Cost-Effectiveness of 12-Month Therapeutic Assertive Community Treatment as Part of Integrated Care Versus Standard Care in Patients With Schizophrenia Treated With Quetiapine Immediate Release (ACCESS Trial)

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ABSTRACT

Objective: To compare the 1-year cost-effectiveness of therapeutic assertive community treatment (ACT) with standard care in schizophrenia. ACT was specifically developed for patients with schizophrenia, delivered by psychosis experts highly trained in respective psychotherapies, and embedded into an integrated care system.

Method: Two catchment areas in Hamburg, Germany, with similar population size and health care structures were assigned to offer 12-month ACT (n = 64) or standard care (n = 56) to 120 first- and multiple-episode patients with schizophrenia spectrum disorders (*DSM-IV*), the latter with a history of relapse due to medication nonadherence. Primary outcome was the incremental cost-effectiveness ratio (ICER) based on mental health care costs from a payer perspective and quality-adjusted life-years (QALYs) as a measure of health effects during the 12-month follow-up period (2006–2007).

Results: ACT was associated with significantly lower inpatient but higher outpatient costs than standard care, resulting in nonsignificantly lower total costs (*P* = .27). Incremental QALYs in the ACT group were 0.1 (*P* < .001). Thus, the point estimate for the ICER showed dominance of ACT. The probability of an ICER below €50,000 per QALY gained was 99.5%.

Conclusions: The implementation of a psychotherapeutically oriented schizophrenia-specific and -experienced ACT team led to an improved patient outcome with reduced need of inpatient care. Despite the introduction of such a rather "costly" ACT team, treatment in ACT was cost-effective with regard to improved quality of life at comparable yearly costs.

Trial Registration: ClinicalTrials.gov identifier: NCT01081418

Schizophrenia is often characterized by developmental impairments, poor insight, persistent neuropsychological deficits, a high risk of comorbid psychiatric disorders, and a long delay between initial symptoms and first treatment.[1–7] Treatment of patients with schizophrenia is further complicated by a high risk of medication nonadherence, service disengagement,[8] and comorbid somatic disorders.[9] These problems cause social disability and poor quality of life.[7] Adapting health care structures adequately to these needs could improve quality of care and thereby outcome.[10] However, in light of increasing health care costs internationally, new programs need to be cost-effective.

An intervention to improve quality of care cost-effectively for patients with schizophrenia may be assertive community treatment (ACT).[10–12] Key features mediating the effectiveness of ACT are the multidisciplinary team approach with a small client/staff ratio, home-treatment, high-frequent treatment contacts, no dropout policy, and 24-hour availability.[13,14] Compared to standard care, ACT was found to be superior in terms of treatment retention, number of hospital admissions and time spent in hospital, accommodation status, employment, and patient satisfaction.[12] Some recent European studies, however, could not replicate these positive results of earlier US trials, which were mainly attributed to improved standard care and the difficulty to further reduce already low levels of admission days.[15,16]

However, a recent trial by Lambert et al,[10] on which this cost-effectiveness analysis is based, found clearly better outcomes for ACT compared to standard care. These advantages were attributed to the following specifications of the ACT model: (1) ACT specifically tailored to schizophrenia-spectrum disorders, (2) a multiprofessional ACT team highly experienced in the treatment of psychosis including psychotherapy, and (3) ACT embedded into a specialized integrated care system (see Lambert et al[10]).

Ideally, treatment programs with better outcomes are also cost-effective. Consequently, the purpose of this analysis was to evaluate the cost-effectiveness of ACT compared to standard care in patients with schizophrenia-spectrum disorders. Different from other economic evaluations of ACT, we used quality-adjusted life-years (QALYs) as the measure of health effects, following the concept of cost-utility analysis as recommended by health economists.[17] Quality-adjusted life-years are a standard measure of health output in cost-effectiveness analysis, in which the ratio of additional costs to QALYs gained is calculated for a particular health care intervention.[18] More precisely, we hypothesized that the additional mental health care costs associated with ACT are below €50,000 per QALY gained, a threshold for cost-effectiveness commonly regarded as acceptable by decision makers.[19]

METHOD

The detailed trial method was previously described.[10] Briefly, the trial was carried out in 2 catchment areas in Hamburg, Germany (ie, University Medical Center Hamburg-Eppendorf [UKE] and Asklepios Westhospital Rissen [AWR]) with similar catchment area size and similar health care structures. In the UKE catchment area, ACT was implemented as described below, while standard care was offered to participants in the AWR area.

Participants were recruited from 2006 to 2007 and included in the study if they met the following inclusion criteria: (1) age 18 to 65 years; (2) met the diagnostic criteria of a first or multiple episode of a schizophrenia spectrum disorder, ie, schizophrenia, schizophreniform disorder, schizoaffective disorder, delusional disorder, or psychotic disorder not otherwise specified[20] as assessed with the Structured Clinical Interview for *DSM-IV* Axis disorders (SCID-I)[21]; and (3) new initiation or current treatment with quetiapine immediate release (IR). Multiple-episode patients had to meet the following additional inclusion criterion: at least 1 psychotic relapse with subsequent hospitalization caused by medication nonadherence within the last 24 months. The selection of first-episode and previously nonadherent multiple-episode patients was chosen because they represent a key population with high risk of service disengagement, medication nonadherence, and incomplete remission and meet the "severe mental illness" indication for ACT.[7] Informed consent was given by each patient. Institutional review board approval was given for the study (IRB Hamburg, Germany 2515).

Treatment Groups

Assertive community treatment and integrated care. Assertive community treatment was implemented as part of a specialized psychosis integrated care program in the UKE intervention group. This program comprises a specialized psychosis inpatient unit, 2 day-clinics, a psychosis outpatient center, an occupational therapy center, and a network of 6 private psychiatrists. Each study participant was designated to a team consisting of 1 ACT therapist and 1 psychiatrist who offered 12-month continuous treatment. Assertive community treatment was structured and implemented according to the guidelines of the Assertive Community Treatment Association.[14] Team members were highly educated psychosis experts consisting of a consultant psychiatrist, a psychiatrist, 2 psychologists, and a nurse, all of whom received training in cognitive-behavioral, dynamic, and/or family psychotherapy. The caseload ratio was 15 patients per ACT therapist. The fidelity of the model was assessed with the Dartmouth Assertive Community Treatment Scale (DACTS).[13] The total scores at 1- and 6-month follow-up of 4.5 points indicate that the fidelity of the ACT model was good (DACTS score range 1–5 point = poor to excellent implementation).[10]

Standard care. Comparably structured as within the OPUS trial,[22] participants in the AWR control group received "standard care." Comparable to the UKE area, standard care comprised a treatment network consisting of open and closed inpatient wards, day clinics, an outpatient center, and 8 private psychiatrists. Each patient was treated by a private psychiatrist or by a psychiatrist in the outpatient center. Most of these psychiatrists had completed a 5-year hospital-based training and long-term training in psychotherapy. Home visits were possible, but office visits were the general rule. Psychosocial treatments were provided in the minority of cases and in a less intensive and unsystematic way. This "standard of care" definition is in accordance with other studies.[16,22]

Antipsychotics and Psychotropic Medications

All participants were treated with quetiapine IR at study entry, regardless whether newly initiated or already treated. Allowed concomitant medications included all other indicated psychotropic medications (eg, other antipsychotics, benzodiazepines, mood stabilizer, antidepressants). Switching of quetiapine IR to other antipsychotics or antipsychotic augmentation therapy was allowed and did not cause study termination.

Assessments and Outcome Measures

Assessments were carried out at baseline (T_1), and at 4 (T_2), 12 (T_3), 26 (T_4), 38 (T_5), and 52 (T_6) weeks' follow-ups. The following variables were assessed: (1) diagnoses were confirmed with the Structured Clinical Interview for *DSM-IV* Axis I disorders (SCID-I)[20]; (2) demographic characteristics[23]; (3) psychopathology (Positive and Negative Syndrome Scale, PANSS)[24]; (4) severity of illness (Clinical Global Impressions-Severity of Illness scale, CGI-S)[25]; and (5) functioning level (Global Assessment of Functioning, GAF).[20]

Quality of life was assessed with the EQ-5D descriptive system,[26] the Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q-18),[27] and the Subjective Well-Being Under Neuroleptic Treatment Scale (SWN-K).[28]

The EQ-5D descriptive system is a generic health-related quality of life questionnaire that comprises 5 dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression on 3 ordinal levels (1 = no problems, 2 = moderate problems, 3 = extreme problems). According

to a particular set of societal preference values derived from surveys of the general population, an index score (EQ-5D index) for each health state is available for various countries, with the best state (perfect health) and death being assigned values of 1 and 0, respectively. In the present study, EQ-5D index scores from the United Kingdom[29] were used that were derived from a large general population sample (N = 2,997) and have been used in mental health studies.[30]

The Q-LES-Q-18 is a self-report instrument scored on a 5-point scale, with higher scores indicating better enjoyment and satisfaction with specific life domains.[27] Subjective well-being was assessed with the SWN-K.[28] The SWN-K is a self-rating Likert scale with 6 response categories (absent to very much), which covers 20 statements (10 positive and 10 negative), with higher scores indicating better well-being.

Service Use Data and Calculation of Costs

Within each treatment arm, schizophrenia-related mental health service use data were assessed from the respective hospital database. These databases cover inpatient and day-clinic admissions, treatment contacts in the outpatient center, antipsychotic medication, and, only in the UKE catchment area, treatment contacts by the home-treatment (ACT) team. Additionally, outpatient treatment contacts were collected from each participating private psychiatrist for both catchment areas.

For monetary valuation of psychiatric inpatient care, day-clinic care and outpatient care unit costs were obtained from a recent guideline for cost calculation in health economic evaluation in Germany[31] and adjusted for inflation to the year 2007. Outpatient costs included the number of schizophrenia-related outpatient consultations at the outpatient centers of each hospital and private psychiatrists. The additional outpatient costs for ACT (ie, the additional personnel and facility costs for home treatment) of the UKE were added to the regular outpatient costs in the ACT group. The costs of antipsychotic medication during outpatient care were calculated based on the officially listed German market prices for 2007 (costs of inpatient and day-clinic care already include the costs for drug treatment).[32] Costs for medications were estimated by type of antipsychotic, dosage, and length of treatment. Switch to another antipsychotic treatment and antipsychotic combination therapy were considered.

Statistical Analysis

The economic analysis aimed at estimating the incremental cost-effectiveness ratio (ICER), ie, the ratio of the differences in mean costs $\overline{C}$ and mean health effects $\overline{E}$ between the ACT and the standard care groups during the 12-month follow-up period:

$$ICER = \frac{\overline{C}_{ACT} - \overline{C}_{SC}}{\overline{E}_{ACT} - \overline{E}_{SC}} = \frac{\Delta\overline{C}}{\Delta\overline{E}}$$

Costs included schizophrenia-related mental health service use and antipsychotic medication as described above. Following the concept of cost-utility analysis, quality-adjusted life-years (QALYs) were used as the measure of health effects. Quality-adjusted life-years are a standard measure of health outcome used in economic evaluation studies. They are calculated by weighting the duration of health states with preference-based valuations of health-related quality of life (so-called "utilities") for these particular health states. For example, if during the 12-month follow-up period the utility of a patient's health state was 0.5 for the first 6 months and 1.0 for the last 6 months, this would result in 0.75 QALYs. Utilities were based on the EQ-5D index,[28,32,33] using linear interpolation of EQ-5D index scores between measurement points.[34] Thus, the ICER indicates the mean additional mental heath care costs, which have to be spent in the ACT group in order to gain 1 additional QALY as compared to the standard care group.

Single missing values of a few respondents were imputed by last observation carried forward. Numerical data were given as means (SD), and categorical data were given as number of counts and percentages. Baseline differences were tested by χ^2, Mann Whitney U test, and unpaired t tests. Paired t tests were executed to investigate changes of Q-LES-Q-18 and SWN-K between baseline and endpoint at month 12. For the analysis of differences in mean costs and mean QALYs and for uncertainty analysis of the ICER, the nonparametric bootstrap procedure (4,000 replications) was applied. In order to visualize statistical uncertainty of the ICER, a cost-effectiveness acceptability curve was constructed. The cost-effectiveness acceptability curve shows the probability of ACT being cost-effective for different values of the decision maker's willingness to pay for 1 QALY gained. The level of significance was set at $P = .05$. Statistical analyses were carried out using SPSS (version 16.0; SPSS, Inc., Chicago, Illinois) and STATA (Release 10; StataCorp LP, College Station, Texas).

RESULTS

Treatment

Sixty-four patients were treated in the ACT (53.3%) and 56 in the standard care group (46.7%), of which 56 patients (87.5%) completed the study in the ACT group and 45 (80.4%) in the standard care group. A total of 19 patients dropped out of the study; there were no significant differences between ACT versus standard care regarding the rate of dropouts ($\chi^2_1 = 1.14$, $P = .28$). Mean time until drop out was 140 days (SD = 55 days). Ninety-five percent dropped out after completion of the 3-months follow up (T_3). At study entry, patients displayed a high severity of illness (PANSS total score = 95.7, CGI-S score = 5.1) and a low functioning level (GAF score = 44.8). Patients in both treatment arms had almost similar demographic and clinical characteristics at baseline, except that patients in ACT were significantly younger ($P = .002$), had a higher rate of positive family history of any psychiatric disorder ($P = .048$), displayed a higher prevalence of comorbid substance use disorders ($P = .019$), and were significantly more often employed/occupied ($P = .011$) (Table 1).

Table 1. Baseline Variables of the Comparison Groups of Assertive Community Treatment (ACT) and Standard Care[a]

Variable	ACT (n = 64)	Standard Care (n = 56)	ACT Versus Standard Care, P Value
Demographic details			
Age, mean (SD), y	31.4 (9.9)	37.6 (11.7)	**.002**
Sex, male, n (%)	36 (56.3)	32 (57.1)	.535
Partnership, single, n (%)	49 (76.6)	43 (76.8)	.495
Education, years in school, median (quartiles)[b]	10.0 (10–13)	10.0 (9–12)	**.031**
Employment/occupation, n (%)	22 (34.4)	8 (14.3)	**.011**
Independent living, n (%)	41 (64.1)	30 (53.6)	.235
Illness details			
Diagnostic distribution, n (%)			.915
Schizophrenia	34 (53.1)	32 (57.1)	
Schizoaffective disorder	14 (21.9)	9 (16.1)	
Schizophreniform disorder	8 (12.5)	9 (16.1)	
Delusional disorder	4 (6.3)	3 (5.4)	
Psychotic disorder NOS	4 (6.3)	3 (5.4)	
First episode psychosis, n (%)	28 (43.8)	21 (37.5)	.306
Comorbid psychiatric disorder at entry, n (%)			
Comorbid disorders (without substance use disorder)	23 (35.9)	21 (37.5)	.505
Substance use disorder	33 (51.6)	17 (30.4)	**.019**
Premorbid functioning, GAF score, mean (SD)	77.4 (10.1)	76.1 (7.6)	.420
Suicide attempts in the past, n (%)	21 (32.8)	15 (26.8)	.302
No. of suicide attempts in the past, median (quartiles)[b]	2 (1–2)	1 (1–2)	.538
Family history of any psychiatric disorder, n (%)[c]	39 (60.9)	24 (42.9)	**.048**
Family history of psychotic disorder, n (%)[c]	16 (25.0)	11 (19.6)	.316
Traumatic events in the past, n (%)	55 (85.9)	40 (71.4)	.051
Duration of untreated illness, median (quartiles), wk[b,d]	167.4 (64.4–265.3)	182.5 (79.5–341.1)	.584
Duration of untreated prodrome, median (quartiles), wk[b,d]	112.8 (31.5–212.0)	153.2 (52.1–217.3)	.868
Duration of untreated psychosis, median (quartiles), wk[b,d]	21.9 (8.3–65.3)	27.6 (8.7–52.1)	.544
Baseline scores of assessment scales[d]			
PANSS, mean (SD)			
Total score	97.0 (20.7)	94.3 (18.1)	.452
Positive subscore	23.1 (7.5)	21.3 (4.8)	.114
Negative subscore	25.2 (6.7)	24.0 (4.7)	.266
General subscore	48.7 (9.2)	49.0 (10.6)	.877
CGI-S score, mean (SD)	5.2 (1.0)	5.0 (0.8)	.282
GAF score, mean (SD)	45.0 (12.0)	44.5 (11.7)	.813

[a]Adapted with permission from Lambert et al.[10]
[b]Mann-Whitney U Test for nonnormal distributed data was used.
[c]First- and second-degree relatives.
[d]Duration of untreated psychosis, prodrome, and illness were log transformed for statistical tests.
Abbreviations: CGI-S = Clinical Global Impressions-Severity of Illness, GAF = Global Assessment of Functioning scale, NOS = not otherwise specified, PANSS = Positive and Negative Syndrome Scale.

Patients were treated with a mean quetiapine IR dose of 582.8 mg/day (SD = 293.5); no significant between-group differences were found. More details on psychopharmacologic treatment were detailed previously.[10]

Service Use

Treatment services were used more frequently by ACT patients as compared to standard care patients. The mean number of outpatient contacts amounted to 78.7 (SD = 24.7) in ACT patients versus 15.6 (SD = 6.3) in standard care patients (P < .001). The number of patients admitted to inpatient or day-clinic care was lower for ACT patients as compared to standard care patients for any admission: ACT, n = 25 (39.1%) versus standard care, n = 39 (69.6%; P = .001); inpatient admission: ACT, n = 23 (35.9%) versus standard care, n = 31 (55.4%; P = .033); and day-clinic admission: ACT,

n = 5 (7.8%) versus standard care, n = 14 (25.0%; P = .010). Moreover, the number of hospital days was lower in ACT patients than in standard care patients (mean number of days in inpatient treatment: ACT, 11.3 [SD = 20.1] vs standard care, 28.2 [SD = 44.9]; P = .028; mean number of days in day-clinic treatment: ACT, 2.4 [SD = 10.9] vs standard care, 16.4 [SD = 33.7]; P = .007).

Quality of Life (EQ-5D, Q-LES-Q-18, SWN-K)

The frequency of mental and physical problems was high for all EQ-5D dimensions for both treatment groups at baseline and after 12 months of treatment (Table 2). There were no significant baseline differences between ACT and standard care regarding the EQ-5D index at baseline or the prevalence of problems on the EQ-5D, except for "usual activities" ($\chi^2_1 = 4.06$, P = .04) in favor of subjects in ACT. At endpoint, the prevalence of problems showed no significant differences between ACT and standard care, except for "anxiety/depression" in favor of subjects in ACT ($\chi^2_1 = 7.25$, P = .007).

The Q-LES-Q-18 and SWN-K total scores showed no significant baseline differences between ACT and standard care. Both total scores increased significantly for patients in ACT (Q-LES-Q-18: $t_{55} = -13.12$, P < .001; SWN-K: $t_{55} = -3.93$, P < .001), but only the Q-LES-Q-18 showed a significant improvement for patients treated in standard care (Q-LES-Q-18: $t_{44} = -5.21$, P < .001; SWN-K: $t_{44} = -1.64$, P = not significant [NS]). Analyses of variance showed significant differences for the Q-LES-Q-18 and SWN-K total scores in favor of ACT versus standard care after 12 months of treatment under consideration of age, gender, and respective baseline scores (Q-LES-Q-18: $F_4 = 12.75$, P = .001; SWN-K: $F_4 = 7.09$, P = .009).

Costs, QALYs, and ICER

Nonparametric bootstrapping of the mean incremental costs for mental health care of subjects treated in ACT compared with standard care showed no significant difference (ACT: €12,995 [95% CI for ACT, 11,235 to 14,755] versus standard care: €15,497 [95% CI for standard care, 11,331 to

Table 2. Frequency of Problems in EQ-5D Domains of Patients With Schizophrenia in Treatment With ACT (n = 64) Versus Standard Care (n = 56) at Baseline (T_1) and After 12 Months (T_6)

EQ-5D Domain	Baseline (T_1), Some or Extreme Problems, %		ACT Versus Standard Care (T_1), P Value	After 12 Months (T_6), Some or Extreme Problems, %		ACT Versus Standard Care (T_6), P Value
	ACT (n = 64)	Standard Care (n = 56)		ACT (n = 56)	Standard Care (n = 45)	
Mobility	28	32	.39	20	27	.27
Self-care	45	37	.25	18	13	.37
Usual activities	70	86	**.04**	50	67	.07
Pain/discomfort	46	53	.23	32	44	.14
Anxiety/depression	76	98	.06	56	84	**.007**
Problems in at least 1 dimension	92	93	.58	66	71	.31

Abbreviation: ACT = assertive community treatment.

Table 3. Mean Costs, Mean Quality-Adjusted Life-Years (QALYs), and Incremental Cost-Effectiveness Ratios (ICERs) After 12 Months of Treatment

Costs	ACT, n = 64, Mean (SD)	Standard Care, n = 56, Mean (SD)	Difference, ACT – Standard Care, Mean (SE)[a]	P Value[a]
Total costs, €	12,995 (7,223)	15,497 (15,904)	−2,502 (2,261)	.27
QALY	0.76 (0.15)	0.66 (0.20)	0.10 (0.03)	< .001
ICER of intervention	Point estimate			
Based on total costs	−24,825[b]			

[a]Standard error (SE) and P value for test of difference in means between the ACT and standard care groups are based on nonparametric bootstrapping with 4,000 replications.
[b]Standard care group is dominated by ACT group, ie, ACT was associated with lower mean costs and higher mean QALYs.
Abbreviation: ACT = assertive community treatment.

Figure 1. 12-Month Outpatient Costs and Hospitalization Costs, Assertive Community Treatment (ACT) Versus Standard Care (SC)[a]
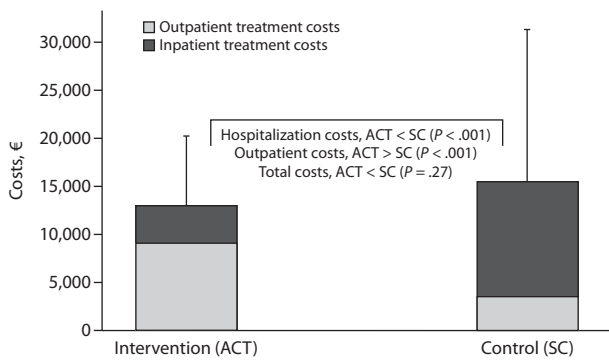
[a]P Values for tests of difference in means are based on nonparametric bootstrapping with 4,000 replications.

Figure 2. Cost-Effectiveness Acceptability Curve of Assertive Community Treatment (ACT) Compared With Standard Care
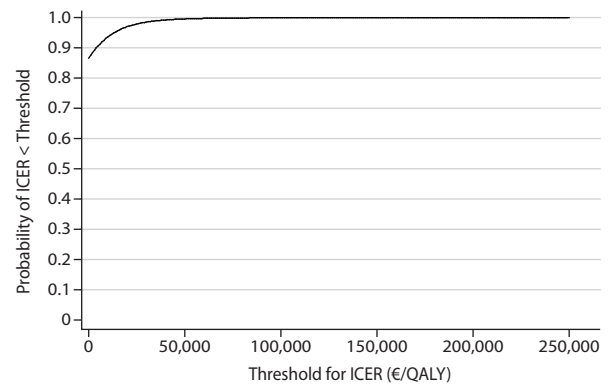
Abbreviations: ICER = incremental cost-effectiveness ratio, QALY = quality-adjusted life-year.

19,663]; Mean difference in total costs: −2,502 [95% CI for difference, −7,027 to 2,022]; *P* = NS). The costs of hospital care (inpatient and day-clinic) were significantly lower for subjects in ACT compared with standard care (*P* < .001), while costs for outpatient care were significantly higher for subjects in ACT compared with standard care (*P* < .001) (Figure 1). Mean QALYs during the 12-month follow-up period for subjects treated with ACT were 0.76 (SD = 0.15) compared with 0.66 (SD = 0.20) for subjects in standard care, resulting in mean incremental QALYs of 0.1 (SE = 0.03) in favor of subjects treated in ACT compared with standard care (*P* < .001) (Table 3). Thus, the point estimate for the ICER showed dominance of ACT, ie, lower costs and more health

effects (QALYs). Based on nonparametric bootstrapping of the distributions of incremental costs and incremental QALYs, a cost-effectiveness acceptability curve was derived, which showed that ACT was very likely to be cost-effective (Figure 2); for example, the probability of an ICER < €50,000/ QALY was 99.5%.

DISCUSSION

This study has some important methodological differences compared to previous trials, both in terms of ACT implementation as well as in the economic analysis. The differences in ACT implementation have already been described elsewhere

in detail,[10] and comprise the high fidelity of ACT team, the strict focus on patients with schizophrenia-spectrum disorders, the inclusion of first-episode and previously nonadherent patients with high levels of psychopathology, the application of individual and other psychotherapy, and a homogenous psychopharmacotherapy. In terms of the economic analysis, a cost-utility approach was chosen to allow for (1) a patient-centered view, (2) a comparison of cost-effectiveness with other health care technologies, and (3) an appraisal of cost-effectiveness based on various thresholds for decision makers' willingness-to-pay for one QALY.

Key Findings

Assertive community treatment was associated with lower inpatient but higher outpatient costs than standard care, resulting in no different incremental total costs, which is in line with other recent ACT studies.[16,35] Moreover, higher mean incremental QALYs for subjects treated in ACT compared with standard care were detected. Consequently, the ICER analyses showed that ACT dominated standard care in positive effects for subjective health (QALYs). The cost-effectiveness acceptability curve showed, for example, that the probability of an ICER < €50,000 per QALY was 99.5%, a threshold for cost-effectiveness commonly regarded as acceptable by decision makers.[36] Notably, costs for inpatient care were not only higher for standard care, but in addition they showed more variation and were consequently less predictable. This observation may be of interest for health care suppliers as well.

Limitations and Strengths

Our design does not exclude bias as effectively as a fully randomized design. Even though a large number of baseline variables were controlled, a margin error may exist. On the other hand, our design facilitates the inclusion of more severely ill, which better reflects a real world scenario. Notably, a higher motivation of the experimental intervention team (here ACT), a factor often found in controlled studies, might have contributed to the superiority of ACT. From a statistical point of view the relatively small sample size in this study may limit the generalizability of the results. However, the effect of ACT on health-related quality of life was so strong that even based on this small sample the derived probability of ACT to be cost-effective was above 99%.

With respect to the economic analysis, it has to be noted that the presented cost calculations have the following limitations: (1) neither costs for concomitant medication other than antipsychotics nor for non–mental health services were included, (2) analyses were based on the average costs (eg, per hospital day) for treatment in general psychiatry in Germany; thus, neither illness-specific costs nor individual hospital costs were considered, (3) costs for the implementation of a new ACT team, eg, a lower than optimal case load at beginning, were not considered, (4) preliminary results of the subsequent and ongoing ACT program for patients

with psychosis at the UKE indicate that patients in real life treatment settings may display more severe levels of illness, (5) 16% dropped out of study conditions, with no differences between both arms of treatment. Taking all these aspects into account, costs of treatment in both, ACT and standard care, are likely to be underestimated. Furthermore, from a societal perspective, it must be noted that several important costs, such as indirect costs due to lost productivity or supported accommodation caused by disease related disability, or the emotional costs of the psychological burden for caregivers, were not included in the present analysis.

CONCLUSIONS

This cost utility analysis confirmed that treatment with this ACT program was comparably costly and more effective for patients with schizophrenia spectrum disorders. Differences in treatment costs in ACT compared with standard care did not reveal cost savings. However, the present ACT intervention was carried out by highly educated and consequently "costly" psychosis experts specifically tailored to the needs of patients with schizophrenia-spectrum disorders. In addition, treatment with ACT caused a huge shift of costs from inpatient to outpatient treatment, ie, patients in ACT had 5 times more outpatient treatment contacts but 3 times fewer days in hospital than those in standard care, which may fit the subjective requirements of patients better.[13,14] The latter is supported by the fact that patients in ACT reported better quality of life. Results of the present study confirm that the superior effectiveness of ACT over standard care is highly dependent on the specification of the ACT model and the standard of care. ACT in very well-developed health care systems with a high standard of care as in Germany may only be cost-effective if patients' quality of life improvement in ACT outperforms standard care. This superiority can only be achieved by an avoidance of hospitalizations due to high quality and quantity of outpatient care with a combination of case management and home treatment as is provided by ACT. The lower the standard of care, eg, in developing countries, the easier ACT may be cost effective. Similar relationships between costs and subjective outcome may apply for antipsychotic treatment other than quetiapine.

Taken together, an ACT-based, diagnosis-specific intervention may lead to better outcomes at comparable costs. The present results need replication especially in other countries and health care systems.

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