

Borderline Personality Disorder (BPD) Clinical Development – Methodological Issues

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BPD Clinical Development – Methodological Issues

- No approved therapies & several failed trials
- Lack of 'gold standard' measure
- Uncertain placebo rate
- Phase II sample sizes that mirror Phase III
- Difficult and non-adherent population
- Timing of the Primary Endpoint
- What about psychotherapy?

BPD – No Approved Therapies & Several Failed Trials

17 Studies found for: **Interventional Studies | Borderline Personality Disorder | Industry**
 Also searched for **Borderline Personality** and **Diseases**. See Search Details

Applied Filters: Interventional Funding: Industry

List By Topic On Map Search Details

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Showing: 1-17 of 17 studies (25 studies per page)

Row	Level	Status	Study Title	Conditions	Interventions	Locations
1	<input type="checkbox"/>	Recruiting	A Trial of Brexpiprazole in the Treatment of Borderline Personality Disorder	• Borderline Personality Disorder	• Drug: Brexpiprazole • Other: Placebo	• For additional information regarding sites, contact 844-687-8522 New York, New York, United States
2	<input type="checkbox"/>	Recruiting	Evaluating the Safety and Tolerability of Brexpiprazole in the Treatment of Adults With Borderline Personality Disorder	• Borderline Personality Disorder	• Drug: Brexpiprazole	• For additional information regarding sites, contact 844-687-8522 New York, New York, United States
3	<input type="checkbox"/>	Completed	Clonazepam in Patients With Borderline Personality Disorder	• Borderline Personality Disorder	• Drug: Clonazepam • Drug: placebo	• For additional information regarding investigative sites for this trial, contact 1-877-CTLLLY (1-877-285-4559, 1-317-615-4559) Monday-Friday from 9:00 AM to 5:00 PM Eastern Time (UTC/GMT - 5 hours, EST), or speak with your personal physician Atlanta, Georgia, United States • For additional information regarding investigative sites for this trial, contact 1-877-CTLLLY (1-877-285-4559, 1-317-615-4559) Monday-Friday from 9:00 AM to 5:00 PM Eastern Time (UTC/GMT - 5 hours, EST), or speak with your personal physician Marietta, Georgia, United States • For additional information regarding investigative sites for this trial, contact 1-877-CTLLLY (1-877-285-4559, 1-317-615-4559) Monday-Friday from 9:00 AM to 5:00 PM Eastern Time (UTC/GMT - 5 hours, EST), or speak with your personal physician Minneapolis, Minnesota, United States • (and 36 more...)
4	<input type="checkbox"/>	Completed	Efficacy and Safety of Clonazepam in Patients With Borderline Personality Disorder	• Borderline Personality Disorder	• Drug: Clonazepam	• For additional information regarding investigative sites for this trial, contact 1-877-CTLLLY (1-877-285-4559, 1-317-615-4559) Mon-Fri from 9 AM to 5 PM Eastern Time (UTC/GMT - 5 hours, EST), or speak with your personal physician National City, California, United States • For additional information regarding investigative sites for this trial, contact 1-877-CTLLLY (1-877-285-4559, 1-317-615-4559) Mon - Fri from 9 AM to 5 PM Eastern time (UTC/GMT - 5 hours, EST), or speak with your personal physician New Haven, Connecticut, United States • For additional information regarding investigative sites for this trial, contact 1-877-CTLLLY (1-877-285-4559, 1-317-615-4559) Mon-Fri from 9 AM to 5 PM Eastern Time (UTC/GMT - 5 hours, EST), or speak with your personal physician Indianapolis, Indiana, United States • (and 12 more...)
5	<input type="checkbox"/>	Completed	Verkes Borderline Study: The Effect of Quetiapine on Borderline Personality Disordered Patients	• Borderline Personality Disorder	• Drug: Quetiapine fumarate • Drug: Placebo	• Research Site Apeldoorn, Netherlands • Research Site Nijmegen, Netherlands • Research Site Veghel, Netherlands
6	<input type="checkbox"/>	Completed	Evaluating an Internet-Based Self-Management Intervention for Borderline	• Borderline Personality Disorder	• Behavioral: Provo • Other: CAU	• Gaia AG Hamburg, Germany
7	<input type="checkbox"/>	Recruiting	Brexpiprazole in Borderline Personality Disorder	• Borderline Personality Disorder	• Drug: Ruxell • Drug: Placebo	• University of Chicago Chicago, Illinois, United States
8	<input type="checkbox"/>	Completed	Study of Lamotrigine Treatment of Affective Instability in Borderline Personality Disorder	• Borderline Personality Disorder	• Drug: Lamotrigine • Drug: Placebo	• McLean Hospital Belmont, Massachusetts, United States
9	<input type="checkbox"/>	Completed	Effective Measurement of Risperidone Treatment Outcome for Persons With Borderline Personality Disorder	• Borderline Personality Disorder	• Drug: risperidone	• University of Alabama at Birmingham Birmingham, Alabama, United States
10	<input type="checkbox"/>	Completed	Quetiapine Treatment for Symptoms Associated With Borderline Personality Disorder	• Borderline Personality Disorder	• Drug: Quetiapine Fumarate	• University of Medicine and Dentistry of New Jersey - School of Osteopathic Medicine - Department of Psychiatry Cherry Hill, New Jersey, United States
11	<input type="checkbox"/>	Completed	PET Imaging and Clonazepam Treatment in Borderline Personality Disorder	• Borderline Personality Disorder	• Drug: clonazepam	• University of Minnesota, Dept of Psychiatry Minneapolis, Minnesota, United States
12	<input type="checkbox"/>	Completed	Desipicote ER in Borderline Personality Disorder	• Borderline Personality Disorder	• Drug: Desipicote ER	
13	<input type="checkbox"/>	Recruiting	Effectiveness of PTSD-treatment Compared to Integrated PTSD-PD-treatment in Adult Patients With Comorbid PTSD and BPD	• Posttraumatic Stress Disorder (PTSD) • Borderline Personality Disorder (BPD)	• Behavioral: EMCR • Behavioral: DBT	• Sinel Centrum Amstelveen, Noord-Holland, Netherlands
14	<input type="checkbox"/>	Completed	Serquel Extended Release (XR) for the Management of Borderline Personality Disorder (BPD)	• Borderline Personality Disorder	• Drug: quetiapine extended-release • Drug: Placebo	• University of Iowa, Department of Psychiatry Iowa City, Iowa, United States • McLean Hospital, Harvard Medical School, Department of Psychiatry Belmont, Massachusetts, United States • University of Minnesota Medical Center, Fairview Riverside Minneapolis, Minnesota, United States
15	<input type="checkbox"/>	Completed	Zonisidone in the Treatment of Borderline Personality Disorder	• Borderline Personality Disorder	• Drug: zonisidone • Drug: Placebo	• Department of Psychiatry, Sta. Creu and St. Pau Hospital Barcelona, Spain
16	<input type="checkbox"/>	Completed	Calling for Care: Cell Phones for Mood Telemetry in Teens	• Bipolar Disorder • Cyclothymia • Borderline Personality Disorder	• Other: Mental health telemetry (MHT)	• Sunnybrook Health Sciences Centre Toronto, Ontario, Canada
17	<input type="checkbox"/>	Completed	Safety and Efficacy Study of Clonazepam and Lithium for the Treatment of Depressive Mood Disorder Symptoms	• Major Depressive Disorder • Dysythymia • Depression Not Otherwise Specified • Borderline Personality Disorder	• Drug: Lithium Carbonate • Drug: Placebo • Drug: Clonazepam	• Artamis Institute for Clinical Research San Diego, California, United States • Northwest Clinical Research Center Bellevue, Washington, United States

BPD – No Approved Therapies & Several Failed Trials

- ClinicalTrials.gov – 17 Clinical Trials w/Industry funding
 - 14/17 involve Investigational Medicinal Product (IMP)
 - 3/17 include behavioral interventions
- 14/17 trials have Completed
 - 11/14 involving IMP
 - 3/3 including behavioral interventions
- Completed Clinical Trials explored:
 - Citalopram & Lithium*
 - Mental Health Telemetry
 - Ziprasidone
 - Seroquel XR
 - EMDR/DBT
 - Depakote IR
 - Olanzapine
 - Quetiapine
 - Risperidone
 - Lamotrigine
 - Internet-Based Self-Management
- No approved drug therapies to-date
- 3 Ongoing Clinical Trials with Brexpiprazole

*Trial included MDD, Dysthymia, Depression NOS and/or BPD patients

BPD – Lack of ‘Gold Standard’ Measure

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- There is no clear consensus on a ‘gold standard’ measure in BPD
 - Several sponsors have leveraged the Zanarini Rating Scale for BPD (ZAN-BPD)
 - However, no trials have led to a drug approval with the ZAN-BPD as the primary or secondary endpoint.
 - Is a scale with a one-week recall period (i.e., aligned with the frequency of psychotherapy visits) suitable for clinical trials with longer recall periods?

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 - Is a scale with a one-week recall period (i.e., aligned with the frequency of psychotherapy visits) suitable for clinical trials with longer recall periods?
 - A few sponsors have used the Clinical Global Impression (CGI)
 - PRO – Regulatory accepted across trials & therapeutic areas
 - CON – Limited dynamic range of performance
 - No BPD trials have led to a drug approval with the CGI as the primary or secondary endpoint.
 - Is a scale with limited dynamic range suitable as a primary endpoint?

BPD – Lack of ‘Gold Standard’ Measure

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Clinical Global Impression (CGI)

1. Severity of illness

Considering your total clinical experience with this particular population, how mentally ill is the patient at this time?

- | | |
|-----------------------------|---|
| 0 = Not assessed | 4 = Moderately ill |
| 1 = Normal, not at all ill | 5 = Markedly ill |
| 2 = Borderline mentally ill | 6 = Severely ill |
| 3 = Mildly ill | 7 = Among the most extremely ill patients |

2. Global improvement: Rate total improvement whether or not, in your judgement, it is due entirely to drug treatment.

Compared to his condition at admission to the project, how much has he changed?

- | | |
|------------------------|---------------------|
| 0 = Not assessed | 4 = No change |
| 1 = Very much improved | 5 = Minimally worse |
| 2 = Much improved | 6 = Much worse |
| 3 = Minimally improved | 7 = Very much worse |

BPD – Lack of ‘Gold Standard’ Measure

Drug/Intervention	Primary Endpoint(s)	Key Secondary Endpoints
Brexpiprazole	ZAN-BPD	CGI; PGI
Brexpiprazole – Safety Study	Adverse Events (AEs)	
Brexpiprazole	ZAN-BPD	BEST; MOAS
Citaprolam & Lithium	S-STs	BHS; BSS
Depakote IR	SCL-90-R	Barratt Impulsivity Scale
EMDR/DBT	CAPS5	SCID-5-PD
Internet-Based Self-Management	BPD Severity Index	BPDCL – Short Version
Lamotrigine	ALS; Affective Lability of ZAN-BPD	Items of ZAN-BPD
Olanzapine	ZAN-BPD	
Olanzapine	ZAN-BPD	SDS; OAS-M; LSDS; Suicide Att.
Olanzapine – PET Study	PET metabolism	
Quetiapine	Psychotic-like symptoms & severity of psychiatric symptoms	Mood, Anger; Impulsiveness; Hostility; Anxiety
Quetiapine	SCL-90-R	Safety & Tolerability
Risperidone	CGI; BSI	BDI
Seroquel XR	ZAN-BPD; BEST; OAS-M; GAF; BIS; SCL-90-R; YMS; SDS	
Ziprasidone	CGI-BPD;	HAM-D-17; HAM-A; BPRS; SCL-90-R; BIS

ALS – Affective Lability Scale

BEST – Borderline Evaluation of Severity over Time

BDI – Beck Depression Inventory

BHS – Beck Hopelessness Scale

BIS – Barratt Impulsiveness Scale

BPDCL – Borderline Personality Disorder Checklist

BPRS = Brief Psychiatric Rating Scale

BSI – Brief Symptom Inventory

BSS – Beck Scale for Suicide Ideation

CAPS5 – Clinician Administered PTSD Scale for DSM-5

CGI – Clinician Global Impression

GAF – Global Assessment of Functioning

HAM-A – Hamilton Rating Scale for Anxiety

HAM-D-17 – Hamilton Rating Scale for Depression

LSDS – Lifetime Self-Destructiveness Scale

MOAS – Modified Overt Aggression Scale

OAS-M – Overt Aggression Scale – Modified

PGI – Patient Global Impression

SCL-90-R – Symptom Checklist 90 – Revised

SCID-5-PD – Structured Clinical Interview, DSM-5, Personality Disorders

SDS – Sheehan Disability Scale

S-STs – Sheehan-Suicidality Tracking Scale

Suicide Att. – Number of Suicide Attempts

YMS – Young Mania Rating Scale

ZAN-BPD – Zanarini Rating Scale for Borderline Personality Disorder

BPD – Uncertain Placebo Rate

- Lack of a 'gold standard' measure complicates establishing a placebo rate
- There is no established placebo rate in BPD Clinical Development
- Previous trials (e.g., olanzepine) have experienced high PBO rates

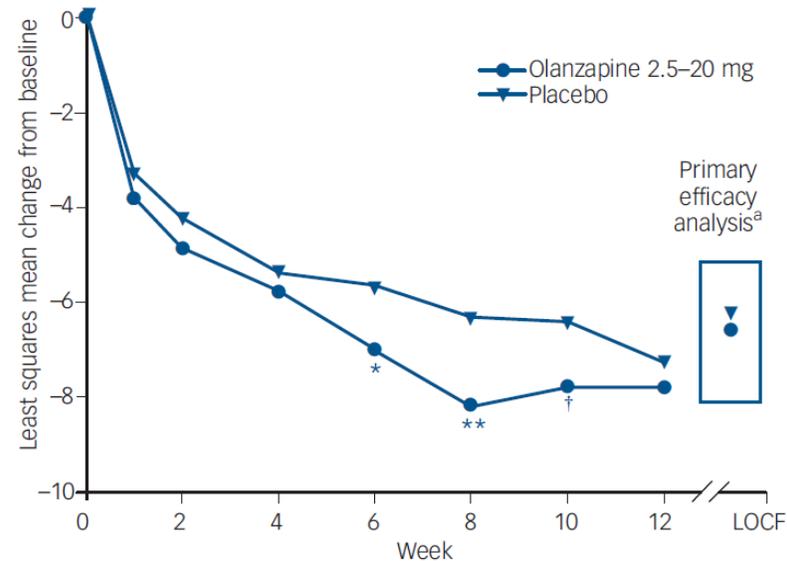


Fig. 2 Mean visit-wise changes in Zanarini Rating Scale for Borderline Personality Disorder (ZAN-BPD) total scores (mixed-effects model repeated measures), and mean baseline to end-point change in ZAN-BPD total score, last observation carried forward (LOCF).

a. Type III sum of squares (ANOVA): model = baseline, investigator, therapy; $P=0.661$.
* $P<0.05$; ** $P<0.01$; † $P=0.08$.

The British Journal of Psychiatry (2008)
193, 485–492. doi:
10.1192/bjp.bp.107.037903

BPD – Lack of ‘Gold Standard’ Measure & Uncertain PBO Rate

- Potential Solutions:
 - Include a variety of measures in early phases of development
 - Phase Ib & Phase IIa to establish the PBO rate
 - Determine COA type that works best in population (PerfO, ClinRO, ObsRO, CRO)
 - Test drive measures with the intended population
 - Consider including quality of life and functional measures
 - Important to help demonstrate clinical meaningfulness
 - Eventual potential payer discussions
 - Avoid need to collect this data in Phase IIIb/IV trials
 - Develop your own measure – Agitation & Aggression Psychiatric Inventory[©] (AAPI[©])
 - Include multiple or co-primary primary endpoints
 - If already in Phase IIb or Phase III consider using an adaptive trial design
 - Best shot on goal when variability around endpoints and PBO rate is uncertain
 - Allows you to drop endpoints (just like doses) for futility at planned analyses
 - Permits increasing the sample size if there is increased variability around the COA or a higher than expected PBO rate
 - NOTE: Always have fully transparent discussions with regulatory authorities around all reasons for leveraging an adaptive design

BPD – Phase II sample sizes that mirror Phase III

- Phase II BPD clinical trials have become increasingly large with sample sizes expected in Phase III
 - For instance, an enrolling Brexpiprazole, Phase II trial plans to enroll (N=240)
- This results from not having great data regarding:
 - COA performance (i.e., variability)
 - Placebo rate
 - Both are needed for power calculations and sample size determination
- Potential Solution:
 - Implement an adaptive trial design to allow:
 - Enrollment of a smaller sample
 - Dropping a dose for futility – subjects then roll into other arm increasing power
 - Potentially increasing sample at the IA when there is unexpected variability in PE or high PBO rate
 - Overall, an adaptive design is the best solution when you do not know COA performance or PBO rate in the intended population

BPD – Difficult & Non-Adherent Population

- According to the DSM-5, BPD patients must exhibit five or more of the following diagnostic criteria:
 - Frantic efforts to avoid real or imagined abandonment.
 - Pattern of unstable and intense interpersonal relationships characterized by alternating between extremes of idealization and devaluation.
 - Identity disturbance: markedly and persistently unstable self-image or sense of self.
 - Impulsivity in at least two areas that are potentially self-damaging (e.g., spending, sex, substance abuse, reckless driving, binge eating).
 - Recurrent suicidal behavior, gestures, or threats, or self-mutilating behaviors.
 - Affective instability due to a marked reactivity of mood.
 - Chronic feelings of emptiness.
 - Inappropriate, intense anger or difficulty controlling anger (e.g., frequent displays of temper, constant anger, recurrent fights).
 - Transient, stress-related paranoid ideation or severe dissociative symptoms.

BPD – Difficult & Non-Adherent Population

- In addition to meeting DSM-5 BPD criteria, this population:
 - Multiple comorbidities
 - ADHD
 - Depression
 - Bipolar Disorder
 - Anxiety
 - PTSD
 - Eating Disorders
 - Substance Abuse
 - Affectively unstable
 - Angry, agitated and aggressive population
 - Extremely impulsive
 - Frequently paranoid
 - High percentage of substance use and abuse
 - Do not like to be told what to do
 - Frantic efforts to avoid real or imagined abandonment

BPD – Difficult & Non-Adherent Population

- Potential Solutions:
 - Leverage sites with longstanding patient relationships to:
 - Increase trust and potentially decrease dropouts
 - Increase adherence
 - Decrease impulsivity
 - Improve the probability of following directions
 - Avoid feelings or real (i.e., the trial is ending) abandonment
 - Craft Inclusion & Exclusion criteria to allow for comorbidities, but only in treated and/or stable patients.
 - Leverage a run-in period, screen for illicit substances during and inform subjects they will be removed from the trial for illicit drug use during the trial.
 - Remove non-adherent patients – leverage monitored dosing strategy
 - Discuss and gain regulatory approval for exclusion of deliberately non-adherent subjects in the Per-Protocol Set (PPS) for the primary analyses

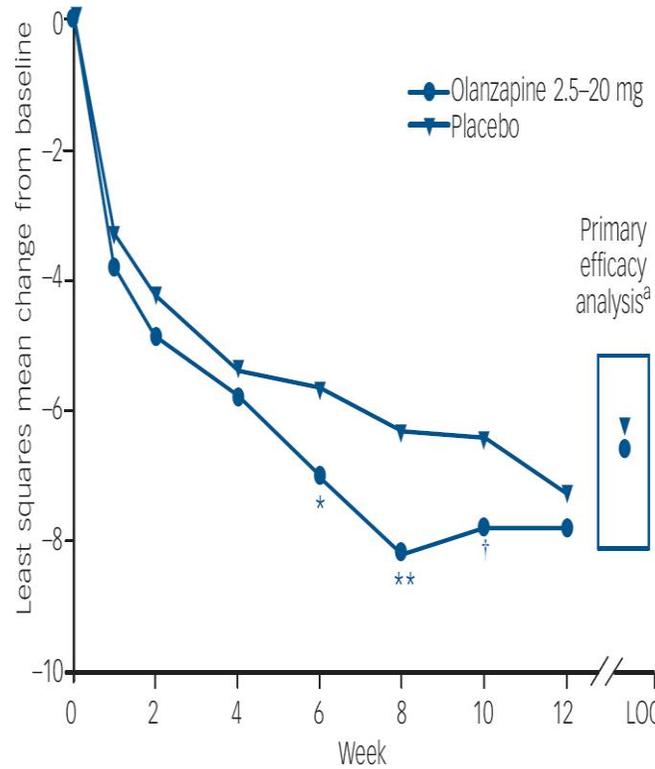
BPD – Timing of the Primary Endpoint (PE)

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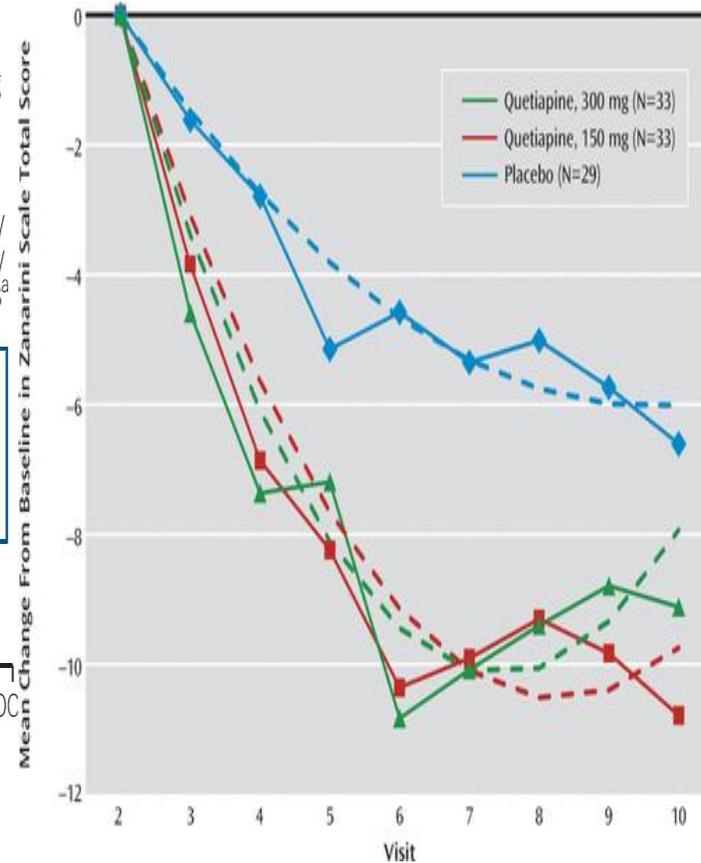
- It is critical to think creatively around the timing of the PE
- Subjects may self-sabotage before and because of the trial ending
 - Stop taking their IMP
 - Dropout of the trial

BPD – Timing of the Primary Endpoint (PE)

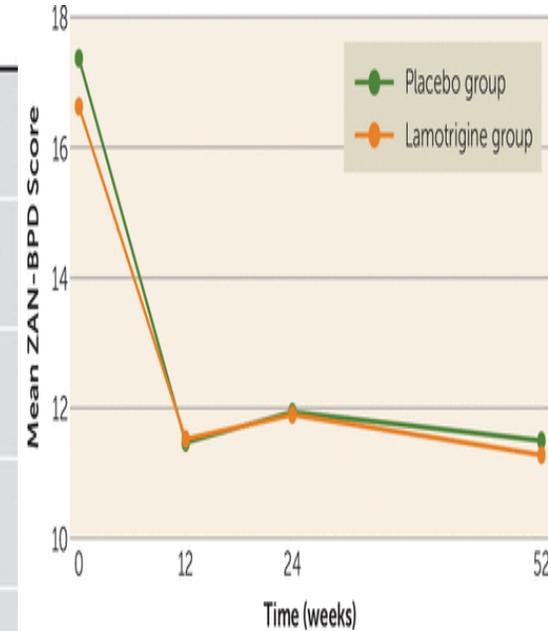
BPD – Timing of the Primary Endpoint (PE)



Schulz SC et al. Olanzapine for the treatment of borderline personality disorder 2008



Black et al. Comparison of low and moderate dosages of extended-release quetiapine in borderline personality disorder 2014



Crawford M, et al. The Clinical Effectiveness and Cost-Effectiveness of **Lamotrigine** in Borderline Personality Disorder **2018**

BPD – Timing of the Primary Endpoint (PE)

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- Potential Solutions:
 - Extend trial and collect PE well before the last visit
 - Blind subjects and PIs on the timing of the PE
 - Collect PE at multiple time points
 - For example, if the goal is 12-weeks of treatment, then plan for 16-week trial to allow:
 - 2-week blinded PBO run-in period
 - 12 weeks of active treatment
 - 2-weeks of blinded safety follow-up
 - All subjects and PI believe the trial ends at week 16
 - Collection of PE every 2 weeks up to 16 weeks
 - Primary analysis: longitudinal mixed effects model evaluating difference at 12 weeks
 - Uses all PE data up to 12 weeks

BPD – Timing of the Primary Endpoint (PE)

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 - Alternatively, select a different objective endpoint and consider leveraging a time to event analysis
 - Number of suicidal attempts, ER visits, Urgent Care visits, psychiatric inpatient hospitalizations, Primary Care Physician visits, and/or non-suicidal self-injuries
 - Measure time to trial dropout resulting from these events

BPD – What about Psychotherapy?

- Psychotherapy is standard of care in BPD
- How do you run a trial in BPD and ethically exclude the only SOC?
 1. Carefully, after discussions and alignment with regulators.
OR
 2. You allow psychotherapy, with limits defined in the protocol.
- Potential Solution:
 - Treat psychotherapy like an allowed concomitant medication.
 - Enrolled subjects must maintain their Pre-Screening psychotherapy.
 - Subjects cannot start psychotherapy within a specified time prior to enrollment.
 - Subjects cannot initiate psychotherapy during the trial.
 - Subjects who start the trial while in psychotherapy must remain in therapy throughout the trial.

BPD Clinical Development – Methodological Issues

Overall, given all the methodological issues reviewed in this presentation leaves one wondering whether the lack of an approved drug for BPD is because:

- Lack of a ‘gold standard’ measure
 - The COAs used as the primary and/or secondary endpoints
- Uncertain placebo rate
 - Lack of a ‘gold standard’ measure complicates establishing a placebo rate
 - High placebo rates seen in previous BPD clinical trials
- BPD subjects are a difficult and non-adherent population
- Study design
 - Inclusion/Exclusion criteria
 - Timing of the PE
- Study conduct
 - Addressing illicit substance use and abuse
 - Handling of deliberately non-adherent subjects
- Were the drugs studied, just not the right ones

Summary BPD Methodological Issues - Solutions

Lack of 'gold standard' measure, unknown PBO rate & Phase II sample sizes that mirror Phase III

- Employ a variety of measures in early phases of development
 - Phase Ib & Phase IIa to establish the PBO rate
- Test drive measures with the intended population
- Consider including quality of life and functional measures
 - Important for clinical meaningfulness
 - Eventual potential payer discussions
 - Avoid need to collect this data in Phase IIIb/IV trials
- Consider including multiple or co-primary primary endpoints
- If already in Phase IIb or Phase III consider using an adaptive trial design to allow:
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 - Dropping a dose for futility – subjects then roll into other arm increasing power
 - Potentially increasing sample with unexpected variability in PE or higher than expected PBO rate
 - An adaptive design is the best solution when you do not know COA performance or PBO rate in intended population

Difficult and non-adherent population

- Leverage sites with longstanding patient relationships to:
 - Increase trust and potentially decrease dropouts
 - Increase adherence
 - Decrease impulsivity
 - Improve probability of following directions
 - Avoid feelings or real (i.e., the trial is ending) abandonment
- Craft Inclusion & Exclusion criteria to allow for comorbidities, but only in treated and/or stable patients.
- Leverage a run-in period, screen for illicit substances during and inform subjects they will be removed from the trial for illicit drug use.
- Remove non-adherent patients
- Discuss and gain regulatory approval for their exclusion in the Per-Protocol Set (PPS) for the primary analyses

Summary BPD Methodological Issues – Solutions (Continued)

Timing of the Primary Endpoint

- Extend trial and collect PE well before the last visit
- Blind subjects and PIs on the timing of the PE
- Collect PE at multiple time points
 - For example, if the goal is 12-weeks of treatment, then plan for 16-week trial to allow:
 - 2-week blinded PBO run-in period, 12 weeks of treatment
 - Collection of PE every 2 weeks up to 16 weeks
 - Primary analysis: longitudinal mixed effects model evaluating difference at 12 weeks
 - Uses all PE data up to 12 weeks

What about Psychotherapy?

- Treat psychotherapy like an allowed concomitant medication.
- Enrolled subjects must maintain their Pre-Screening psychotherapy.
- Subjects cannot start psychotherapy within a specified time prior to enrollment.
- Subjects cannot initiate psychotherapy during the trial.
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