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ORIGINAL PAPER

Treatment Models for Treating Patients with Combined Mental Illness and Developmental Disability

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Abstract The presence of co-occurring psychiatric disorders among individuals with developmental disability (DD) requires clinicians to adjust and modify standard mental health assessment and treatment planning. In particular, assessment includes input from a multi-disciplinary team and as a result, diagnosis is frequently a synthesis of data from many different points of view. Treatment planning and implementation commonly include a collection of highly specialized, individualized programs that focus on the long term management of both disorders. Crises and recurrence of mental disorders are commonplace in part due to the presence of ongoing risk and vulnerability factors for mental disorders. As a result, the need for emergency interventions, specialized respite services, hospitalization and other transition services is extensive. The quality, availability and access to these services vary considerably. Many programs are concentrated in metropolitan or university-based centers and pose hardships based on geographic distance. The availability and utilization of services is affected by political, economic, socio-cultural and psychological forces that impact both the willingness to use services and the distribution of professionals trained and qualified to manage individuals with dual diagnoses. The complex interaction between each of these factors determines the structure, function, and capacity for innovation built into current service models.

Keywords Dual diagnosis · Developmental disorder · Mental illness · Psychiatric disorder · Treatment models · Comorbidity

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Introduction

In spite of substantial diversity, treatment models for individuals with dual diagnosis share many common themes. Because significant numbers of individuals with DD (developmental disabilities) have comorbid mental disorders, there is a need for specialized assessments and intensive treatment services. Traditionally these services were provided in large residential programs or hospital settings. This practice changed after attitudinal shifts towards more humane care for individuals with DD fueled the expansion of support for deinstitutionalization and the rise of community-based care models for service delivery. Training for providers also changed to accommodate community-based service delivery.

A shift from custodial to treatment-oriented programs accompanied the rise of community-based interventions. As a result there was a growing need for multi-modal assessments and interventions and integration of behavioral therapy, psychiatric and medical services. Community-based services also place a premium on case management and coordinating links to community resources, prevention and outreach, patient advocacy, emergency and crisis care, hospitalization, discharge planning and coordination, and residential, family, and in-home services.

With such a broad range of services provided, a multidisciplinary approach is essential to providing needed collaboration, coordination, and integration. But the shift to community-based programs is not without pitfalls. Some of the greatest challenges to effective programs still hinge on overcoming interagency and interdisciplinary barriers and providing adequate and ongoing training. Direct care staff turnover is a major issue for many service delivery programs and support for frontline staff is essential for the retention and morale of quality personnel.

The organization and structure of services for individuals with dual diagnoses differ substantially from those designed for DD. Unfortunately many service provider network administrators do not always factor in these differences. Programs designed for individuals with dual diagnosis need to accommodate the effects of cognitive, adaptive, and neurological deficits on the capacity of clinicians to differentiate mental disorders from severe challenging behaviors. In addition, these clinicians must consider the complex, multidirectional role DD plays in terms of risk, precipitation, probability of relapse, treatment response and course for many mental disorders.

More Complex Needs

Perhaps the greatest challenge for clinicians and service providers is to accommodate the heterogeneous nature of both DD and mental disorders. This problem is especially challenging for individuals with severe/profound DD. Communication barriers plus exquisite sensitivity to multiple physiological and environmental stressors confound attempts at diagnosis and long term treatment planning. As a result these individuals need more intensive, specialized, integrated, long-term treatment, and perhaps most critical, consistent high quality behavioral intervention [1, 2].

There is also growing evidence that interventions are most effective when started early during childhood. Early intervention programs require access to comprehensive assessments and intensive treatment services (e.g., daily behavior therapy, frequent medication management). Evidence supporting early intervention is perhaps strongest for young children with cognitive impairments, language disorders and autistic spectrum disorders [3–5]. Consistent with the philosophy early intervention programs can be quite effective

reducing some troublesome features of autism while at the same time enhancing higher cognitive function and expressive speech. But in spite of this progress these children still displayed substantial developmental delays [5].

For individuals at risk for dual diagnoses, current research suggests that although early intervention may not inoculate against or completely eliminate the risk for adult onset mental disorders, they can affect long term morbidity—relapse risk and frequent re-hospitalizations [6]. But there are problems with this approach. Establishing early intervention programs puts the onus on clinicians to reliably identify and begin treatment early in the evolution of major psychiatric disorders [6]. Since this can be difficult for individuals with dual diagnoses, most treatment programs shift their focus from curing, to managing, the chronic disorder. In this sense, intervention not only reduces active symptoms but also attempts to minimize secondary morbidity. This habilitation model also calls for prevention and health promotion when possible, but adds maintenance strategies. Success at this level of care requires individual, family and multiple systemic interventions. When successful, these programs result in decreased secondary morbidity and high levels of parent satisfaction with services [7].

Patients with dual diagnoses present the greatest challenges to their families. It is not uncommon to see desperate families in the midst of a crisis consulting professionals for help. Unless crisis services are in place, many receive truncated assessments that short-circuit differential diagnosis and focus on single modality (medication management) rather than systemic intervention. Unfortunately this approach results in fragmented and often ineffective interventions [2].

Models of Assessment

A model multidisciplinary approach to assessment and care incorporates a family-centered, collaborative approach that permits diagnostic information form multiple sources and allows clinicians to develop a comprehensive plan of care. This kind of approach incorporates the special skills and talents of multiple clinicians. The team also provides families with a cadre of care providers that can be matched to individualized needs. The person centered approach also increases the likelihood of improve outcomes while avoiding over reliance on single treatment modalities [8].

A comprehensive assessment also maximizes efficiency and effectiveness while minimizing the inappropriate use of scarce treatment resources by matching individual needs with clinically appropriate resources [9, 10]. For example, a recent survey of outpatient clinics reported a decidedly disproportionate use of available services by patients with intellectual disabilities and comorbid affective disorders and schizophrenia [9, 11]. Matching these individuals with, specialized services can focus resources on the complex needs of individuals with these specific disorders [12].

Individuals with both DD and autistic spectrum disorders present special challenges for providers. In particular, cognitive and behavioral inflexibility as well as generalized adaptive skills increase the likelihood of increasing challenging behaviors in response to ever-changing environments. Impaired social and communication skills create also add to this risk while also creating problems for mental health professionals unfamiliar with autism. In many circumstances, the core features of autism are misattributed to or confused as symptoms of severe primary mental disorders [1]. Teasing out this boundary requires a thorough developmental history that includes gathering information from multiple informants about pregnancy, neonatal, and early developmental and psychosocial history, direct

observations by clinicians familiar with autism as well as data gathered from standardized assessment instruments [1].

Once the comprehensive assessment is complete, the mental health clinician is often called upon to synthesize information from multiple specialists—audiologists, speech/language pathologists, neurologists, geneticists, pediatrics, and psychologists [13, 14]. The end result of this synthesis is a multi-axial diagnosis and treatment plan. Parent participation in the planning phase can help foster an alliance with the treatment team and can be major assets while creating the plan of care needs and implementing neurodevelopmental, psychosocial and pharmacological interventions [2].

Multimode Treatment

Studies of component models of service delivery suggest superior efficacy for comprehensive treatment programs across settings (inpatient, day treatment, and outpatient settings) and treatment modalities (combinations of individual psychotherapy, functional therapy, parent and family interventions, environmental interventions, and psychotropic medication) [15]. For psychiatrists, a key feature of these studies is the need to integrate behavioral and pharmacological treatments in a fashion that maximizes the efficacy of both interventions [16, 17]. Another feature supports the usefulness and efficacy of multi-modal or multi-systems therapy [18, 19]. Originally used for children with serious emotional and externalizing disorders, multi-system interventions combine a range of psychosocial and pharmacological treatments into an ecologically-based plan of care. Although we lack large scale efficacy studies for individuals with dual diagnosis, many features of this intervention model are well suited for this population. Combination treatments models involving behavioral, cognitive behavioral, psychodynamic, and psycho-educational approaches are difficult to study. Perhaps the small evidence base is due to difficulties with study design, under-use of standardized assessment instruments, variable formats of data collection and measuring efficacy, and a paucity of adequately randomization controlled investigations [20].

Any treatment model also must take into account the diverse needs and developmental trajectories of individuals with DD. These developmental issues have a substantial effect on the assessment of treatment response. Under some circumstances, improvement may result from maturation rather than a specific treatment effects. For others, positive responders may represent an idiosyncratic response to particular unconventional or alternative strategies that defies established evidence. These individuals appear particularly sensitive to a particular treatment strategy that lacks statistically significant effects in large group designed studies. Single case designs may be helpful, especially when the cohort is a highly heterogeneous population—outcome studies are confounded by not only neurobiological diversity but also subtle effects of ethnicity, culture, family structure, language/communication barriers and socio-economic differences [12, 21–24].

For child psychiatrists, the lack of adequate studies of children with dual diagnosis poses real problems in applying optimum treatment [25]. For example, research showed that children with autism specifically had high rates of anxiety disorders and functional impairments when assessed with a standardized rating scale, the Autism Comorbidity Interview [26], but present research fails to provide a roadmap for treatment. As discussed above, early intervention in specialized treatment programs for dual diagnosis may not prevent recurrence during adulthood significantly better than more generic interventions. As an example, studies comparing inpatient psychiatric treatment with inpatient care by

primary care physicians (generalists) failed to demonstrate the superiority of specialized services. Importantly the meta—analysis reported inadequate study design—only 2 out of 27 studies were randomized controlled trials. More research is needed to clarify the many variables affecting these findings [27].

In many cases symptoms of mental disorders are exacerbated by medical comorbidities. For instance, the interrelationship between DD, MI, and epilepsy is by no means straight forward. Challenging behaviors and psychiatric symptoms are influenced by the underlying neurological substrates for epilepsy and can vary in appearance during prodromal, ictal, post-ictal or interictal phases of seizure activity. Some individuals increase target behaviors in response to adverse effects of both psychotropic medications and anticonvulsant regimens. The adverse events are frequently misattributed and treated as psychiatric symptoms [28].

Pharmacological treatments are frequently based on the judgment, experience, and skill of individual clinicians rather than scientific evidence for efficacy. For instance psychosis in individuals with DD represents a final common pathway associated with underlying medical, neurological and metabolic disorders. Prescribing medications without a careful differential diagnosis, creates potential problems-conditions such as delirium. Much research remains to be done to fully understand drug mechanisms of action and efficacy across the spectrum of DD, challenging behaviors and primary psychiatric disorders [29].

Changes in Public Policy and Attitudes

Models for treatment have also been greatly influenced by shifts in public policy, such as trends towards de-institutionalization and increased levels of community-based care. These structural changes in care delivery followed on the heels of attitudinal changes favoring more humane treatment and greater respect for the civil rights of individuals with DD [9, 12]. The need for innovative community service delivery systems also fueled changes in professional training to accommodate this shift. The focus for clinicians changed from the mindset of long-term institutionalization to the need for integrating services at multiple sites and models of care inherent in community settings. The need for active case management and advocacy grew [10, 12].

The need for advocacy and case management is especially acute for individuals with dual diagnosis. One factor influencing this trend is the complexity of most cases. One of the most critical factors is the inability of many individuals with dual diagnosis to function as strong self-advocates. Studies of health advocacy intervention suggest that active promotion and education on self-advocacy for individuals with dual diagnosis can improve communications between patients, service providers, and patient advocates and thereby contribute to improved treatment and health outcomes [30]. It seems clear that the role of case managers and advocates offers potential benefits for matching needs with specific services. In addition, advocates can safeguard against well-intentioned but inappropriate treatments – the use of aversive therapies or punishment [31]. Unfortunately other behavioral strategies, such as token economies, are quite effective in managing challenging behaviors, but can appear de-humanizing when applied inconsistently or in the hands of inadequately trained staff [32].

Integration of Services

While the need for comprehensive approaches for persons with dual diagnosis is clearly recognized, many communities lack sufficient resources to implement multi-disciplinary

programs. In communities with sufficient resources, the utilization of these resources is occasionally negated by duplication of services by or competing programs [33]. In more recent years, the trend towards privatization of both general and mental health care is increasing problems with the fragmentation of services in some settings [9, 12]. In short, the evolving nature of provider driven service delivery and the need for integrating specialized services is exposing problems within different organizational cultures. On occasion confusion arises based on problems of interfacing record-keeping systems, mismatched provider service packages, inadequate communication between providers and fragmentation of care [22].

Different models and philosophies of treatment among providers can also present barriers to effective collaboration and consultation. Frequently, psychiatrists are called upon to provide consultation and liaison services between community agencies, medical practitioners, and professional staff at psychiatric hospitals public hospital. In this setting the psychiatrist plays a useful leadership role in coordinating various aspects of treatment [34]. For example, sleep disorders can result in increased rates of challenging behaviors as well as risk for factors for major psychiatric disorders. Recognition of sleep disorders by the psychiatrists can prompt referral for sleep studies and initiation of appropriate medical care [35–39]. In a larger sense, the psychiatrist can also provide cross-disciplinary training and supervision for treatment staff, especially in the area of mental disorders and psychopharmacology [22, 40, 41]. Unfortunately, collaboration can run aground in settings where there is a shortage of well trained direct care staff available to implement the plan of care and adversely affect the quality of care [34, 42, 43].

A collaborative role for psychiatrists in interdisciplinary settings is demonstrated in a consultative service for at-risk infants in New Mexico. This program integrates occupational therapy, physical therapy, child development, speech-language pathology, and family therapy. The psychiatrist helps synthesize or integrate these varied treatment approaches [44] while playing a facilitative role in developing models for multidisciplinary, family-centered, collaborative approaches that are sensitive to the child's neurodevelopmental needs [8].

The availability of a spectrum of interdisciplinary services is a crucial in the management and treatment of individuals with dual diagnosis. Behavioral psychologists play an essential role in not only functional behavioral analysis but also designing, implementing and monitoring treatment. Occupational therapists play an important role in applying cognitive strategies to skill development [45]. Physical therapists can assist in maximizing physical skills necessary for skill training. Because communications difficulties are common, speech and language therapists can assist in defining methods of communication that may decrease some forms of challenging behaviors. For instance each discipline provides major pieces of data for the differential diagnosis and treatment planning [46].

Efforts to enhance motor and social skills and communication among individuals with communications disorders or autistic spectrum disorders can go a long way towards improving social development [47]. On the other hand, a meta-analysis of speech-language therapy for children with primary developmental delays found evidence for improvement in phonological and expressive language difficulties. Improvements in expressive syntax and receptive language difficulties are less clear cut. But data suggesting a connection between improvements in these skill areas, increased social interaction and a reduction in challenging behaviors is ambiguous. For example there are few differences in treatment efficacy when comparing trained parents with clinicians. These same studies also suggest that longer term therapies using trained parental "therapists" can be effective [48].

In light of the multi-faceted nature of assessment and system-wide interventions the mobilization of families is crucial. Negotiating the system of care requires good social work and case management since the co-ordination of family training and support with behavioral and educational services can be time consuming. Behavioral programs require ongoing family contact and in many settings, collaboration with family-oriented therapists [49].

Impact of MI-DD

There are many treatment models for individuals with MI-DD. The best programs integrate person centered assessments and provide a spectrum of treatment options. But service availability varies across communities, regions and country. In areas where universities have a major presence, training health care providers, innovation, breadth and availability of quality, comprehensive services contrasts with services available in many rural settings [9, 50]. In rural settings, the population density of clinicians and services may be low. Clinicians and other staff are frequently called upon to perform many roles and struggle to manage in areas outside their core areas of expertise or competency [51].

The problem of competencies is even more complicated for clinicians serving individuals with severe profound DD. The gulf widens for those providing specialized services targeted towards individuals with dual diagnosis. Because of this shortfall, many providers struggle to maintain community placement and meet the more demanding needs of the dually diagnosed. In many communities individuals are literally "bounced" from one system to another, "fall through the cracks," or enter the revolving door or admissions to mental health or developmental centers [22].

Person-Centered Treatment and Quality Improvement

Evidence suggests the substantial benefits of comprehensive person-centered treatment programs. But determining the efficacy of any plan requires continuous quality monitors. The capacity to modify dysfunctional parts of the plan should be based on data generated by quality monitors. An example of this approach is the "care programme" in Britain [52]. In this system, the treatment plan defines explicit roles for each professional service provider, advocates and families. Feedback is these team members is a critical component in this model. Corroborating evidence from a Connecticut-based study also suggests that periodic and systematic evaluations of service delivery programs are useful in identifying gaps in services and for planning future needs [53]. As a result the quality of programs is continually improved and adapted to meet the ever changing needs of individuals. Additional support for proactive and ongoing program review comes from a report on the Special Needs Clinic at Johns Hopkins. This study compares the quality of programs in terms of their cost-effectiveness [54]. A principle finding is that daily in-home interventions by families are effective for high risk children and adolescents.

In home services may not be a viable option for some individuals with severe challenging behaviors [55]. In these situations, deciding the best setting and mix of services requires a careful matching of the individual's needs with the strengths and weaknesses of each setting. If an in-home program is a viable option then other community based services can be designed to augment family supports. The mix of treatments is outlined in the personal care plan and frequently includes a variety of day treatments, habilitative services and school based interventions [55].

For individuals with dual diagnoses the scope and severity of challenging behaviors or psychiatric symptoms help determine the type and form of these services. For children with autism, Applied Behavior Analysis and parent-focused educational programs such as Treatment and Education of Autistic and related Communication-handicapped Children (TEACCH) program, based at the University of North Carolina, Chapel Hill are geared towards training parents to provide at some of the in-home services. In general both approaches are effective but do have their specific strengths and weaknesses [56].

When the individuals receive services from multiple programs, it is necessary to collect relevant behavioral data and other information from each setting. For children and adolescents with severe externalizing behaviors, research suggests that multimodal home based treatment programs can be an effective alternative to out-of-home placement for improving social functioning. But to be effective these programs require close cooperation between multiple providers—patients, parents, therapists, supervisors, other clinicians [57]. But no matter which type of program is in place, the adequacy of provider and staff training are crucial. It is also essential to provide ongoing support for front line providers in order to avert high levels of provider stress, burnout, and turnover [58].

While a number of individualized home based service models for persons with dual diagnosis are considered effective, there is relative dearth of research that distinguishes which home-based interventions are most effective for specific mental disorders. Studying this issue involves subdividing different program models based on the settings in which service are delivered. Table 1 contains examples of several programs gleaned from the literature and highlights the major issues discussed throughout this paper. These programs illustrate the range of existing services and focus the discussion on relevant features of each that tare useful areas of clinical research. Following these examples, a number of conclusions, practice recommendations, and areas for further research are given.

Different Treatment Models and Examples

Types and Settings of Services

Because of their complex and diverse needs, individuals with dual diagnosis often receive services across a number of settings and specialized provider networks. Table 1 highlights the location (home based, inpatient etc) and structure (focus and types of services) for each treatment setting. The table also highlights core features of each service (specific program emphasis and features) as well as a brief review of outcome findings and innovative approaches to care relevant to these programs.

The programs outlined in Table 1 include primarily outpatient/community settings, home-based (that typically involve family members) or school-based services. When needed, crisis intervention programs typical provide time limited inpatient or respite care services. There is less comprehensive data on large residential institutional and long term hospital settings (includes Universities with multiple sites, comprehensive mental health organizations, and mental hospitals).

Outpatient/Community-Based

Many services are now outpatient and community-based. The impetus for this transformation was a wave of social reforms that led to the deinstitutionalization and an emphasis on least restrictive environments or community or independent living. The rise of

Table 1 Treatment models applied to patients with dual diagnosis of developmental disorder and psychiatric illness

Model settings	Description—Key features	Examples	References	Comments
Outpatient/Community-based	Residential and Day Treatment Service—focus on client empowerment and close collaboration between clients and staff	Oak Center of Trinity Services	[60]	Provides educational, residential, adult day, respite, and vocational services
	Day Treatment—flexibility and psychosocial support	Alternative Opportunities of Athelas Institute	[61]	Focus on teaching adaptive skills
Home-based interventions	In-home, family-centered psychiatric treatment for high-risk children and youth		[55]	Did not address children with comorbid DD/PD
School-based	School Pediatric Psychology Partnership	Lehigh University and Childrens Hospital of Philadelphia School Pediatric Psychology partnership	[76]	Program to prepare school and child psychologists to coordinated systems of care for health and education needs of children. Dual diagnosis may be one focus of broader programs
Residential	Group living—safe structured treatment, patient feedback and quality improvement	Devereux Foundation	[77]	Comprehensive program for children and adults incorporating a wide variety of services
	Services tailored to need. Use of Groups therapy and structured assessment	Stockley Center	[78]	Rural campus facility, programs for children and adults
Emergency/Crisis	Short-term emergency residential treatment up to 30 days, acute stabilization and enduring crisis admission	Fircrest Residental Habilitation Center	[83]	Goal to provide successful return to community-based programs
	Short—stay inpatient adolescent/adult, family participation, discharge planning and follow-up	Neuropsychiatric Disabilities Unit	[84]	Housed at University of Massachusetts, facilitates return to community by working directly with community providers
Inpatient and Comprehensive Institutional	Collaborative consultation program for newborns at developmental risk	New Mexico Developmental Care team of University Hospital	[44]	Provides a variety of services, such as genetics, neurology, occupational therapy, physical therapy, child development specialists, and family therapy
	Specialized psychiatric inpatient unit compared to a generalist unit for adults with DDs		[85]	Demonstrated improvements in psychopathology and functioning

community based service models fits nicely into practice parameters on DD as well as child and adolescent mental health published by the American Academy of Child and Adolescent Psychiatry [59]. The emphasis is on community-based clinics and day treatment centers that are frequently integrated into institutions (e.g., hospitals, universities, regional mental health services). This proximity allows for step-up and step—down transitions in level of care as the needs of the individual dictate. Other day treatment programs are housed in or affiliated with existing community mental health services [54].

More specialized programs also exist. Two examples of specialized outpatient and community based services are outlined in Table 1. The Oak Center of Trinity Services in the Chicago area is a large program (serving over 700 patients per year) that provides a continuum of care that includes residential, multiple outpatient services, educational programs, day and vocational treatment services, and respite care [60]. The center serves around 40 people daily who live mostly in group homes. The philosophy of the center is focused on empowerment and integration into the community and operates on behavioral and social learning principles. The staff includes professionals from nursing, social work and other bachelor's-level staff members who function as a team. Treatment includes an incentive program, psychoeducation, and recreation groups, and a number of standardized evaluations are used.

The Athelas Institute is another example of day treatment services that is designed to be flexible and creative in response to patient needs, while teaching adaptive skills [61]. Other day treatment services specialize in the treatment of children with autistic spectrum disorders that encourages positive affective experience, language therapy, interpersonal development, play, structure, occupational and physical therapies [62]. Another specialized early intervention program provides developmental and mental health services for toddlers with DD and behavior problems (77% had DD and 70% had a MI). This program focuses on children between birth and three from families living below the federally defined poverty level. This program represents a cooperative venture that combines services of community-based agencies and a university MH services. The program serves as a training site for graduate students, and for clinical research [63].

This program applies a multi-disciplinary team approach that focuses on (1) parent interactions to develop communications, (2) intense instruction on life skills, and (3) exposure to normal social interactions [64]. Variations on this theme involve specialty psychiatrics for children from birth to 5 years old who present with significant emotional and behavioral problems in the context of learning and language diagnosis. This program offers diagnostic, treatment, advocacy services, as well as training and research for clinicians in infant psychiatry [65].

A number of assertive community treatment (ACT) programs are also evaluating and treating individuals with dual diagnosis. Although research data from these outreach programs is limited and studies often inadequately designed, there is some evidence that such programs can be as effective as traditional clinical interventions [66]. Contradictory evidence from other exploratory studies of ACT services for individuals with dual diagnosis fail to support this finding. It is difficult to factor level of DD training and experience among the clinicians involved in these intervention studies and the lack of randomized design complicate attempts to interpret the ACT efficacy data [67, 68].

Home-Based

Home based services for individuals with MI-DD integrate natural supports by family members with ongoing professional services. In these programs, treatment includes

specially trained service providers (e.g., psychologists, social workers, psychiatrists) and family members who receive specialized instruction and training in therapeutic and educational interventions. The rationale for this service focuses on a naturalistic family-centered approach [55, 56]. In this model, health care providers seek to mobilize family members to include the effected individual is family process and provide training to intervene directly with potential problem situations and behaviors. A strength of this approach to lies in the positive involvement of family members with the individual. An indirect benefit is a sense of emotional empowerment and well-being among participating family members. Table 1 highlights one program that uses this in-home, family-centered treatment model for high-risk children and youth without DD [55].

Other home-based programs focus on non-DD children with severe externalizing disorders. Studies demonstrate improvements in psychiatric symptoms and psychosocial adjustment [57]. Unfortunately there is very little research on treatment outcomes for home-based treatment for individuals with dual diagnosis. There are studies that suggest modest improvements in challenging behaviors among children with PDD participating in a study that combines intensive clinic-based with 6 months of ongoing in-home treatment [3].

School-Based

School based services for children with dual diagnosis generally focus on language development, adaptive or daily living skills, and facilitated academic skills. Specialized school based programs (day school or partial hospitalization programs) are often affiliated with mental health programs. These center-based programs focus on screening and diagnosis of mental disorders, behavioral and medication management, psychotherapeutic interventions and specialized instruction [40, 56, and 69]. Additional assessments and interventions involve speech language pathologists, occupational, therapists, psychologists, nurses, and physicians within school-based clinics. Mental health services are provided by consulting specialists to deliver diagnostic and treatment services that are integrated with other school-based services [70, 71]. School psychologists, in particular, may collaborate with pediatricians in coordinating treatment of patients and may play an expanded role in coordinating services with other disciplines [14, 69, 71, 72]. Parent involvement in complementing educational services and treatment within these school-based program contributes to clinical improvement in the child and high parent satisfaction ratings [73].

A subspecialty of school psychology, school pediatric psychology, has emerged in recent years and is designed to focus on the health and educational needs of children where the health needs of children are addressed by psychologists and other school-based professionals [74, 75]. A model for training, especially school psychologists, in this subspecialty is listed in Table 1 and is a partnership between the Children's Hospital of Philadelphia and Lehigh University [76]. In particular, this program focuses on coordinating community care, promoting health and positive educational outcomes, and providing interventions in traditional health care and in school settings, although is not specifically applied to children with dual diagnosis. The expansion of similar school based programs to include children with DD is sorely needed.

Residential

Residential services typically involve services delivered in group homes or various forms of specialized foster or respite care. These residential programs provide a stable and

predictable environment for individuals with dual diagnosis. This setting provides a stable base for comprehensive assessments and implementation of behavioral and medication interventions. The goals of residential placement are to provide ongoing habilitative services that can include therapy, and access to vocational and recreational habilitation services that foster independence and optimal functioning.

Residential facilities are hierarchically organized around severity of behaviors, intensity of treatment capabilities and levels of supervision. Within higher intensity residential settings, individuals live for extended periods of time in a highly structured therapeutic setting that integrates personal care (responsibilities for cleaning own room, maintaining personal hygiene, and complying with the schedule and programs offered by the facility). These programs are usually affiliated with mental health services, hospitals, outpatient mental health clinics, or regional and state mental health services. Family members can remain involved in treatment through participation in some activities and periods of time at home with family. There are linkages between school, work environments (e.g., assisted employment) and other community programs to foster appropriate levels of independent functioning.

The Devereux model (see Table 1) is a good example of a comprehensive program of educational and residential services for children and adults [77]. These facilities serve children and adults with DD, PDDs, and dual diagnosis. Devereux adheres to a treatment philosophy that incorporates a person-centered plan that focuses on providing a safe and stable/predictable environment for behavioral and other therapeutic interventions. This program also has clear clinical quality standards, supervision, credentialing, and comprehensive training for staff as well as a wide array of professional services including nursing, psychiatry, and psychology. The programs are typically in rural or wooded campus-like settings with smaller group homes, medical, administrative offices, and recreational facilities [77].

The Shockley Center Psychology Department (see Table 1) is a residential facility located on a 900 acre campus in rural Delaware. The Center usually devotes about 30% of residential cottage space to residents with dual diagnosis. Services are provided by licensed and registered psychology professionals with experience in working with DD. Treatment philosophy and objectives are person-centered and focused on optimal quality of life with a variety of therapeutic orientations including behavioral, cognitive-behavioral, and psychoeducational therapies delivered by an interdisciplinary team approach—including occupational, physical, speech, music, vocational and recreational programs. There are programs for children and a senior center [78].

On Long Island, New York, there are programs devoted to serving adults with dual diagnosis and a history of violent and destructive behavior. The individuals require more intense treatment and close supervision [79]. Patient-staff rations are 2 to 1 during daytime hours and a higher level of nursing and intensive psychological services are augmented by close supervision and ongoing staff training. Comprehensive and individualized, assessment, treatment planning, and evaluation of effectiveness are geared towards the individual's eventual reintegration back into the community.

Short-Term Emergency Residential and Inpatient

Back-up psychiatric inpatient services are essential to maintaining some individuals with dual diagnosis in community settings. This need is especially acute in states where the earlier rounds of de-institutionalization left a residual population of highly problematic

individuals—those with severe challenging behaviors, complicated medical or psychiatric disorders. Transitioning these individuals is a complex process. Many are prone to periods of intense regression, resurgence of severe challenging behaviors and recurrence of major psychiatric disorders. They need effective short-term crisis or emergency treatment programs to deal with psychiatric disorders that recur throughout the lifespan of the individual [80–82]. Some of these crisis services have developed specialized facilities and teams for addressing the problems of persons with dual diagnosis. In most areas, individuals are admitted to acute care, general hospitals for short-term, crisis stabilization. Appropriate diagnostic testing and modifications in the treatment plan and disposition planning are major features of these admissions. Patients are generally discharged back to the community, but those that fail to respond may be transferred to long-term care facilities, such as involuntary committment regional programs, or in special circumstances state mental hospitals [81].

The Firecrest Residential Rehabilitation Center (see Table 1) is an example of a program structured for short-term emergency residential treatment in Washington State [83]. The program originated because of the unmet need to provide specialized crisis stabilization services. The program provides a safe environment for a thorough functional behavioral assessment and plan of care as well as crisis stabilization. The goal of this treatment program is a successful return to community-based settings.

The Neuropsychiatric Disability Unit at the University of Massachusetts is an acute care, locked inpatient psychiatric unit that concentrates on diagnostic assessment, treatment of complicating medical problems in conjunction with combined pharmacological and behavioral interventions. The goal is to facilitate a return to community-based care by focusing on the transition by working work with community providers to increase the efficacy of outpatient programs and attempts to minimize recidivism [84].

Comprehensive Institutional/Mental Hospital

Chronic residential facilities are typically large institutions that provide a range of medical, developmental and behavioral services. Due to downsizing brought about by de-institutionalization the majority of individuals remaining in the programs have violent or severe challenging behaviors or treatment refractory psychiatric disorders. Other acute care facilities include state mental hospitals and programs that are affiliated with university medical centers (see Table 1). These institutions vary widely in the types of options available for patients with dual diagnoses. Many offer comprehensive and well-coordinated array of services but most are now acute care facilities. Community based providers generally refer individuals for specialized diagnostic studies or seek consultation with service providers with substantial expertise in particular specialty areas of need (intractable epilepsy and severe aggression).

Many of these facilities are also involved in training professionals in the field of dual diagnosis. An example of such a program (listed in Table 1) is the New Mexico Developmental Care Team of University Hospital. This program is designed to provide care for newborns with illness and intensive developmental needs. The medical and other professional staff provides collaborative and consultative services such as genetics, neurology, occupational therapy, speech-language therapy, physical therapy, child development specialists, and family therapy [44].

Table 1 reports a study that supports the effectiveness of a specialized psychiatric inpatient unit compared to a general unit for adults with dual diagnosis. Improvement

includes decreased psychopathology ratings, improved global function, and improvements in both challenging behaviors and severity of MI. [85].

Conclusions and Practice Recommendations

Individuals with dual diagnosis of DD and MI have complex and varied needs that often go unmet in many traditional systems of care. In order to reconcile such a discrepancy, multidisciplinary and multimodal treatment models are needed [86] during the early phases of psychiatric disorder in order to maximize treatment responses. These acute services require the seamless coordination and integration of a number of different organizations and systems. There is a great need for more research on formal assessment, matching plans of care to individual needs, the most effective structure and delivery system, and quality monitoring of treatment programs—to determine what works and what does not. Psychiatrists can play an important role in providing leadership, cross-disciplinary and cross-institutional communication and collaboration, along with providing ongoing training and education to other health service providers. Also, the involvement of family and other caregivers in the community has the potential to benefit patients and improve treatment gains. The main recommendations of the present review are summarized in the following list.

Summary of Recommendations

More complex and varied needs can be addressed by development of specialized models of care. These models involve the following:

1. A greater number of specialists, treatments, and integration of services
2. Early and more intensive treatment and application of a chronic disorder model
3. Services delivered across a variety of settings and organizations where institutional and interdisciplinary barriers have been removed
4. Quality monitoring, patient and caregiver feedback, and continuous improvement
5. Much more systematic service outcome research
6. Psychiatrists taking the lead in treatment decisions, cross-training, supervision, and coordination of services across disciplines and institutions
7. Patient and family-centered treatments.

Recommended Further Research

1. Need more research with larger samples and better design and control on topics where limited or no research currently exists.
2. Existing services need to implement a quality monitoring, data collection approach in order to allow evaluation of service components and effects on outcome.

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