes	Adjust up	**B**
3	None	Yes	Direct	**C**
2	Negative	Yes	Adjust down	**C**
4	Positive	Yes	Adjust up	**C**
4	None	Yes	Direct	**D**
3	Negative	Yes	Adjust down	**D**
1,2,3,4	NA	No	Adjust down	**D**

**** Starting with the left column, best evidence levels (BEL), subjective factors, and consensus map to recommendation grades in the right column. When subjective factors have little or no impact ("none"), then the BEL is directly mapped to recommendation grades. When subjective factors have a strong impact, then recommendation grades may be adjusted up ("positive" impact) or down ("negative" impact). If a two thirds consensus cannot be reached, then the recommendation grade is D. NA = not applicable (regardless of the presence or absence of strong subjective factors, the absence of a two-thirds consensus mandates a recommendation grade D).***

3.8.2. EASO 2017 – Key to evidence statements and grades of recommendations

LEVELS OF EVIDENCE	
1++	High-quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1+	Well-conducted meta-analysis, systematic reviews of RCTs, or RCTs with a low risk of bias
1-	Meta-analysis, systematic reviews of RCTs, or RCTs with a high risk of bias
2++	High-quality systematic reviews of case-control or cohort studies
2+	High-quality case control or cohort studies with a very low risk of confounding bias, or chance and a high probability that the relationship is casual
2-	Well-conducted case control or cohort studies with a low risk of confounding bias, or chance and a moderate probability that the relationship is casual
3	Non-analytic studies, e.g. case reports, case series
4	Expert opinion
GRADES OF RECOMMENDATION	
A	At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or a systematic review of RCTs or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++, or 1+
C	A body of evidence including studies rated as 2+, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++
D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+
Good practice points	
RBP	Recommended best practice based on the clinical experience of the guideline development group

3.8.3. HAS 2009 – Key to evidence statements and grades of recommendations

LEVELS OF EVIDENCE	GRADES OF RECOMMENDATION
Niveau 1 - **Essais comparatifs randomisés de forte puissance** - **Méta-analyse d'essais comparatifs randomisés** - **Analyse de décision fondée sur des études bien menées**	**A** **Preuve scientifique établie**
Niveau 2 - **Essais comparatifs randomisés de faible puissance** - **Études comparatives non randomisées bien menées** - **Études de cohorte** Niveau 3 - **Études cas-témoins**	**B** **Présomption scientifique** ·
Niveau 4 - **Études comparatives comportant des biais importants** - **Études rétrospectives** - **Séries de cas**	**C** **Faible niveau de preuve**

En l'absence d'études, les recommandations sont fondées sur un accord professionnel au sein du groupe de travail réuni par la HAS, après consultation du groupe de lecture. Dans ce texte, les recommandations non gradées sont celles qui sont fondées sur un accord professionnel. L'absence de gradation ne signifie pas que les recommandations ne sont pas pertinentes et utiles. Elle doit, en revanche, inciter à engager des études complémentaires.

3.8.4. Heber 2011 – Key to evidence statements and grades of recommendations

LEVELS OF EVIDENCE: Cross-filled circles represent the quality of the evidence	
+OOO	Very low quality evidence
++OO	Low quality
+++O	Moderate quality
++++	High quality
GRADES OF RECOMMENDATION	
Strong	use the phrase "we recommend" and the number 1
Weak	use the phrase "we suggest" and the number 2

3.8.5. IFSO-EC/EASO 2017 – Levels of evidence

LEVELS OF EVIDENCE: Based on the "Oxford Centre for Evidence-Based Medicine" classification system	
A	Consistent RCT, cohort study, all or none, clinical decision rule validated in different populations
B	Consistent retrospective cohort, exploratory cohort, ecological study, outcomes research, case-control study, or extrapolations from level A studies
C	Case series study or extrapolations from level B studies
D	Expert opinion without explicit critical appraisal, or based on physiology, bench research or first experience/principles case reports

3.8.6. SIGN 2010 – Key to evidence statements and grades of recommendations

LEVELS OF EVIDENCE	
1++	High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1+	Well conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
1-	Meta-analyses, systematic reviews, or RCTs with a high risk of bias
2++	High quality systematic reviews of case control or cohort studies High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2+	Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2 -	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, eg case reports, case series
4	Expert opinion
GRADES OF RECOMMENDATION ***Note: The grade of recommendation relates to the strength of the evidence on which the recommendation is based. It does not reflect the clinical importance of the recommendation.***	
A	At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+
C	A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++
D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+
GOOD PRACTICE POINTS	Recommended best practice based on the clinical experience of the guideline development group.

4. APPENDICES TO CHAPTER 5

4.1. Search strategies conducted for the discussion – Compliance and adherence

Initial search for systematic reviews

Database: Ovid MEDLINE(R) <1946 to March Week 4 2019>

Search Strategy:

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1 exp Obesity/ (195108)
2 Overweight/ (21985)
3 over weight.tw. (379)
4 overweight.tw. (52247)
5 over eating.tw. (317)
6 overeating.tw. (1964)
7 Weight Loss/ (33353)
8 weight loss.tw. (67616)
9 weight reduc$.tw. (8973)
10 (obese or obesity).tw. (229597)
11 or/1-10 (340060)
12 exp Bariatric Surgery/ (22853)
13 bariatric.tw. (13008)
14 (antiobesity adj3 surg$).tw. (25)
15 (obesity adj3 surg$).tw. (3157)
16 "restrictive surgery".tw. (95)
17 gastroplasty.tw. (1650)
18 (gastrogastrostomy or gastro gastrostomy).tw. (45)
19 jejuno-ileal bypass.tw. (196)
20 jejunoileal bypass.tw. (785)
21 gastrointestinal diversion$.tw. (5)
22 Biliopancreatic Diversion/ (945)
23 biliopancreatic diversion.tw. (869)
24 bilio-pancreatic diversion.tw. (63)
25 ((biliopancreatic or bilio-pancreatic) adj1 bypass).tw. (87)
26 gastric band$.tw. (3188)
27 silicon band$.tw. (21)
28 exp Gastroenterostomy/ (11682)
29 sleeve gastrectomy.tw. (3255)
30 gastric sleeve.tw. (135)
31 LAGB.tw. (964)
32 stomach stapl$.tw. (11)
33 lap band$.tw. (250)
34 lapband$.tw. (27)
35 malabsorptive surg$.tw. (30)
36 mason$ procedure.tw. (22)
37 Anastomosis, Roux-en-Y/ (3366)
38 Roux-en-Y.tw. (8412)
39 malabsorptive procedure$.tw. (137)
40 duodenal switch$.tw. (601)
41 or/12-40 (36103)
42 11 and 41 (22192)

43 exp Obesity/su (17023)
44 42 or 43 (23763)
45 "Treatment Adherence and Compliance"/ (211)
46 adherence.tw. (87853)
47 compliance.tw. (93849)
48 Patient Compliance/ (55291)
49 attrition.mp. (10226)
50 45 or 46 or 47 or 48 or 49 (214253)
51 44 and 50 (571)
52 limit 51 to systematic reviews (47)

****

Result after sifting

- Four articles retained based on title and abstract{Gourash, 2016 #77;Karmali, 2013 #78;Kim, 2014 #79;Moroshko, 2012 #80}

Forward search of selected in Web of Sciences

The four reviews resulted in 213 references of which 16 were retained after screening title and abstract. After full-text review, the review of Gourash et al. (2016) was excluded as this concerned attrition rates in research (not post-surgery follow-up programmes).

4.2. Review on volume-outcome

Database: Ovid MEDLINE(R) <1946 to March Week 5 2019>

Search Strategy:

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1 exp Obesity/ (195307)
2 Overweight/ (22033)
3 over weight.tw. (379)
4 overweight.tw. (52333)
5 over eating.tw. (317)
6 overeating.tw. (1968)
7 Weight Loss/ (33375)
8 weight loss.tw. (67679)
9 weight reduc$.tw. (8976)
10 (obese or obesity).tw. (229895)
11 or/1-10 (340449)
12 exp Bariatric Surgery/ (22873)
13 bariatric.tw. (13027)
14 (antiobesity adj3 surg$).tw. (25)
15 (obesity adj3 surg$).tw. (3159)
16 "restrictive surgery".tw. (95)
17 gastroplasty.tw. (1651)
18 (gastrogastrostomy or gastro gastrostomy).tw. (45)
19 jejuno-ileal bypass.tw. (196)
20 jejunoileal bypass.tw. (785)

21 gastrointestinal diversion$.tw. (5)
22 Biliopancreatic Diversion/ (945)
23 biliopancreatic diversion.tw. (869)
24 bilio-pancreatic diversion.tw. (63)
25 ((biliopancreatic or bilio-pancreatic) adj1 bypass).tw. (87)
26 gastric band$.tw. (3189)
27 silicon band$.tw. (21)
28 exp Gastroenterostomy/ (11688)
29 sleeve gastrectomy.tw. (3266)
30 gastric sleeve.tw. (135)
31 LAGB.tw. (964)
32 stomach stapl$.tw. (11)
33 lap band$.tw. (250)
34 lapband$.tw. (27)
35 malabsorptive surg$.tw. (30)
36 mason$ procedure.tw. (22)
37 Anastomosis, Roux-en-Y/ (3369)
38 Roux-en-Y.tw. (8420)
39 malabsorptive procedure$.tw. (137)
40 duodenal switch$.tw. (601)
41 or/12-40 (36136)
42 11 and 41 (22216)
43 exp Obesity/su (17039)
44 42 or 43 (23787)
45 provider volume.tw. (119)
46 procedural volume.tw. (220)
47 volume outcome.tw. (563)
48 surgical volume.tw. (683)
49 operator volume.tw. (38)
50 surgeon volume.tw. (675)
51 physician volume.tw. (77)
52 doctor volume.tw. (1)
53 individual volume.tw. (92)
54 hospital volume.tw. (1429)
55 centralisation.tw. (521)
56 centralization.tw. (2035)
57 (concentration adj2 (care or services)).tw. (76)
58 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 (5591)
59 44 and 58 (51)

We selected 22 articles based in the sifting. Including one review (Zevin 2012).

We checked the Included primary studies in this review and identified the following studies that were in our 22:

- Carbonell (2005)
- Livingston (2010)
- Livingston b (2010)
- Smith (2010)

Therefore we continue with:

- 2 reviews
- 16 studies

Excluded during full text review:

- Caiazzo (was identified as additional, not in 17 articles): regionalization of ‘postoperative complications’ in France
- Lazzati: no volume-outcome focus
- Kuo: effect of centralization on accessibility
- Leroux: not a focus on volume-outcome

Table 16 – Systematic review volume-outcome

Author	Research question	Timeframe	Included studies	Results	Author conclusions	Comments
Zevin et al. (2012)	To systematically examine the association between annual hospital and surgeon case volume and patient outcomes in bariatric surgery.	Until 2011, more than 3 databases (including Medline, Cochrane)	24 studies (2 prospective cohort studies; 3 retrospective cohort studies; 2 retrospective case controls; 17 retrospective case series) 458 032 patients	A positive association between annual surgeon volume and patient outcomes was reported in 11 of 13 studies. A positive association between annual hospital volume and patient outcomes was reported in 14 of 17 studies.	**There is strong evidence for improved patient outcomes in the hands of high-volume surgeons. Higher annual hospital case volumes are also associated with improved patient outcomes; however, the evidence is weaker.** Overall, this study supports the BSCOE accreditation and the bariatric surgery fellowship training programs.	Each of the studies used different cut-off points for surgeon volume groups. The methodological quality for most studies was fair. This review includes studies that dates back to a period that mortality rates and complications rates post bariatric surgery were higher compared to today The advantage of regionalizing care is to have experienced surgeons and staff caring for the bariatric patients, which may minimize the lapses in recognition and management of complication, thereby improving patient outcomes The disadvantages of regionalizing bariatric care include difficulties with patient travel, access to bariatric surgery for low-income patients living in rural communities added costs to the patient, potential for monopolization of care, and potential for less stringent patient selection criteria to ensure adequate number of cases to obtain the BSCOE status. In addition, the skill level of health care providers working with obese individuals undergoing non-bariatric procedures in non-BSCOE may also deteriorate.
Markar et al. (2012)	To evaluate the relationship between institutional and surgeon volume and outcomes following bariatric surgery.	the Embase and Medline databases from 1966 to 2011	15 studies: 13 studies on hospital volume and 6 on surgeon volume 289 732 bariatric	Mortality was reduced following surgery at high volume institutions (0.24 vs. 2.18 %; pooled odds ratio00.26; P=.004) and by high volume surgeons (0.41 vs. 2.77 %;	**This pooled analysis does suggest a benefit in the centralisation of bariatric surgery to high volume**	

Author	Research question	Timeframe	Included studies	Results	Author conclusions	Comments
			procedures were included in the institutional volume analysis, and 32 920 bariatric operations were included in the surgeon volume analysis A definition of 100 cases per year was used to distinguish low from high volume institutions 25 cases per year was used for maximum threshold for a low volume surgeon and 50 cases per year as a minimum threshold for a high volume surgeon;	pooled odds ratio=0.21; P<0.001). Similarly, morbidity was reduced in high volume institutions (7.84 vs. 8.85 %; pooled odds ratio00.52; P<0.001) and with high volume surgeons (6.92 vs. 7.29 %; pooled odds ratio00.47; P<0.001). There were insufficient data for conclusive statistical analysis of length of hospital stay.	**institutions and surgeons with respect to mortality and morbidity. Future high-powered studies with adjustment for procedural and patient case mix are required to further define the volume–outcome relationship in bariatric surgery.**	

Author	Study design – number of subjects – study period – setting	Association	Operation types	Variables of interest	Outcomes of interest	Statistical analysis and risk adjustment	Results	Author conclusion
Brunaud et al. (2018)	Cross-sectional study; 2011-2014 France (nationwide) 17% of hospitals were high-volume (>200) 184 332	Hospital: +	SG; LAGB; RYGB; intra-gastric balloon; biliopancreatic diversion	Hospital Volume: <100/year 100-200/year >200 year	LOS; Postop stay in ICU; Re-operations 1/3/6 months	Generalized estimating equations (GEE logistic regressions; RA for age; gender; BMI (≥30; ≥40; ≥50); Elixhauser comorbidity index	Hospital volume > 200/year was significantly associated with shorter average length of stay (p < 0.001) and less frequent need for intensive or critical care unit (p = 0.003). All procedures. The risk of reoperation after gastric bypass was lower (at 1, 3, 6 months) in higher	**Health care institutions performing more than 200 bariatric cases per year** were significantly associated with improved postoperative outcomes and less frequent need for reoperation. This threshold of 200 bariatric cases per year should be evaluated for further validation or adjustments.

Author	Study design – number of subjects – study period – setting	Association	Operation types	Variables of interest	Outcomes of interest	Statistical analysis and risk adjustment	Results	Author conclusion
	inpatient stays in 606 hospitals						volume institutions (OR of 0.71-0.74 p= 0.003), while it was unchanged for SG and (borderline) more frequent after gastric banding (OR 1.26 and p = 0.057)	
Doumares et al. (2017)	Cross-sectional study; Nationwide data about Canada (except Quebec) 18 398 patients April 2008-May 2015; Average annual hospital volume (n=300) surgeon volume (n=96);	Hospital: 0; Surgeon: + Teaching status: + Accredi-tation: 0	SG; RYGB	Annual hospital volume, surgeon volume; formal accreditation; teaching status	All-cause morbidity (any documented complication which extended LOS by 24h or required an unplanned procedure); hospital costs;	Hierarchical regression models; RA: gender, age, comorbidities (hypertension, coronary artery disease, renal disease, mild-severe diabetes, peptic ulcer disease, connective tissue disease, OSAS)	For all-cause morbidity, surgeon volume and teaching hospitals were both found to significantly decrease the risk of all-cause morbidity. Specifically, for each increase in 25 bariatric cases per year, the odds of all cause morbidity was 0.94 times lower (95% CI 0.87–1.00, p = 0.03). Teaching hospitals conferred a 0.75 lower odds. Hospital volume, formal accreditation, and number of surgeons at a hospital, after adjusting for surgeon volume, were not associated with a decrease in all-cause morbidity. With regards to costs, after adjustment for patient risk, none of the health system factors were associated with significant differences in adjusted average cost of the index admission.	This study found **that surgeon volume and teaching hospitals were the most important factors** in decreased all-cause morbidity after surgery. Accreditation status, however, was not associated with decreased morbidity in universal healthcare systems. Lastly, costs were not heavily influenced by health system factors.
Doumares et al. (2017b)	A 5-year longitudinal analysis in Ontario;	Hospital: - Surgeon: +	SG; RYGB	Annual hospital volume, surgeon	All-cause morbidity (any documented	RA: gender, age, comorbidities, procedure, and year of	Surgeon volume was associated with decreased odds of morbidity; as for each increase in 25 bariatric	This study underscored **the importance of surgeon volume in outcomes even in high resource settings for fellowship trained**

Author	Study design – number of subjects – study period – setting	Association	Operation types	Variables of interest	Outcomes of interest	Statistical analysis and risk adjustment	Results	Author conclusion
	April 2009 to March 2015; 29 individual surgeons identified at 9 sites. The median annual surgeon volume was 103 cases (IQR 86–138).			volume; formal accreditation (e.g. fellowship-trained bariatric surgeons with a; teaching status minimum of 50 cases per year and a total hospital volume of 120 cases per year; and multidisciplinary medical, psychiatric, and respiratory support for preoperative, postoperative, and clinic care)	complication which extended LOS by 24h or required an unplanned procedure); hospital costs;	procedure. Morbidity: logistic hierarchal regression model. Surgical cost was modeled using a linear mixed effects model.	cases per year, the odds of all-cause morbidity was 0.94 lower (95%CI 0.88– 1.00; p = 0.04). Conversely, hospital volume was associated with an increase in all-cause morbidity as compared to the years where hospital volumes were lower than 200; years with hospital volumes greater than 400 cases had a risk of morbidity 1.70 times greater (95%CI 1.20–2.33; p = <0.001). Adjusted average costs did not decrease over the course of the study, and gender, volume, and fellowship training site status also were not significantly associated with cost differences.	**surgeons.** It also demonstrated that there was improvement in outcomes over time for high-volume fellowship-trained surgeons in the center of excellence system suggesting a cumulative volume effect. In addition, after adjustment, there is little variation in outcomes across hospitals and surgeons suggesting that **accreditation standards can lead to little variation across sites** for risk-adjusted outcomes. With regard to cost, complications were the most substantial predictor and there was little variation in the surgeon level.
Celio et al. (2016)	16 547 patients USA There were 87 high volume SG surgeons and 649 low-volume SG surgeons; there were 181 high-volume RYGB and 555 Low volume RYGB	Surgeon SG volume: + RYGB volume: 0	SG patients	Surgeon volume per type: 50 annual cases as a cutoff per type: High-SG and low-SG; High-RYGB and Low-RYGB	30-day readmissions, reoperations, complications (anastomotic leakage, DVT, heart failure, liver failure, respiratory failure, AMI, pneumothor	Multivariable binary logistic regression models were used to examine the effect of surgeon volume on 30-day readmission, reoperation, and complication following non-revisional SG, while controlling for patient demographics, comorbidities (and other type of surgery volume).	High-volume SG surgeons had lower rates of 30-day complications (OR 0.80, 95 % CI 0.64–0.92), reoperation (OR 0.69, 95 % CI 0.52–0.90), and readmission (OR 0.73, 95 % CI 0.61–0.88). High-volume SG surgeons had lower 30-day complication rates (OR 0.80, 95 % CI 0.69–0.92), but were without differences in reoperation (OR 0.82, 95 % CI 0.61–1.10) or	In conclusion, 30-day complication, readmission, and reoperation rates are decreased when patients undergo SG by HV-SG surgeons. Although concurrent RYGB volume independently improves complication rates, it has no significant impact on readmission or reoperations. **Our finding suggests SG-specific experience is important for optimal safety outcomes and resource utilization in SG patients.**

Author	Study design – number of subjects – study period – setting	Association	Operation types	Variables of interest	Outcomes of interest	Statistical analysis and risk adjustment	Results	Author conclusion
					ax, etc.)	angina, asthma, CHF, DVT/ PE, functional status impairment, hypertension, ischemic heart disease, hyperlipidemia, liver disease, obstructive sleep apnea, peripheral vascular disease, Caucasian race, male gender, and glucose metabolism impairment	readmission (OR 1.06, 95 % CI 0.88–1.27) compared to LV-RYGB surgeons. RYGB volume impacts 30-day complications after SG, but not readmissions or reoperations. I	
Pradarelli et al. (2016)	8 693 patients 2013-2014 40 hospitals in the Michigan Bariatric Surgery Collaborative (requirement: a minimum of 25 bariatric procedures per year)	Hospital: 0	SG	Hospital volume: <50 procedures per year (7 hospitals), 50–124 procedures per year (17 hospitals), and $125 procedures per year (16 hospitals)	10 different types of bariatric surgery-related complications occurring within 30 days of the operation (short-term complications)	Hierarchical logistic regression; RA: age, sex, race, income level, insurance type, body mass index, smoking history, and clinically relevant limitations in mobility. Comorbid conditions (e.g. lung disease, cardiovascular disease, diabetes, gastroesophageal reflux, peptic ulcer disease, diabetes, liver disease, musculoskeletal disease, and psychiatric disease)	The odds of having any postoperative complication when operated on at high-volume or medium-volume hospitals were not statistically different than when operated on at low-volume hospitals (adjusted odds ratio for high-volume to low-volume hospitals, 1.53 [95% CI, 0.71–3.28] and for medium-volume to low-volume hospitals, 1.94 [95% CI, 0.89–4.23])	In conclusion, bariatric surgery has demonstrated marked improvements in perioperative safety during the sleeve gastrectomy era. Relatively low rates of serious complications were observed after laparoscopic sleeve gastrectomy at hospitals in Michigan; however, some variation persists for rates of overall complications. **Hospital complications were unrelated to volume standards required for accreditation as a comprehensive bariatric surgery center.** This study can be used to guide future research that informs payers, providers, and accreditation bodies on best practices for high quality bariatric surgery.

Author	Study design – number of subjects – study period – setting	Association	Operation types	Variables of interest	Outcomes of interest	Statistical analysis and risk adjustment	Results	Author conclusion
Varban et al. (2015)	USA: 12 states from 2006 through 2011, 446 127 patients.	Hospital: + (serious complication)	LAGB and RYGB	Hospital volume: <50 cases/yr, 50–125 cases/yr, and >125 cases/yr.	serious complications (any complication with length of stay >5 days; reoperations; in-hospital mortality.	Logistic regression models; RA: age, race, sex, type of insurance (Medicare and non-Medicare), and Elixhauser co-morbidities	LAGB: There were no significant differences in rates of reoperations and mortality between the highest (>125 cases/yr) and lowest (<50 cases/yr) volume hospitals after LAGB over the study period. The volume– outcome relationship was strongest for serious complications; the adjusted odds ratio for the lowest volume hospitals compared with the highest volume hospitals was 1.65 (CI: 1.18, 2.30) for 2006–2007, 1.81 (CI: 1.36, 2.41) for 2008–2009, and 2.08 (CI: 1.40, 3.09) for 2010–2011. RYGB: there were no significant differences in rates of reoperations and mortality between the highest (>125 cases/yr) and lowest (<50 cases/yr) volume hospitals after LRYGB over the study period. The volume–outcome relationship was also strongest for serious complications; the adjusted odds ratio for the lowest volume hospitals compared with the highest volume hospitals was 1.55 (CI: 1.23, 1.95) for 2006–2007, 1.39 (CI: 1.09, 1.76) for 2008–2009, and 1.39 (CI: 1.07,	**Significant improvements in the safety profile of bariatric surgery have occurred in the past decade; both high- and low-volume hospitals have experienced a decrease in adverse events over time. However, the inverse relationship between hospital volume and surgical quality still exists;** the highest volume hospitals experience fewer serious complications than lowest volume hospitals for both stapled and non-stapled procedures. However, the effect of hospital volume on mortality is diminished and may no longer serve as an accurate measure of quality.

Author	Study design – number of subjects – study period – setting	Association	Operation types	Variables of interest	Outcomes of interest	Statistical analysis and risk adjustment	Results	Author conclusion
							1.80) for 2010–2011.	
Stenberg et al. (2014)	Sweden 26 173 patients May 1, 2007, - September 30, 2012. Approximately 8000 bariatric procedures are performed annually at 44 centers	Hospital volume: +	RYGB	Annual volume at time of operation and learning curve: <100; 100-199;200-299 ;300-399; 400-499;500 or more	Specific complications (e.g. leakage or deep intra-abdominal infection, bleeding requiring intervention, gastrointestinal obstruction/ileus,) serious complications (complication requiring an invasive procedure under general anesthesia, failure of one or several organ systems requiring treatment on an intensive care facility or death);	Logistic regression; RA: Comorbidity is defined as a condition needing active pharmacological or continuous positive airway pressure treatment, registered as hypertension, diabetes, dyslipidemia, diarrhea, depression, sleep apnea, or other condition.	Annual hospital volumes were inversely correlated to the risk for serious complications (P < 0.001). Increasing annual hospital volumes decreased the risk for leakage/deep infection (P < 0.001) and pulmonary complications (P = 0.023). The incidence of serious postoperative complications was significantly higher with volumes up to 200 cases per year. Length of operating time and hospital stay were reduced with volumes up to 300 cases per year. The risk for serious postoperative complications was higher during the first 400 operations at a specific hospital (P < 0.001). For specific complications, the risk for leakage/deep infection (OR = 1.41; CI: 1.17–1.70; P < 0.001), pulmonary complications (OR = 1.48; CI: 1.10–1.98; P = 0.009), and port-related complications (OR = 1.62; CI: 1.16–2.25; P = 0.005) was increased .	Intraoperative adverse events and conversion to open surgery are the strongest risk factors for serious complications after laparoscopic gastric bypass surgery. **Annual operative volume and total institutional experience are important for the outcome.** Patient related factors, in particular age, also increased the risk but to a lesser extent.
Torrente et al.	Pennsylvania	Hospital	RYGB	Hospital	in-hospital	Multivariate analyses	High-volume surgeons at	In Pennsylvania, both higher

Author	Study design – number of subjects – study period – setting	Association	Operation types	Variables of interest	Outcomes of interest	Statistical analysis and risk adjustment	Results	Author conclusion
(2013)	Health Care Cost Containment Council included 14 714 patients	volume: + Surgeon: +		volume ((high [≥300], medium [125–299], and low [<125]) and Surgeon volume categories (high [≥50] and low [<50]).	mortality and 30-day mortality.	were performed using logistic regression analysis to control for patient demographics and severity	high-volume hospitals had the lowest in-hospital mortality rates of all categories (.12%) and low-volume surgeons at low-volume hospitals had the poorest outcomes (.57%). The same trend was observed for 30-day mortality (.30% versus .98%). After controlling for other covariates, high-volume surgeons at high-volume hospitals also had significantly lower odds of both in-hospital (odds ratio 20, P = .002) and 30-day mortality (odds ratio .30, P <.001).	surgeon and hospital volume were associated with better outcomes for bariatric surgical procedures. **Although a high-surgeon volume correlated with lowered mortality, we also found that high-volume hospitals demonstrated improved outcomes, highlighting the importance of factors other than surgical expertise in determining the outcomes.**
Gould et al. (2011)	2005-2007 USA 32 509 patients	Hospital volume: +	RYGB; LAGB	Hospital volume (per 25 cases)		Multilevel logistic regression controlling for	For all procedures, using a combined end point of mortality and major complications, a volume-outcomes relationship was evident for hospitals. This relationship appeared linear with no clear point that maximally differentiated high- and low-volume centers.	Using a nationwide dataset and bariatric procedure-specific data, we have demonstrated that **bariatric surgery mortality and complication rates are very low. A definite volume-outcomes relationship exists when hospital-level data are analyzed, but there is no inflection point to justify selecting a specific volume threshold to determine Centers of Excellence**. Low-volume centers with extremely low complication rates can be identified and, conversely, there are high-volume centers with elevated rates of complication.
Asano et al. (2012)	Jan 2008- jun 2011	Hospital volume:	RYGB	hospital volume,	length of stay (LoS)	multivariate analysis (logistic	Certified CoE remained as the strongest	Currently, the majority of public hospitals in Brazil has low volume of

Author	Study design – number of subjects – study period – setting	Association	Operation types	Variables of interest	Outcomes of interest	Statistical analysis and risk adjustment	Results	Author conclusion
	Brazil 13 069 surgeries	+		surgery at certified center of excellence (CoE) by the Surgical Review Corporation (SRC), teaching hospital,	and ICU need	regression RA: gender, age, region, and year of hospitalization.	predictor of ICU need (OR, 0.011; 95 % CI, 0.007–0.018), followed by hospital volume (OR, 3.096; 95 % CI, 2.861– 3.350).	bariatric surgery and does not meet the requirements to be accredited as a CoE. Length of stay and ICU need are higher in public hospitals than in private hospitals, and this might be limiting the availability of more surgeries and consequently leading to longer waiting times for the procedure. Efforts should be made to increase hospital efficiency in terms of time and resource use in an attempt to meet the increasing demand for the procedure. According to the study findings, increasing the number of bariatric CoE with enough resources to become highvolume hospitals might help solve part of the problem. An increase in current reimbursement value and the introduction of laparoscopic approach to the Public Health System may also help overcome part of the patient access barrier, but more studies should be conducted in order to evaluate that.
Chiu-Chiu (2012)	2,674 bariatric surgery procedures performed from 1997 to 2008. Taiwan	Hospital volume:+ Surgeon volume: +	open gastric bypass, laparoscopic gastric bypass, open gastroplasty, and laparoscopic gastroplasty	hospital volume (35 as cut-off) and surgeon (15 as cut off) volume	hospital resource utilization and length-of-stay	RA: Hierarchical regression models; RA: age, gender, Charlson co-morbidity index (CCI), and bariatric procedures.	After adjusting for patient characteristics and hospital characteristics, the hierarchical linear regression model revealed that the LOS for high-volume hospitals was significantly shorter (by 3.71 days) than that for low-volume hospitals (P< 0.001). The hierarchical linear regression model also showed that, compared to	The data suggest that annual surgical volume is the key factor in hospital resource utilization. This study suggests that LOS may explain the lower costs incurred at high-volume hospitals and by high-volume surgeons in comparison with low-volume hospitals and surgeons. Therefore, to increase healthcare quality and decrease costs, payers may consider using highvolume hospitals/surgeons preferentially for performing complex surgical procedures or

Author	Study design – number of subjects – study period – setting	Association	Operation types	Variables of interest	Outcomes of interest	Statistical analysis and risk adjustment	Results	Author conclusion
							low-volume hospitals, mean hospital treatment cost was significantly lower in high-volume hospitals (US $308.93 lower; P<0.001).	consider providing expert consultation to low-volume surgeons. Additionally, the results also can improve the understanding of medical resource allocation for this surgical procedure and can help to formulate public health policies for optimizing hospital resource utilization for related diseases. Careful management of these factors can enhance efficiency in allocating scarce hospital resources