

Effectiveness of Assertive Community Management in Singapore

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Abstract

Introduction: Assertive Community Treatment (ACT) was introduced in the 1970s as a comprehensive and assertive approach to community-based case management of patients with chronic and serious mental illness. Launched in Singapore in 2003, the Assertive Community Management (ACM) was modelled after the ACT, but with the main difference of 24 hour availability for the latter only. In line with the move towards de-institutionalisation of psychiatric patients, ACM was introduced to provide a mobile community-based multidisciplinary team approach to manage patients with severe chronic psychiatric illness. This article aims to evaluate and provide an update on this service programme in Singapore following an earlier study by Fam Johnson in 2007. **Materials and Methods:** A naturalistic and retrospective study was conducted. One hundred and fifty-five patients recruited into ACM from 1 September 2008 to 1 September 2009 and had completed 1 year of ACM were included in our study. Outcomes were defined as number of admissions (NOA) and length of stay (LOS) one year before and one year following induction into the programme. Baseline socio-demographic factors were also investigated to see if they predicted outcome with ACM. **Results:** The mean NOA was 1.9 pre-ACM and 0.6 post-ACM, with mean reduction in NOA of 1.3 ($P < 0.01$). The mean LOS was 72.2 days pre-ACM and 17.1 days post ACM, mean reduction in LOS 55.1 days ($P < 0.01$). In addition, it was found that gender, diagnoses and ethnicity were not predictive of the outcome measures of NOA or LOS. **Conclusion:** ACM in Singapore had been well established since its inception and continued to show effectiveness in reducing inpatient hospitalisation among the chronically mentally ill.

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Introduction

In Asia, various community programmes have been adopted and studied in several countries in an effort to promote de-institutionalisation, community psychiatric services and reduce relapses or readmission rates. In Manila, Philippines, the National Mental Hospital has successfully reduced hospitalisation by 70% after introducing the Acute Crisis Intervention Services (ACIS), which involved a period of family intervention and intensive treatment before further decisions were made for a patient to be admitted.¹ Indeed, psychoeducation and training for caregivers of psychiatric patients have been shown to have significant impact on the success of treatment of patients in the community setting.² Elsewhere in Iran, a period of intervention for selected psychiatric patients with structured family education programme by the home visit teams have

also shown positive study results in terms of increasing families' confidence and independence in continuing the care of these patients in the community.³ Similarly, the Yuli Veterans Hospital in Taiwan adopted and modified the idea of a therapeutic community to promote psychosocial and vocational rehabilitations and helped extended stay patients with severe illness integrate into the local community.⁴ In India, the idea of comprehensive community programmes is gradually catching on, as seen in the introduction of Nitte Rural Psychiatric Project, a pilot project that included outpatient clinics for follow-up, home visits to villages to educate families and assess at risk population, and a rehabilitation programme to re-integrate patients in the community.⁵ While these may not be modelled according to Assertive Community Treatment (ACT), keeping in mind cultural differences and limitations in resources, the

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efforts and impact of these programmes are encouraging.

Poor social support systems and stigma associated with psychiatric patients have led to the heavy dependence on hospital-based services for psychiatric patients in many Asian countries previously.⁶ However, with greater awareness of human rights issues and subsequent amendments in mental health laws and psychiatric services, major changes have been made with a move from hospital centred to community-based services, notably so since the 1980s.²

ACT is one such programme aimed at reducing repeated hospitalisations of patients with severe mental illness and with poor response to traditional outpatient mental health services.⁷ Its effectiveness has been extensively described since its introduction in 1972, based on the early works of Arnold Marx, MD, Leonard Stein, MD, and Mary Ann Test, PhD.^{8,9} The nature of ACT services includes an assertive approach to community-based case management, long-term ongoing assessments and psychiatric services by a multidisciplinary team with small client to staff ratio, substance abuse services, employment and housing assistance and family support.⁹ These services are provided 24 hours per day and 365 days per year to individuals with serious chronic mental illness or personality disorders with significant functional impairments.⁹

Although a recent meta-analysis on the evidences of ACT did not support its superiority over ordinary community mental health treatment,¹⁰ it was noted that the benefits of ACT was dependent on the differences in nature of local practices.¹¹ A recent review article also highlighted that despite existing shortcomings in implementation of ACT, it has facilitated monitoring and intervention for high-risk and difficult patient cases.¹² The recent ACCESS Trial in Germany evaluating effectiveness of an integrated ACT programme as compared to standard community care in patients with schizophrenia spectrum disorders treated with the same antipsychotics showed improved 1-year outcomes in terms of functional recovery and reducing illness severity for patients on the ACT.¹³ Positive outcomes in support of ACT were also reported in a recent Cochrane systematic review where ACT intervention was found to be associated with a reduced likelihood of admission and length of hospitalisation, and increased likelihood of independent living.¹⁴ Although there were no differences in terms of reducing length of stay in a randomised control trial of patients on ACT in the Netherlands, the programme has led to better sustained contact with patients, and this finding was repeatedly observed in studies done in the United Kingdom.¹⁵ The REACT study conducted in London was one such randomised controlled trial evaluating outcome of ACT management compared to community mental health care amongst 251 study subjects with primary diagnoses

of schizophrenia spectrum disorder or bipolar affective disorder, high inpatient care use or difficulties engaging with community services. It was found that although there had been no statistical difference in inpatient bed use when comparing those on ACT with standard community mental health care, patients who received ACT were better engaged and reported higher satisfaction.¹⁶

There have been limited studies done on ACT in Asia as it is currently still a relatively new treatment concept in Asia. An earlier study on ACT in Singapore by Fam Johnson¹⁷ showed significant positive results with 57.1% reduction in number of admissions, 61.9% reduction in length of stay, and an increase in employment figures after 1 year of follow-up. Another prospective study of ACT in Japan also showed significant reduction in length of stay, whilst a case study of Hospital Bahagia Ulu Kinta home care service in Malaysia which included ACT reported a reduction in relapse and readmission rates.^{18,19}

The National Mental Health Blueprint (NMHB) programme was launched in April 2007 in Singapore. The NMHB aimed to develop a comprehensive continuum of care services involving general practitioners at the primary care setting, training of community care providers and ensuring an integrated national mental health delivery system.^{20,21} As part of the blueprint, Assertive Community Management (ACM) in Institute of Mental Health (IMH), the only tertiary mental institution in Singapore, was restructured and subsumed under the Community Mental Health Team (CMHT). CMHT incorporated Standard Care Management (SCM) and ACT, the latter of which was renamed the Assertive Community Management (ACM). Prior to the introduction of ACM, standard community care provided by IMH included outpatient care in behavioural medicine clinics and individual case management programmes.²² Rehabilitation programmes were also conducted inpatient to equip patients with necessary skills to adapt back to community life before discharge.²²

IMH launched the ACM programme on 1 November 2003 as a pilot project.²² This service was modelled after similar programmes in the United States, Britain and Australia. The current ACM team includes doctors, community psychiatric nurses (CPNs) and allied health professionals such as social workers and occupational therapists.^{17,22} Similar to the ACT model mentioned above, this community-based multidisciplinary team provides treatment monitoring, rehabilitation and support services primarily through visits to the patients at their homes or workplace.^{17,22,23} The cases are also shared within the team to minimise service disruption in the event that certain members of the team were unavailable. However, in comparison to the original ACT model, the ACM service is available to patients during conventional working hours only. The frequency of contact

depends on the needs of the patient, although patients or families' preferences will also be taken into consideration.

This study looked at the effectiveness of Assertive Community Management (ACM) in Singapore 5 years into its establishment. We aimed to evaluate if there were any differences in the effectiveness of the programme in our local context in light of the recent controversies regarding its benefits and provide an update of an earlier similar local study by Fam Johnson et al¹⁷ on ACM as part of service evaluation. In addition to that, we also sought to determine if baseline characteristics of patients were predictive of the effectiveness of ACM in Singapore as this was not previously evaluated.

Materials and Methods

This is a naturalistic and retrospective study evaluating the impact of ACM on the outcome of preventing relapses and reducing hospitalisation rates of patients who had completed one year of the programme. A total of 156 patients were accepted into ACM between 1 September 2008 and 1 September 2009. However, as the data on number of admissions (NOA) and length of stay (LOS) for one patient were incomplete, only 155 patients were included in the overall analysis.

Patients were accepted into ACM instead of standard care management if they had a total of 3 or more admissions and/or duration of hospitalisation of more than 30 days over the prior one year. In addition, they also had to fulfil criteria 1 to 4 of the admission criteria listed below. The exclusion criteria are also as listed below. Assessment of patients' symptoms and diagnoses were conducted by the inpatient psychiatric team prior to referral into the ACM programme. Acute risks of suicide and violence were also reviewed by the inpatient psychiatric team to ensure that these patients were stabilised at time of discharge before entry into ACM thereafter to continue monitoring and managing these risks. Global Assessment of Functioning (GAF)²⁴ was used to assess the level of clinical function. However these data were incomplete at the time of this article. Patients were only discharged from ACM after they had been assessed by the team to have fulfilled the discharge criteria listed below.

Admission, Exclusion and Discharge Criteria for the Assertive Community Management¹⁷

Admission Criteria:

1. Individuals aged 18 to 65 years.
2. Severe and persistent mental illness (E.g. schizophrenia, delusional disorder and bipolar disorder).

3. Presence of severe symptoms and impairment that produce distress and major disability in daily function.
4. Significant disability caused by severe mental illnesses and is not helped by the traditional outpatient management services.
5. Patients with a total of 3 admissions and/or duration of hospitalisation of more than 30 days over the past 1 year.

Exclusion Criteria:

1. Patients with organic brain disorder.
2. Patient who are psychotic and have concurrent alcohol/ substance abuse problems. (Patients who have comorbid alcohol/substance abuse problems would have referrals to the appropriate services to get such issues sorted out first before ACM undertakes the case to prevent duplication of services).
3. Patients who are presently residing in chronic wards of the Institute of Mental Health.
4. Patients who are homeless.
5. Patients who are actively violent or suicidal. (Such patients would require the assistance of law enforcers and are best managed in an emergency setting).

Discharge Criteria:

1. Demonstration of ability to function in all major role areas.
2. Requests by patients for discharge despite the team's best efforts to develop acceptable rehabilitation plan, and/or
3. Enrolment into a housing service (such as a nursing home or a residential care centre) or IMH inpatient rehabilitation ward/chronic stay ward.

Outcome Measures

Data for number of admissions and duration of hospitalisations were obtained from patient's medical records which are kept by the Medical Records Office of IMH as well as inpatient computerised registers as part of service evaluation. Socio-demographic data was obtained from the patients at the point of patients' entries into the programme by the ACM team. No patient identifiable data were included in the data set throughout this evaluation to provide patient anonymity. Parameters used to assess outcome were (i) number of admissions (NOA) and (ii) total length of stay in days (LOS) in the 1 year period pre-ACM and one year post-ACM. NOA 1 year pre-ACM is stated as pre-NOA and LOS 1 year pre-ACM will subsequently be stated as pre-LOS while NOA 1 year post ACM will

be stated as Y1-NOA and LOS 1 year post ACM is stated as Y1-LOS. Results were further stratified accordingly to various socio-demographic data to identify factors that predict better outcomes.

Paired sample analysis was performed using Predictive Analytic Software Statistics (PASW) comparing pre-ACM against post-ACM. Paired-sample t-test was used to compare the means for the primary outcomes of NOA and LOS pre and post ACM. Mixed design ANOVA was performed using ACM as a within-subjects independent variable while diagnosis, gender, and race were treated as between-subjects independent variables in the ANOVA model to predict NOA and LOS. Confidence level for statistical significance was set at 95%.

Results

The baseline patient data obtained at the start of ACM is shown in Table 1.

The mean age of study subjects was 44.3 (SD = 10.6). The gender distribution of study subjects represented Singapore's general population of 1:1 [$\chi^2(1, N = 155) = 0.01, P = 0.94$].²⁵ Similarly, the race distribution of our study population was also comparable with Singapore's population of 74.1% Chinese, 13.4% Malays, 9.2% Indians [$\chi^2(3, N = 155) = 1.60, P = 0.66$].²⁵

Paired-Samples t-Tests on NOA and LOS

Results showed that there was a significant drop in number of admissions ($P < 0.01$). The number of admissions one year post ACM of 0.6 (SD = 1.33), was significantly lower

than the number of admissions prior to entry into ACM at 1.9 (SD = 1.39). Apart from that, results also indicate that there was a significant drop in length of stay from 72.2 (SD = 128.2) days on entry into ACM to 17.1 (SD = 38.8) days 1 year post ACM and this difference is statistically significant ($P < 0.01$).

Mixed Design ANOVA on NOA and LOS (Tables 2 and 3)

Results show that there were significant main effects of ACM ($F(1, 154) = 18.87, P < 0.01, \hat{\eta}_p^2 = 0.12$) and interaction effects of diagnosis and gender ($F(1, 154) = 3.51, P < 0.05, \hat{\eta}_p^2 = 0.05$) in predicting number of admissions. Male patients who had Schizoaffective Disorder ($M = 2.75, SD = 1.60$) were found to have significantly higher number of admissions (both pre and 1 year post ACM) than those who had Schizophrenia ($M = 1.13, SD = 0.95$) at 0.01 level using Hochberg post-hoc test.

However all other main effects, including diagnosis, gender and race and all other interaction effects were found to be not significant in predicting reduction in the number of admissions. Results also show that the main effects of ACM, diagnosis and gender and all interaction effects between ACM, diagnosis and gender were not significant in predicting LOS.

Discussion

The participants selected in this study were representative of Singapore's gender and racial composition as reflected in the results above. The other strength of this study was

Table 1. Demographics / Baseline Information of Patients

Gender	Race	Diagnosis			Total
		Schizophrenia (%)	Schizoaffective Disorder (%)	Bipolar Disorder and Others (%)	
Female	Chinese	48 (31.0%)	4 (2.6%)	10 (6.5%)	62 (40.0%)
	Malay	7 (4.5%)	1 (0.7%)	3 (1.9%)	11 (7.1%)
	Indian	1 (0.7%)	0 (0.0%)	0 (0.0%)	1 (0.7%)
	Others	1 (0.7%)	2 (1.3%)	0 (0.0%)	3 (1.9%)
	Total	57 (36.8%)	7 (4.5%)	13 (8.4%)	77 (49.7%)
Male	Chinese	44 (28.4%)	4 (2.6%)	9 (5.8%)	57 (36.8%)
	Malay	7 (4.5%)	0 (0.0%)	2 (1.3%)	9 (5.8%)
	Indian	7 (4.5%)	2 (1.3%)	0 (0.0%)	9 (5.8%)
	Others	2 (1.3%)	0 (0.0%)	1 (0.7%)	3 (1.9%)
	Total	60 (38.7%)	6 (3.9%)	12 (7.7%)	78 (50.3%)
Total	Chinese	92 (59.4%)	8 (5.2%)	19 (12.3%)	119 (76.8%)
	Malay	14 (9.0%)	1 (0.7%)	5 (3.2%)	20 (12.9%)
	Indian	8 (5.2%)	2 (1.3%)	0 (0.0%)	10 (6.5%)
	Others	3 (1.9%)	2 (1.3%)	1 (0.7%)	6 (3.9%)
	Total	117 (75.5%)	13 (8.4%)	25 (16.1%)	155 (100.0%)

Table 2. Mixed Design ANOVA Summary Table on NOA

Source		df	SS	MS	F
Within-Subjects Effects					
ACT	Greenhouse-Geisser	1.00	28.46	28.46	18.87†
	Huynh-Feldt	1.00	28.46	28.46	18.87†
	Lower-Bound	1.00	28.46	28.46	18.87†
ACT Diagnosis	× Greenhouse-Geisser	2.00	0.14	0.07	0.05
	× Huynh-Feldt	2.00	0.14	0.07	0.05
	× Lower-Bound	2.00	0.14	0.07	0.05
ACT Gender	× Greenhouse-Geisser	1.00	0.02	0.02	0.02
	× Huynh-Feldt	1.00	0.02	0.02	0.02
	× Lower-Bound	1.00	0.02	0.02	0.02
ACT Race	× Greenhouse-Geisser	3.00	2.29	0.76	0.51
	× Huynh-Feldt	3.00	2.29	0.76	0.51
	× Lower-Bound	3.00	2.29	0.76	0.51
ACT Diagnosis Gender	× Greenhouse-Geisser	2.00	1.31	0.66	0.43
	× Huynh-Feldt	2.00	1.31	0.66	0.43
	× Lower-Bound	2.00	1.31	0.66	0.43
ACT Diagnosis Race	× Greenhouse-Geisser	5.00	5.02	1.00	0.67
	× Huynh-Feldt	5.00	5.02	1.00	0.67
	× Lower-Bound	5.00	5.02	1.00	0.67
ACT Gender Race	× Greenhouse-Geisser	3.00	0.64	0.21	0.14
	× Huynh-Feldt	3.00	0.64	0.21	0.14
	× Lower-Bound	3.00	0.64	0.21	0.14
Error	Greenhouse-Geisser	138.00	208.11	1.51	
	Huynh-Feldt	138.00	208.11	1.51	
	Lower-Bound	138.00	208.11	1.51	
Total	Greenhouse-Geisser	155.00	245.99		
	Huynh-Feldt	155.00	245.99		
	Lower-Bound	155.00	245.99		
Between-Subjects Effects					
Intercept		1.00	104.26	104.26	50.16†
Diagnosis		2.00	3.49	1.74	0.84
Gender		1.00	2.69	2.69	1.29
Race		3.00	16.60	2.20	1.06
Diagnosis × Gender		2.00	14.60	7.30	3.51*
Diagnosis × Race		5.00	5.57	1.12	0.54
Gender × Race		3.00	1.21	0.40	0.19
Error		138.00	286.85	2.08	
Total		155.00	425.27		

N = 155

NOA: number of admissions

* $P < 0.05$, † $P < 0.01$

Table 3. Mixed Design ANOVA Summary Table on LOS

Source		df	SS	MS	F
Within-Subjects Effects					
ACT	Greenhouse-Geisser	1.00	21 116.79	21 116.79	2.21
	Huynh-Feldt	1.00	21 116.79	21 116.79	2.21
	Lower-Bound	1.00	21 116.79	21 116.79	2.21
ACT Diagnosis	× Greenhouse-Geisser	2.00	381.78	190.89	0.02
	× Huynh-Feldt	2.00	381.78	190.89	0.02
	× Lower-Bound	2.00	381.78	190.89	0.02
ACT Gender	× Greenhouse-Geisser	1.00	2 619.87	2 619.87	0.27
	× Huynh-Feldt	1.00	2 619.87	2 619.87	0.27
	× Lower-Bound	1.00	2 619.87	2 619.87	0.27
ACT Race	× Greenhouse-Geisser	3.00	4 685.67	1 561.89	0.16
	× Huynh-Feldt	3.00	4 685.67	1 561.89	0.16
	× Lower-Bound	3.00	4 685.67	1 561.89	0.16
ACT Diagnosis Gender	× Greenhouse-Geisser	2.00	2 251.78	1 125.89	0.12
	× Huynh-Feldt	2.00	2 251.78	1 125.89	0.12
	× Lower-Bound	2.00	2 251.78	1 125.89	0.12
ACT Diagnosis Race	× Greenhouse-Geisser	5.00	3 917.82	783.56	0.08
	× Huynh-Feldt	5.00	3 917.82	783.56	0.08
	× Lower-Bound	5.00	3 917.82	783.56	0.08
ACT Gender Race	× Greenhouse-Geisser	3.00	5 874.90	1 958.30	0.21
	× Huynh-Feldt	3.00	5 874.90	1 958.30	0.21
	× Lower-Bound	3.00	5 874.90	1 958.30	0.21
Error	Greenhouse-Geisser	138.00	1 319 755.82	9 563.45	
	Huynh-Feldt	138.00	1 319 755.82	9 563.45	
	Lower-Bound	138.00	1 319 755.82	9 563.45	
Total	Greenhouse-Geisser	155.00	1 360 604.43		
	Huynh-Feldt	155.00	1 360 604.43		
	Lower-Bound	155.00	1 360 604.43		
Between-Subjects Effects					
Intercept		1.00	97 252.12	97 252.12	10.14†
Diagnosis		2.00	194.77	97.38	0.01
Gender		1.00	1 376.28	1 376.28	0.14
Race		3.00	17 068.67	5 689.56	0.59
Diagnosis × Gender		2.00	8 683.91	4 341.95	0.45
Diagnosis × Race		5.00	17 758.59	3 551.72	0.37
Gender × Race		3.00	8 675.57	2 891.86	0.30
Error		138.00	1 324 076.09	9 594.75	
Total		155.00	1 475 086.00		

N = 155

LOS: Length of Stay

* $P < 0.05$, † $P < 0.01$

the relatively large number of patients selected ($n = 155$) in the study which increased the power of the study. In addition, this study also contributed to providing results on the use of ACM in the context of limited studies of the similar ACT model in Asia.

Our results show that ACM was highly effective in reducing the primary outcomes of NOA and LOS for patients with chronic and persistent mental illness in our local population, and this is important in working towards the goal of de-institutionalisation of psychiatric patients. This is also consistent with the aims of ACT in reducing re-hospitalisation rates despite subtle differences in the local ACM programme.⁷ The impact of the reduction was sizeable given that there was a mean reduction of 69.4% in NOA and 76.3% in LOS post-ACM, and greater in comparison to that noted in the earlier study by Fam Johnson showing 57.1% and 61.9% reduction respectively.¹⁷

Similar to prior large scale studies such as the Pan-London Assertive Outreach Study, it was also reflected in our study population that the majority of the patients under assertive care management were diagnosed with schizophrenia.²⁶ Using mixed design ANOVA analysis, we examined the effects of ACM, diagnosis, gender and ethnic group as well as the effects of their interactions on the outcomes of NOA and LOS. Results indicated that being in ACM alone was predictive of better outcomes in terms of NOA and LOS. Also, the interaction effect of gender and diagnosis was significant in predicting overall NOA, specifically in the case of male patients with schizoaffective disorder who had a higher NOA (both pre and post ACM) than male patients with a diagnosis of schizophrenia. However, it was noted that the number of males with schizoaffective disorder in this study group was small ($n = 4$), hence this may limit further interpretation. Overall, patients' diagnoses and other socio-demographic factors of gender and ethnic group alone were not predictive of reducing NOA and LOS outcomes. This implies that the effect of ACM on patient outcome in terms of NOA was largely uninfluenced by their diagnosis, gender and ethnic group.

Limitations

This was a naturalistic and retrospective study comparing patients pre-ACM and post-ACM. The patients in this study were all from one hospital, IMH. The non-inclusion of psychiatric patients from other hospitals could be potentially confounding. However in practice, IMH sees the majority of patients with chronic persistent mental illness in Singapore, including those often displaying the "revolving-door" phenomena, hence these confounding effects were likely to be minimal. While it would be difficult to organise a multicentre trial in view that ACM services are currently

available only to suitable patients from IMH, perhaps further interventional studies may adopt the design of a randomised controlled trial to provide better measurement of outcomes and further compare effectiveness of ACM with other services.

Moreover, this study only compared the outcomes of patients with mental illness one year pre-ACM and one year post-ACM. As this programme was designed to be long-term, the positive results from this 1 year period of evaluation post ACM cannot be interpreted as evidence for long-term effectiveness of the programme in reducing the primary outcomes of NOA, LOS and clinical status for the chronically mentally ill.⁷

Conclusion

Our findings suggest that despite recent controversies to the effectiveness of ACT in our western counterparts, the impact of local ACM services in reducing hospital bed use of the chronically mentally ill patients in Singapore was still highly significant and its positive value in our local context had not changed since its introduction in 2003. This is consistent with the findings of earlier studies on ACM in Singapore by Fam J et al.¹⁷ In addition, the effectiveness of ACM services were not found to be influenced by patients' baseline demographics such as race, gender or diagnoses.

Further long-term studies could be done on ACM subsequently to see if these improvements in primary outcomes were sustainable and to assess if the programme had any impact on other outcome measures such as quality of life measures, treatment compliance and other measures of clinical improvement.

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