Published in final edited form as:

Bull Menninger Clin. 2012 ; 76(4): 314–328. doi:10.1521/bumc.2012.76.4.314.

A four-year retrospective study of Assertive Community Treatment: Change to more frequent, briefer client contact

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Abstract

The authors explored the feasibility of providing frequent, brief client contact as a strategy for reallocating Assertive Community Treatment (ACT) staff time to new clients, while preserving relationships with current clients and ACT program fidelity standards. A retrospective analysis of 4 years of service records for a high-fidelity ACT team revealed gradual increases in staff–client contact frequency, and corresponding decreases in contact duration. During these years, fidelity to ACT standards remained moderately high, and clients’ employment and hospitalization outcomes improved.

Assertive Community Treatment (ACT) is a self-contained comprehensive program designed to maintain clients in independent community residences who are at high risk for rehospitalization or homelessness (e.g., Rosen, Mueser, & Teesson, 2007). Because ACT program model standards emphasize “time-unlimited services” (Monroe-Devita, Teague, & Moser, 2011; Teague, Bond, & Drake, 1998), staff–client contact is continuously intensive, and the program is relatively inaccessible to new clients after the caseload has reached full capacity. For this reason, mental health agencies have questioned the premise of lifetime

enrollment in ACT, and have begun planning for the gradual transfer of some ACT clients to less intensive support programs, to make space for new clients (Chen & Herman, 2012; Donahue et al., 2012; Rosenheck & Dennis, 2001; Salyers & Tsemberis, 2007).

These ACT step-down initiatives make an implicit assumption that effective ACT programs share a common dilemma: Because clients' service needs decline steadily as their clinical status and functioning improve, ACT staff will eventually spend more time than necessary with some clients in order to maintain fidelity to ACT standards for service frequency and intensity. To our knowledge, there is no empirical support for this assumption because no study has documented the provision of ACT services for a period longer than 2 years. We do not know to what extent long-term ACT clients actually receive more services than they need, and no published study has established that clinical improvement lowers the risk of relapse for clients who have been severely chronically ill for many years. The one retrospective study that has examined ACT service dosage prior to transfer (Rosenheck, Neale, & Mohamed, 2010) reported that clients deemed eligible for transfer established a low rate of service contact soon after their enrollment in ACT, an indication they may not have ever needed high-intensity care.

We also do not know how ACT teams with high staff retention typically adjust their service delivery over time as they become familiar with their clients' needs and the availability of community resources. According to the NAMI-PACT service manual (Allness & Knoedler, 1998) and early longitudinal studies of intensive case management (e.g., Ryan, Sherman, & Bogart, 1997), we should expect parallel improvements in client functioning, staff–client familiarity, and staff efficiency that result in a gradual shift from lengthy assessment and resource-building visits to brief, frequent visits aimed at crisis prevention and community engagement. This expected change in the pattern of ACT service delivery should allow high-risk clients to improve in functioning while staff respond quickly to their evolving needs, as long as staff turnover and client attrition remain minimal.

In the present 4-year observational study of a start-up ACT program, we tested the hypothesis that ACT staff–client contacts will tend to become briefer, but more frequent, over the course of several years. Through annual ACT fidelity assessments, we also assessed whether this expected change in service delivery would compromise a program's compliance with ACT standards for either the frequency or the intensity of weekly staff–client contact. Last, we examined parallel employment and hospitalization outcomes for this same ACT caseload.

Methods

ACT program

We conducted this 4-year study using service delivery records maintained by an ACT program (Rosen et al., 2007; Stein & Test, 1980) located in western Massachusetts. This ACT team was mentored by Leonard Stein, MD, one of the original ACT designers, and Jana Frey, PhD, the developer of vocationally integrated ACT (Russert & Frey, 1991). ACT full-time staff included a registered nurse, a clinical psychologist, social workers, substance abuse specialists, an occupational therapist, vocational specialists, and an office manager, in

addition to a part-time (20% FTE) psychiatrist. Beginning at program start-up, the team hired one staff worker for each specialty service, and then added additional direct service staff (i.e., nurse, vocational specialist, social worker) as the caseload grew larger. The program remained fully staffed throughout the 4-year study period except for brief periods of staff turnover. Team leadership changed hands twice during the initial 9 months of the program. A master's-level social worker then led the program from program month 10 to month 22. A second master's-level social worker, who had already served on the team for 18 months, led the program from month 22 to month 48.

Clients

The ACT program enrolled clients at a rate specified by ACT standards (six or fewer new clients per month; Teague et al., 1998) until the caseload reached 90 clients. Thereafter, the program restricted new enrollment to replacing discharged clients. Of the 121 total clients served by the ACT program over the 4-year study period, two-thirds were male (63%, $n = 76$), and one-third were female (37%, $n = 45$). Primary Axis I diagnoses were schizophrenia spectrum disorders (58%, $n = 70$) and major mood disorders (42%, $n = 51$).

Measures

Service delivery—The ACT program's auspice agency maintained comprehensive electronic service delivery records for billing purposes. For this study, we examined only face-to-face client contacts recorded by ACT staff in their daily service logs, and used the date, time of day, and duration of each service contact to calculate study variables. We defined contact frequency as each individual client's mean count of contact days per month. Contact intensity was calculated as each client's total service hours per month. Because ACT staff sometimes recorded one continuous contact as two or more separate activities (e.g., shopping for cleaning supplies together prior to teaching a client how to clean an apartment), we defined contact duration as each client's mean service hours per contact day per month.

ACT fidelity—The Dartmouth Assertive Community Treatment Scale (DACTS) is a 28-item interviewer-administered scale that assesses a program's degree of fidelity to the ACT model along three dimensions: human resources; organizational boundaries; and nature of services. Each item is rated on a five-point behaviorally anchored scale, ranging from 1 = *not implemented* to 5 = *fully implemented*. The total fidelity score is presented as the mean of all 28 items, using weekly averages for a 2-week sample period. Based on norms derived from a sample of mature ACT programs, a DACTS score of greater than 4.0 is deemed moderately high fidelity (Teague et al., 1998).

Using the DACTS during site visit assessments, Dr. Gary Bond assigned DACTS scores for the study program of 4.4 (October 1996), 4.4 (July 1997), and 4.5 (May 1998). In the present study, we use only two DACTS items, contact frequency (item S5) and contact intensity (item S4), to examine ACT weekly service "dosage" during calendar years 1997 through 1999.

Analysis Plan

We tested the study hypothesis in a three-stage hierarchical linear regression analysis that specified time (in months) as the criterion variable. In Block 1, we entered the monthly mean of the client-to-staff ratio to control for fluctuations that might influence *contact frequency* and *contact duration*. In Block 2, we entered the monthly program caseload means for *contact frequency* and *contact duration*. In Block 3, we entered a “frequency-by-duration” interaction term calculated as the product of contact frequency and contact duration, with both variables z-transformed prior to calculation. We did not enter contact intensity into this analysis because, by definition, this variable equals the arithmetic product of contact frequency and contact duration, and therefore is collinear with these measures. To guard against Type 1 errors, we assumed support for the study hypothesis only if four conditions were all met: (a) regression coefficients for contact frequency and contact duration are both statistically significant in Block 2 in the predicted directions; (b) the regression coefficient for the interaction term is significant in Block 3; (c) there is a significant increase in R^2 from Block 2 to Block 3; and (d) the full regression model (Block 3) is statistically significant.

To check for any temporal associations of contact frequency and contact duration with changes in program fidelity to ACT model standards, we analyzed DACTS fidelity scores for identical time-points during each of the study’s three full calendar years (1997 to 1999). To check for any temporal associations of contact frequency and contact duration with clinical and functional status, we calculated the ACT program’s annual rates of client employment and hospitalization for these same three calendar years from the program’s computerized records.

All analyses were conducted using SPSS version 19. The institutional review board of McLean Hospital in Belmont, Massachusetts, approved use of these de-identified datasets.

Results

Plot of change in contact frequency and contact duration over 48 months

Figure 1 presents monthly trajectories for staff–client *contact frequency* and *contact duration* over the 4-year study period beginning in the first program month (April 1996) and ending with program month 48 (March 2000). As Figure 1 shows, both *contact frequency* and *contact duration* initially spiked, and then sharply decreased in month 8. *Contact frequency* then began to increase, while *contact duration* declined at a slower rate, so that near the end of the program’s second year, the *contact frequency* trajectory crossed over the *contact duration* trajectory. Prior to this “crossover,” *contact duration* exceeded *contact frequency*; after the crossover, *contact frequency* exceeded *contact duration*. Throughout these same 4 years, client tenure (mean months since enrollment) and staff tenure (mean months since hire) both rose steadily, indicating no significant association of the observed crossover service pattern with client attrition or staff turnover (data not shown).

Annual means for staff–client contact frequency, contact duration, and contact intensity

Table 1 presents annual means for *contact frequency* (caseload mean of individual client count of contact days per month), *contact duration* (caseload mean of individual client mean service hours per contact day per month), and *contact intensity* (caseload mean of individual client total service hours per month) for each calendar year of program operation (1996 to 2000). The pattern of variable means presented in Table 1 supports the study hypothesis that staff–client contact will become more frequent, but briefer over time. *Contact frequency* steadily increased from 1996 to 2000 by slightly more than one full contact day per month ($M = 5.96$ to $M = 7.41$). In contrast, mean *contact duration* sharply decreased from 1996 to 1997 by 30 min ($M = 1.48$ to $M = 0.96$ hours per day), and then decreased gradually by about 10 min from 1997 to 2000 ($M = 0.96$ to $M = 0.80$ hours per day). *Contact intensity* decreased sharply from 1996 to 1997, but remained fairly stable thereafter. Taken together, these annual measures demonstrate a crossover to more frequent contacts of shorter duration, in the context of an initial overall decline in contact intensity (total service hours per client) as the client-to-staff ratio stabilized.

Statistical test of the crossover to more frequent, briefer contact

We tested our hypothesis that ACT staff–client contacts would gradually become more frequent, but briefer, over the course of 48 months by examining the statistical significance of this observed change (Figure 1; Table 2) in a hierarchical regression analysis (Table 2). This three-stage analysis specified time (in months) as the criterion variable, and *contact frequency* and *contact duration* as predictor variables. The crossover to more frequent, briefer staff–client contacts was an interaction term calculated as the product of *contact frequency* multiplied by *contact duration*. In Block 1, we entered client-to-staff ratio as a control variable, which negatively predicted time, indicating that the monthly ratio of clients to direct service staff decreased over time as the ACT caseload increased in size. In Block 2, *contact frequency* positively predicted time, indicating that the caseload mean of individual client count of contact days per month increased over time. In contrast, *contact duration* negatively predicted time, indicating that the caseload mean of individual client mean service hours per contact day decreased over time.

In Block 3, the interaction of *contact frequency* and *contact duration* negatively predicted time, indicating that the crossover effect displayed visually in Figure 1 and Table 1 achieved statistical significance. The addition of this interaction term significantly increased R^2 from Block 2 to Block 3 ($R^2 = .086$, $p < .001$), and the full regression model (Block 3) was statistically significant at $p < .001$. These results meet all four criteria for support of the study hypothesis laid out in the analysis plan.

Tests of the robustness of study findings and program compliance with DACTS fidelity criteria

To determine whether the program's significant reduction in contact duration resulted in a loss of fidelity to ACT model standards, we calculated DACTS fidelity measures (Teague et al., 1998) for the 5 full weeks (Sunday–Saturday) that encompassed the month of May in Spring 1997, Spring 1998, and Spring 1999. Following the DACTS protocol, we redefined the study variables for this assessment. *Contact frequency* (criterion S5) was measured as

each client's mean weekly count of staff contacts across each 5-week period, and *contact intensity* (criterion S4) was measured as each client's mean weekly total hours of staff contact across each 5-week period. Because DACTS does not specify contact duration as a fidelity measure, we measured *contact duration* as each client's mean weekly total minutes of service per staff contact across each of these same 5-week periods.

We obtained the same crossover service pattern when using these DACTS operational definitions of frequency and duration. From Spring 1997 to Spring 1998 and Spring 1999, *contact frequency* increased on average by approximately one full contact per week ($M = 2.93$, $SD = 2.56$; $M = 4.05$, $SD = 3.93$; $M = 3.80$, $SD = 3.83$, respectively). However, *contact duration* decreased on average by about 10 min per contact per week ($M = 42$, $SD = 12$; $M = 33$, $SD = 12$; $M = 33$, $SD = 12$, respectively). Although about one-half of all clients averaged less than 30 min per contact in Spring 1998 ($n = 31$, 53%), and in Spring 1999 ($n = 32$, 48%), overall *contact intensity* (mean total hours of contact per week) decreased only slightly between 1997, 1998, and 1999 ($M = 1.89$, $SD = 1.48$; $M = 1.84$, $SD = 1.40$; $M = 1.79$, $SD = 1.44$, respectively), so the ACT program had an overall moderately high DACTS fidelity rating of 4 for contact intensity (criterion S4) in the spring of each year.

Employment and hospitalization rates

To qualitatively examine temporal associations of *contact frequency* and *contact duration* with client clinical and functional status, we analyzed annual rates of client employment and episodes of hospitalization. The percent of active clients employed in a community-based job rose from 46% in 1997 to 53% in 1998 and 57% in 1999. By contrast, the percent of clients hospitalized for psychiatric reasons decreased over time, with 21% hospitalized during 1997, 11% in 1998, and 14% in 1999. Length of hospital stays also decreased over time from 1997 ($M = 19.15$, $SD = 17.21$; Median = 10.0 days) to 1998 ($M = 7.87$, $SD = 6.03$; Median = 6.0 days) and 1999 ($M = 8.90$, $SD = 5.63$; Median = 8.5 days).

Discussion

This 4-year observational study of a start-up ACT program tested the hypothesis that, over time, ACT staff–client contacts would gradually become more frequent, but briefer. A plot of service records revealed that near the end of the program's second year, as the program's caseload reached capacity, *contact frequency* intersected with (“crossed over”) *contact duration*. Prior to this point of “crossover,” *contact duration* exceeded *contact frequency*; after the crossover, *contact frequency* exceeded *contact duration*. A hierarchical regression analysis confirmed that this observed crossover was statistically significant even with fluctuations in the client-to-staff ratio statistically controlled.

The observed crossover marked an important shift in the way the ACT program allocated service time to its clients—fewer contacts of longer duration in the program's first and second years, shifting to more frequent contacts of shorter duration in the program's third and fourth years. Reduction in contact duration did not alter the program's fidelity to ACT model standards, and does not appear to have compromised client well-being, because the service crossover was temporally associated with improved employment and hospitalization outcomes.

Based on similar descriptions of change to more frequent, briefer service contact in long-term substance use disorder interventions (e.g., Dennis, Scott, & Funk, 2003; Scott, Dennis, & Foss, 2005) and in chronic illness management programs (e.g., diabetes; Wagner et al., 2001), we speculate that this ACT program's service crossover to more frequent, briefer staff–client contact occurred when clients' symptoms, life quality, and daily functioning stabilized, and staff had become sufficiently familiar with their clients to efficiently meet their evolving needs.

Implications for the design of services research

We would not have detected this predicted change in ACT service delivery if we had only examined contact frequency and contact intensity, the only two measures of service dosage reported by most mental health service studies. Our study findings illustrate how practical insights can be gained by disaggregating composite measures such as *contact intensity* (total hours of service per client) into its arithmetic components, contact frequency and contact duration.

Likewise, our study's use of the DACTS operational definitions for weekly contact intensity and contact frequency and adoption of a parallel weekly measure of contact duration illustrate how multiple methods can be useful for assessing the robustness of any research finding (Campbell & Russo, 2001).

Implications for practice

Should our tentative inferences find empirical support in future prospective studies, then ACT programs may find it feasible and ethically responsible to plan for reducing *contact duration* with ACT clients who improve clinically and functionally but remain in need of frequent oversight to prevent crises or relapse. Modest reductions in contact duration and/or modest increases in contact frequency might potentially free up enough program capacity to enroll new clients who are in immediate need of intensive care, without severing relationships with established clients who remain at risk for relapse (Green et al., 2008). If not, service monitoring could at least provide the information needed to begin client transfers to less intensive programs at a point earlier than the average 4-year point-of-service reported by recent ACT studies (Hackman & Stowell, 2009; Rosenheck et al., 2010).

According to ACT fidelity assessments conducted during the last 3 years of the study, we believe that this resource-saving strategy would not risk loss of fidelity to ACT standards, because the mean *contact duration* in Spring 1999 was only 10 min briefer than the mean contact duration of 42 min reported for Spring 1997, and about 10 min briefer than the mean 40–41 min per contact reported for other mobile psychiatric rehabilitation teams (Burns et al., 2000; Dewa et al., 2003). Lastly, client employment and hospitalization rates for these same 3 years suggest that an average 10-min reduction in contact duration could be accomplished without compromising clinical and functional gains.

Study limitations

Further research is needed to determine whether these case study findings generalize to other ACT teams, or to other types of programs designed to serve persons in need of long-term

support. Also, because we analyzed de-identified service delivery log data, we could not test for causal relationships between service dosage and individual clients' clinical and functional outcomes. Nor can we infer that observed changes in service delivery were intentional, because the data were derived from archived records and ACT staff are no longer accessible for interview.

Conclusion

This retrospective analysis of 4 years of agency service billing records illustrates the insights that program administrators can gain from longitudinal analyses of their own program data (Walkup & Yanos, 2005). Service records for this high-fidelity ACT program demonstrated a statistically significant change to more frequent, briefer service contact during the program's second year while the program continued to provide services consistent with ACT fidelity standards without decrement in client outcomes. We encourage program administrators to explore the feasibility of a planned change to more frequent, briefer service contact as a strategy for reallocating staff time to new clients while preserving established staff–client relationships.

Acknowledgments

This research was supported by grants from the National Institute of Mental Health to the first and third authors (MH01903 and MH62628, respectively).

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Figure 1. Mean contact frequency (contact days per client) vs. mean contact duration (service hours per contact day per client) across 48 program months.

Table 1

Annual means for staff–client contact frequency, contact duration, and contact intensity across an ACT program's first 48 months^a

Year (# months)	Monthly Contact frequency ^b		Monthly Contact duration ^c		Monthly Contact intensity ^d		Monthly Active Clients		Monthly Clients/Staff ^e FTE	
	M	SD	M	SD	M	SD	M	SD	M	SD
1996 (9)	5.96	1.87	1.48	0.40	9.05	4.46	21.11	11.65	3.63	1.78
1997 (12)	5.86	0.27	0.96	0.10	5.69	0.57	61.58	9.34	11.01	1.96
1998 (12)	6.61	0.59	0.92	0.06	5.95	0.68	80.67	2.77	9.34	0.64
1999 (12)	7.09	0.43	0.91	0.07	6.27	0.52	78.73	1.85	9.18	0.67
2000 (3)	7.41	0.38	0.80	0.04	6.18	0.29	78.67	4.62	9.03	0.80

^a April 1, 1996 to March 31, 2000.

^b Contact frequency: caseload mean of individual client number of contact days per month.

^c Contact duration: caseload mean of individual client mean service hours per contact day per month.

^d Contact intensity = caseload mean of individual client total service hours per month.

^e Direct service staff only.

Table 2

Hierarchical regression analysis of change in contact frequency and contact duration over 48 months^a controlling for monthly fluctuations in the client-to-staff ratio ($N = 121$ clients)

Predictor variables	Model 1				Model 2				Model 3			
	β	b	SE	t	β	b	SE	t	β	b	SE	t
Intercept		5.35	5.83	0.92	—	23.46	11.77	1.99	—	-12.48	12.65	-0.99
Block 1: (control)												
Client-to-staff ratio ^b	0.45**	2.18	0.64	3.39	-0.17	-0.84	0.58	-1.46	-0.06	-0.29	0.49	-0.59
Block 2												
Contact frequency ^c					0.55***	7.40	1.07	6.94	0.78***	10.56	1.13	9.32
Contact duration ^d					-0.81***	-38.75	5.73	-6.76	-0.59***	-28.18	5.32	-5.29
Block 3												
Frequency $\times$ Duration									-0.41***	-2.49	0.56	-4.49
Adj R^2 , R^2		.186, .203**				.716, .531***				.803, .086***		

Note.

* $p < .05$.

** $p < .01$.

*** $p < .001$;

β = standardized coefficient; b = unstandardized coefficient.

^a 48-month period study period April 1, 1996, to March 31, 2000.

^b Client-to-staff ratio by month = total number of clients divided by total direct-service FTE positions.

^c Contact frequency: caseload mean of individual client number of contact days per month.

^d Contact duration: caseload mean of individual client mean service hours per contact day per month.