

Assessment and Monitoring of the Quality of Clinical Pathways in Patients with Depressive Disorders: Results from a Multiregional Italian Investigation on Mental Health Care Quality (the QUADIM Project)

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SUPPLEMENTARY MATERIAL

Supplementary Table S1. Service interventions, treatments and activities delivered by Community Mental Health Centers (CMHCs) and Day Centers (DCs), and their classification in the Italian Mental Health Information System.

Interventions and activities	Mental Health Information system code
Generic care	
Psychiatric visit	01
Individual meeting with a professional	03
Consultation	04
Medico-legal assessment	05
Psychological testing	06
Drug administration	11
Meeting with relatives	12
Staff meeting	15
Attendance to day centre	20
Support to daily living activity	24
Network interventions	26
Psychosocial interventions	
Individual living skills training	16
Group living skills training	17
Individual socialization	18
Socialization group	19
Expressive, manual and bodywork individual interventions	21
Expressive, manual and bodywork group interventions	22
Vocational training	23
Support for financial, welfare procedures and leisure activities	25
Psychotherapy	
Psychological visit	02
Individual psychotherapy	07
Couple psychotherapy	08
Family psychotherapy	09
Group psychotherapy	10
Psychoeducation	
Single family psychoeducation	13
Multifamily group psychoeducation	14

Supplementary Table S2. Diagnostic and therapeutic (ICD-9-CM, ICD-10, and ATC) codes used in the current study for drawing records and fields from Healthcare Utilization databases.

DEPRESSION	
	ICD-10 codes (Lombardy)
Depressive episode	F32.*
Recurrent depressive disorder	F33.*
Dysthymia	F34.1
Other persistent mood [affective] disorders	F34.8
Persistent mood [affective] disorder, unspecified	F34.9
Other recurrent mood [affective] disorders	F38.1
Other specified mood [affective] disorders	F38.8
Unspecified mood [affective] disorder	F39.*
Adjustment disorders	F43.2
	ICD-9-CM codes (Emilia-Romagna, Lazio and Palermo)
Major depressive disorder, single episode	296.2
Major depressive disorder, recurrent episode	296.3
Atypical depressive disorder	296.82
Unspecified episodic mood disorder	296.90
Depressive type psychosis	298.0
Dysthymic disorder	300.4
Adjustment disorder with depressed mood	309.0
Prolonged depressive reaction	309.1
Depressive disorder	311.*
Drugs	ATC codes
Antidepressants	N06A
OUTPATIENT PROCEDURES	
	National procedure codes
Electrolytes	91.49.2, 90.40.4, 90.37.4, 90.13.3
Electrocardiogram	89.50, 89.52, 89.54
Psychiatric visit	94.12.1, 94.19.1
Psychological interview	94.09
Standardized assessments using tests	94.01.1, 94.08.3, 94.08.4, 94.08.5, 94.08.6
Couple/Family psychotherapy	94.3, 94.42
Group psychotherapy	94.44

Supplementary Table S3. Baseline characteristics of prevalent patients with depressive disorder treated by DMHs of four Italian areas (Lombardy, Emilia Romagna, Sicily, and Lazio Regions) and in the whole sample. Italy, QUADIM-MAP projects, Italy, 2015-2016.

	Lombardy (N=33,222)	Emilia-Romagna (N=21,698)	Sicily (N=6755)	Lazio (N=17,249)	All together (N=78,924)
Gender					
Men	11,760 (35.4%)	7096 (32.7%)	2478 (36.7%)	5693 (33.0%)	27,027 (34.2%)
Age (years)					
Mean (SD)	51.6 (15.1)	56.5 (15.3)	54.9 (14.2)	53.6 (14.7)	54.1 (14.8)
18-25	1494 (4.5%)	506 (2.3%)	205 (3.0%)	645 (3.7%)	2850 (3.6%)
26-40	6468 (19.5%)	2886 (13.3%)	893 (13.2%)	2550 (14.8%)	12,797 (16.2%)
41-49	7106 (21.4%)	3798 (17.5%)	1139 (16.9%)	3243 (18.8%)	15,286 (19.4%)
≥50	18,154 (54.6%)	14,508 (66.9%)	4518 (66.9%)	10,811 (62.7%)	47,991 (60.8%)
Education years					
0-5	14,000 (42.1%)	4449 (20.5%)	2074 (30.7%)	2798 (16.2%)	23,321 (29.5%)
6-8	13,072 (39.3%)	7116 (32.8%)	4199 (62.2%)	6107 (35.4%)	30,494 (38.6%)
9-13	3297 (9.9%)	6051 (27.9%)	0 (0%)	5222 (30.3%)	14,570 (18.5%)
≥14	559 (1.7%)	1557 (7.2%)	479 (7.1%)	1411 (8.2%)	4006 (5.1%)
Missing data	2294 (6.9%)	2525 (11.6%)	3 (0.0%)	1711 (9.9%)	6533 (8.3%)
Job condition					
Employed	17,278 (52.0%)	6665 (30.7%)	1728 (25.5%)	6615 (38.4%)	32,286 (40.9%)
Unemployed	6699 (20.2%)	10,220 (47.1%)	4942 (73.2%)	9166 (53.1%)	31,027 (39.3%)
Invalid	7228 (21.8%)	554 (2.6%)	81 (1.2%)	0 (0%)	7863 (10.0%)
Missing data	2017 (6.1%)	4259 (19.6%)	4 (0.1%)	1468 (8.5%)	7748 (9.8%)
Family arrangement [§]					
Living with family	25,411 (76.5%)	15,658 (72.2%)	1145 (17.0%)	NA	42,214 (68.4%)
Living in community	520 (1.6%)	201 (0.9%)	736 (10.9%)	NA	1457 (2.4%)
Living alone	5387 (16.2%)	3325 (15.3%)	271 (4.0%)	NA	8983 (14.6%)
Missing data	1904 (5.7%)	2514 (11.6%)	4603 (68.1%)	NA	9021 (14.6%)
Marital status					
Unmarried	8245 (24.8%)	5312 (24.5%)	1275 (18.9%)	4677 (27.1%)	19,509 (24.7%)
Married	16,783 (50.5%)	9854 (45.4%)	4351 (64.4%)	7947 (46.1%)	38,935 (49.3%)
Separated	2168 (6.5%)	1043 (4.8%)	355 (5.2%)	1306 (7.6%)	4872 (6.2%)
Divorced	1998 (6.0%)	1573 (7.2%)	148 (2.2%)	933 (5.4%)	4652 (5.9%)
Widow/er	2483 (7.5%)	1863 (8.6%)	520 (7.7%)	1019 (5.9%)	5885 (7.5%)
Missing data	1545 (4.7%)	2053 (9.5%)	106 (1.6%)	1367 (7.9%)	5071 (6.4%)
Clinical status[†]					
Optimal	12,897 (38.8%)	8370 (38.6%)	2346 (34.7%)	7575 (43.9%)	31,188 (39.5%)
Good	10,654 (32.1%)	7646 (35.2%)	2431 (36.0%)	4956 (28.7%)	25,687 (32.5%)
Intermediate	6045 (18.2%)	3278 (15.1%)	1161 (17.2%)	2854 (16.6%)	13,338 (16.9%)
High-intermediate	2109 (6.3%)	1333 (6.2%)	502 (7.4%)	1069 (6.2%)	5013 (6.4%)
Poor	1517 (4.6%)	1071 (4.9%)	315 (4.7%)	795 (4.6%)	3698 (4.7%)

[§] Information for Lazio Region was not available for this characteristic, which was calculated on the 61,675 remaining patients.

[†] The clinical status was assessed by the Multisource Comorbidity Score (MCS) according to the hospital admission and the drugs prescribed in the two-year period before the index date. Five categories of clinical status were considered: optimal (score=0), good ($1 \leq \text{score} \leq 5$), intermediate ($6 \leq \text{score} \leq 10$), high-intermediate ($11 \leq \text{score} \leq 15$) and poor (score ≥ 16).

Supplementary Table S4. Baseline characteristics of patients newly engaged in services with depressive disorder treated by DMHs of four Italian areas (Lombardy, Emilia Romagna, Sicily, and Lazio Regions) and in the whole sample. Italy, QUADIM-MAP projects, Italy, 2015-2016.

	Lombardy (N=4770)	Emilia-Romagna (N=3230)	Sicily (N=1439)	Lazio (N=5795)	All together (N=15,234)
Gender					
Men	1946 (40.8%)	1207 (37.4%)	597 (41.5%)	2130 (36.8%)	5880 (38.6%)
Age (years)					
Mean (SD)	44.9 (11.9)	45.1 (11.8)	48.5 (11.8)	47.0 (12.0)	46.4 (11.8)
18-25	368 (7.7%)	241 (7.5%)	81 (5.6%)	377 (6.5%)	1067 (7.0%)
26-40	1274 (26.7%)	860 (26.6%)	265 (18.4%)	1260 (21.8%)	3659 (24.0%)
41-49	1216 (25.5%)	834 (25.8%)	316 (22.0%)	1346 (23.2%)	3712 (24.4%)
50-65	1912 (40.1%)	1295 (40.1%)	777 (54.0%)	2812 (48.5%)	6796 (44.6%)
Education years					
0-5	1559 (32.7%)	181 (5.6%)	279 (19.4%)	464 (8.0%)	2483 (16.3%)
6-8	1902 (39.9%)	1012 (31.3%)	1024 (71.1%)	2151 (37.1%)	6089 (40.0%)
9-13	657 (13.8%)	1109 (34.4%)	0 (0%)	2006 (34.6%)	3772 (24.8%)
≥14	144 (3.0%)	343 (10.6%)	135 (9.4%)	559 (9.7%)	1181 (7.8%)
Missing data	508 (10.6%)	585 (18.1%)	1 (0.1%)	615 (10.6%)	1709 (11.2%)
Job condition					
Employed	1973 (41.4%)	1430 (44.3%)	501 (34.8%)	2741 (47.3%)	6645 (43.6%)
Unemployed	1296 (27.2%)	1022 (31.6%)	925 (64.3%)	2480 (42.8%)	5723 (37.6%)
Invalid	1043 (21.9%)	47 (1.5%)	12 (0.8%)	0 (0%)	1102 (7.2%)
Missing data	458 (9.6%)	731 (22.6%)	1 (0.1%)	574 (9.9%)	1764 (11.6%)
Family arrangement [§]					
Living with family	3625 (76.0%)	2250 (69.6%)	219 (15.2%)	NA	6094 (69.7%)
Living in community	82 (1.7%)	21 (0.7%)	165 (11.5%)	NA	268 (2.8%)
Living alone	650 (13.6%)	433 (13.4%)	55 (3.8%)	NA	1138 (12.1%)
Missing data	413 (8.7%)	526 (16.3%)	1000 (69.5%)	NA	1939 (20.5%)
Marital status					
Unmarried	1489 (31.2%)	1060 (32.8%)	323 (22.5%)	1843 (31.8%)	4715 (31.0%)
Married	2161 (45.3%)	1232 (38.2%)	901 (62.6%)	2510 (43.3%)	6804 (44.7%)
Separated	320 (6.7%)	145 (4.5%)	94 (6.5%)	476 (8.2%)	1035 (6.8%)
Divorced	278 (5.8%)	243 (7.5%)	37 (2.6%)	331 (5.7%)	889 (5.8%)
Widow/er	143 (3.0%)	88 (2.7%)	55 (3.8%)	153 (2.7%)	439 (2.9%)
Missing data	379 (7.9%)	462 (14.3%)	29 (2.0%)	482 (8.3%)	1352 (8.9%)
Clinical status[†]					
Optimal	2683 (56.2%)	1910 (59.1%)	691 (48.0%)	3390 (58.5%)	8674 (56.9%)
Good	1426 (29.9%)	948 (29.4%)	507 (35.2%)	1537 (26.5%)	4418 (29.0%)
Intermediate	407 (8.5%)	223 (6.9%)	153 (10.6%)	588 (10.2%)	1371 (9.0%)
High-intermediate	127 (2.7%)	83 (2.6%)	50 (3.5%)	164 (2.8%)	424 (2.8%)
Poor	127 (2.7%)	66 (2.0%)	38 (2.7%)	116 (2.0%)	347 (2.3%)

[§] Information for Lazio Region was not available for this characteristic, which was calculated on the 9439 remaining patients.

[†] The clinical status was assessed by the Multisource Comorbidity Score (MCS) according to the hospital admission and the drugs prescribed in the two-year period before the index date. Five categories of clinical status were considered: optimal (score=0), good ($1 \leq \text{score} \leq 5$), intermediate ($6 \leq \text{score} \leq 10$), high-intermediate ($11 \leq \text{score} \leq 15$) and poor (score ≥ 16).

Supplementary Table S5 Clinical indicators estimated, in the whole sample and according to gender, in the first year of follow-up for prevalent patients with Depressive disorder treated by DMHs of four Italian areas (Lombardy, Emilia Romagna, Sicily, and Lazio Regions). QUADIM-MAP projects, Italy, 2015-2016

	Whole sample (n=78,924)	Male (n=27,027)	Female (n=51,897)	SMD
ACCESSIBILITY AND APPROPRIATENESS OF MENTAL HEALTH CARE				
1 Patients with at least one outpatient contact in CMHCs or DCs	92.4%	92.3%	92.5%	1.3
2 Median number of outpatient contacts in CMHCs (<i>per PY</i>)	5.7	5.6	5.8	0.0
3 Patients with at least one contact in psychiatric visits	79.5%	80.4%	79.1%	4.7
4 Median number of outpatient psychiatric visits (<i>per PY</i>)	3.0	3.2	3.0	0.0
5 Patients with at least one standardized assessment using tests	2.5%	2.8%	2.4%	4.4
6 Median number of standardized assessments using tests (<i>per PY</i>)	1.0	1.0	1.0	0.0
7 Patients with at least one home visit §	4.4%	4.2%	4.5%	1.8
8 Median number of home visits §	2.3	2.0	2.3	0.0
9 Patients treated with at least one psychosocial intervention in CMHCs	37.5%	37.0%	37.8%	2.2
10 Median number of psychosocial interventions in CMHCs (<i>per PY</i>)	2.8	2.5	2.8	0.0
11 Patients treated with at least one psychosocial intervention in CMHCs ψ	6.8%	7.5%	6.5%	5.6
12 Median number of psychosocial interventions in CMHCs (<i>per PY</i>) ψ	3.0	2.9	2.9	0.0
13 Patients treated with at least one psychoeducation session ‡	1.8%	2.0%	1.8%	1.8
14 Median number of psychoeducation sessions (<i>per PY</i>) ‡	1.8	1.8	1.8	0.0
15 Patients treated with at least one psychotherapy session	15.6%	13.5%	16.7%	12.3*
16 Median number of psychotherapy sessions (<i>per PY</i>)	4.8	4.0	4.8	0.1
17 Patients with at least one outpatient carers' contact	18.6%	19.7%	18.0%	6.4
18 Median number of interventions specifically addressed to patients' family members (<i>per PY</i>)	1.8	1.8	1.8	0.0
19 Patients treated with Antidepressant agents	65.4%	61.4%	67.5%	18.2*
20 Patients in both Psychotherapeutic-Pharmacological treatment	8.4%	7.1%	9.1%	10.0
21 Patients with at least one admission in residential facilities	5.5%	6.4%	5.1%	8.8
22 Median number of days spent in residential facilities (<i>per PY</i>)	89.4	30.7	88.9	0.5
23 Patients with at least one admission in GHPW	5.1%	6.0%	4.7%	8.3
24 Median number of days spent in GHPW (<i>per PY</i>)	14.4	13.8	14.7	0.0
25 Admissions with a length of stay in GHPW higher than 30 days	5.7%	5.1%	6.1%	5.4
26 Unplanned re-admissions in GHPW within 7 days¶	8.8%	8.9%	8.7%	0.8

27	Unplanned re-admissions in GHPW within 30 days¶	17.1%	16.0%	17.8%	6.8
CONTINUITY OF MENTAL HEALTH CARE					
28	Patients with continuous community care	46.9%	47.6%	46.6%	2.8
29	Patients persistent with therapy with Antidepressant agents	51.2%	49.2%	52.2%	8.1
30	GHPW discharges followed by any mental health outpatient contact within 14 days	55.0%	55.9%	54.4%	4.4
31	GHPW discharges followed by an outpatient psychiatric visit within 14 days	40.4%	40.5%	40.4%	0.4
32	GHPW discharges followed by home care within 14 days §	2.9%	2.3%	3.3%	8.0
SAFETY OF MENTAL HEALTH CARE					
33	Patients monitored with electrocardiogram and exam for electrolytes (in patients treated with antidepressants)	19.8%	20.1%	19.7%	1.4
34	Mortality (SMR), and relative 95% CI	1.4 (1.1 to 1.2)	1.5 (1.4 to 1.6)	0.9 (0.8 to 0.9)	10.5*

SMD: Standardized Mean Difference; DMH: Department of Mental Health. CMHC: Community Mental Health Centres; DC: Day-Care Centres; PY: person-year; FGAs: First generation antipsychotics; SGAs: Second generation antipsychotics; GHPW: General Hospital Psychiatric Wards; SMR: standardized mortality ratio.

* Standardized mean differences ≥10% are considered not negligible for differences between males and females distributions.

§ Information for Emilia-Romagna Region was not available for this clinical indicator, which was calculated on the 57,226 remaining patients.

ψ Psychosocial interventions are intended excluding Psychotherapy and Psychoeducation sessions.

‡ Information for Lazio Region was not available for this clinical indicator, which was calculated on the 61,675 remaining patients.

¶ After a previous hospital admission in GHPW (statistical unit)

¥ Values of I² for heterogeneity are percentages and can be classified in: Negligible (0-25); Moderate (26-50); Substantive (51-75); Considerable (76-100).

Supplementary Table S6 Clinical indicators estimated, in the whole sample and according to gender, in the first year of follow-up for patients newly engaged in services with Depressive disorder treated by DMHs of four Italian areas (Lombardy, Emilia-Romagna, Sicily, and Lazio Regions). QUADIM-MAP projects, Italy, 2015-2016

	Whole sample (n=15,234)	Male (n=5880)	Female (n=9354)	SMD
ACCESSIBILITY AND APPROPRIATENESS OF MENTAL HEALTH CARE				
1 Patients with at least one outpatient contact in CMHCs or DCs	92.3%	92.0%	92.5%	1.6
2 Median number of outpatient contacts in CMHCs (<i>per PY</i>)	4.5	4.5	4.3	0.0
3 Patients with at least one contact in psychiatric visits	75.0%	77.9%	73.2%	11.1*
4 Median number of outpatient psychiatric visits (<i>per PY</i>)	2.8	2.5	2.7	0.0
5 Patients with at least one standardized assessment using tests	4.4%	5.0%	4.0%	4.6
6 Median number of standardized assessments using tests (<i>per PY</i>)	1.0	1.0	1.0	0.0
7 Patients with at least one home visit §	2.2%	2.2%	2.2%	0.2
8 Median number of home visits §	1.6	1.6	1.8	0.0
9 Patients treated with at least one psychosocial intervention in CMHCs	36.5%	35.1%	37.4%	4.8
10 Median number of psychosocial interventions in CMHCs (<i>per PY</i>)	2.7	2.7	3.0	0.0
11 Patients treated with at least one psychosocial intervention in CMHCs ψ	4.1%	4.4%	3.9%	2.7
12 Median number of psychosocial interventions in CMHCs (<i>per PY</i>) ψ	2.0	2.0	1.7	0.0
13 Patients treated with at least one psychoeducation session ‡	1.8%	1.9%	1.7%	2.0
14 Median number of psychoeducation sessions (<i>per PY</i>) ‡	1.0	1.0	1.8	0.1
15 Patients treated with at least one psychotherapy session	22.0%	18.4%	24.2%	14.1*
16 Median number of psychotherapy sessions (<i>per PY</i>)	4.0	3.7	4.2	0.0
17 Patients with at least one outpatient carers' contact	14.9%	16.0%	14.2%	4.9
18 Median number of interventions specifically addressed to patients' family members (<i>per PY</i>)	1.7	1.7	1.5	0.1
19 Patients treated with Antidepressant agents	43.2%	43.3%	43.2%	0.3
20 Patients in both Psychotherapeutic-Pharmacological treatment	8.0%	7.0%	8.7%	6.1
21 Patients with at least one admission in residential facilities	3.4%	4.0%	2.9%	6.1
22 Median number of days spent in residential facilities (<i>per PY</i>)	25.7	24.3	24.7	0.0
23 Patients with at least one admission in GHPW	3.3%	4.3%	2.7%	9.0
24 Median number of days spent in GHPW (<i>per PY</i>) 24.3	13.6	13.8	13.6	0.0
25 Admissions with a length of stay in GHPW higher than 30 days	4.9%	4.4%	5.4%	4.9
26 Unplanned re-admissions in GHPW within 7 days¶	7.5%	8.3%	6.6%	6.6
27 Unplanned re-admissions in GHPW within 30 days¶	29.8%	30.6%	29.1%	4.6

CONTINUITY OF MENTAL HEALTH CARE				
28	Patients with continuous community care	28.2%	28.7%	27.9% 1.7
29	Patients persistent with therapy with Antidepressant agents	34.2%	31.6%	35.8% 8.8
30	GHPW discharges followed by any mental health outpatient contact within 14 days	60.6%	63.9%	57.4% 13.4*
31	GHPW discharges followed by an outpatient psychiatric visit within 14 days	44.9%	49.2%	40.7% 17.2*
32	GHPW discharges followed by home care within 14 days §	1.4%	1.5%	1.4% 0.5
SAFETY OF MENTAL HEALTH CARE				
33	Patients monitored with electrocardiogram and exam for electrolytes (in patients treated with antidepressants)	13.6%	13.5%	13.6% 0.2
34	Mortality (SMR), and relative 95% CI	1.1 (1.0 to 1.3)	1.3 (1.1 to 1.5)	1.0 (0.9 to 1.2) 4.7

SMD: Standardized Mean Difference; DMH: Department of Mental Health. CMHC: Community Mental Health Centres; DC: Day-Care Centres; PY: person-year; FGAs: First generation antipsychotics; SGAs: Second generation antipsychotics; GHPW: General Hospital Psychiatric Wards; SMR: standardized mortality ratio.

* Standardized mean differences ≥10% are considered not negligible for differences between males and females distributions.

§ Information for Emilia-Romagna Region was not available for this clinical indicator, which was calculated on the 12,004 remaining patients.

ψ Psychosocial interventions are intended excluding Psychotherapy and Psychoeducation sessions.

‡ Information for Lazio Region was not available for this clinical indicator, which was calculated on the 9,439 remaining patients.

¶ After a previous hospital admission in GHPW (statistical unit)

¥ Values of I² for heterogeneity are percentages and can be classified in: Negligible (0-25); Moderate (26-50); Substantive (51-75); Considerable (76-100).

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