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Wolters Kluwer

Unipolar major depression in adults: Indications for and efficacy of electroconvulsive therapy (ECT)

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INTRODUCTION

Electroconvulsive therapy (ECT) uses a small electric current to produce a generalized cerebral seizure under general anesthesia. ECT is used mainly to treat severe depression, but is also indicated for patients with other psychiatric and medical conditions [1].

ECT is practiced widely throughout the world [2]. A practice survey from 1988-89 estimated that at least 100,000 patients in the United States received ECT annually [3]. The typical ECT patient in the US is relatively affluent and receives ECT in a private sector psychiatric facility [4]. State hospitals rarely offer the treatment, even though many of the patients would meet indications for ECT.

The efficacy and safety of ECT is well established. Nevertheless, it remains controversial and stigmatized because of misinformation and outmoded perceptions about how the treatment is performed.

The indications for treating unipolar major depression with ECT and its efficacy are reviewed here. An overview of ECT, the technique for performing ECT, medical consultation for ECT, and the indications for and efficacy of ECT in bipolar disorder are discussed separately, as is choosing initial treatment for depression and treatment of resistant depression.

- (See "[Overview of electroconvulsive therapy \(ECT\) for adults](#)".)

- (See ["Technique for performing electroconvulsive therapy \(ECT\) in adults"](#).)
- (See ["Medical evaluation for electroconvulsive therapy"](#).)
- (See ["Bipolar disorder in adults: Indications for and efficacy of electroconvulsive therapy"](#).)
- (See ["Unipolar major depression in adults: Choosing initial treatment"](#).)
- (See ["Unipolar depression in adults: Choosing treatment for resistant depression"](#).)

INDICATIONS

The primary indication for ECT is severe major depression that is life-threatening or significantly impairs functioning. In research studies, patients who receive ECT typically have mean Hamilton Rating Scale for Depression ([table 1](#)) scores over 30 [5,6].

The vast majority of patients receive ECT because they do not respond to or tolerate antidepressant medication trials [1]. There are no established criteria for the number or duration of unsuccessful drug trials prior to initiating ECT [7,8]. Clinicians should consider ECT for patients who fail two or three antidepressant medication trials and remain severely depressed for several months.

ECT provides a rapid clinical response and may thus be indicated as first-line treatment in certain urgent clinical situations [1,9,10]:

- Severe suicidality
- Severe psychosis
- Catatonia
- Malnutrition in patients with food refusal secondary to depressive illness

Speed of response with ECT and use of ECT for psychotic depression and for catatonia are discussed separately. (See ["Speed of response"](#) below and ["Psychotic depression"](#) below and ["Unipolar major depression with psychotic features: Acute treatment"](#), section on ["Electroconvulsive therapy"](#) and ["Catatonia: Treatment and prognosis"](#), section on ["Treatment"](#).)

ECT may be less risky than antidepressant and antipsychotic medication for certain patients, including those who are debilitated or older age [1]. Pregnant and lactating patients worried about teratogenesis and other medication side effects can also be effectively and safely treated with ECT [1,11]. Patients may prefer ECT and request it as a first-line treatment if, for example, the patient has a history of a depressive episode that was successfully treated with ECT after failing multiple medication trials.

Suicidality — In patients with unipolar major depression, ECT can rapidly relieve suicidality (ie, suicidal ideation and behavior) [12]:

- A prospective, observational study enrolled patients who were treated with bilateral ECT three times per week, including 131 who reported active suicidal ideation, threats, gestures, or a serious suicide attempt [13]. Post hoc analyses found that suicidality completely resolved after one week in 38 percent of the patients; after two weeks in 61 percent; and after completing ECT, in 81 percent.
- A national registry study included hospitalized patients who either received ECT (n >5500) or did not (n >5500) [14]. The two groups were initially matched on age, sex, and severity of depression; propensity scoring was used to further match the two groups on other potential confounding factors, such as prior suicide attempts, psychiatric and general medical comorbidities, and family history of suicide. During the 12 months following hospitalization, suicide deaths occurred in fewer patients who received ECT than those who did not (1.1 versus 1.6 percent).

Contraindications — There are no absolute contraindications to ECT. However, clinicians should be aware of the risks involved when using ECT to treat depressed patients with certain comorbid medical conditions. (See "[Overview of electroconvulsive therapy \(ECT\) for adults](#)", [section on 'Patients with comorbid general medical illness'](#) and "[Medical evaluation for electroconvulsive therapy](#)".)

SPEED OF RESPONSE

Patients with major depression remit quickly with ECT, including older age patients [15]. Response typically begins to occur after two to four treatments. Suicidal ideation and behavior often improve quickly with ECT [13]. Disturbed sleep and appetite, and low energy may respond before mood, guilt, and worthlessness improve.

Some patients experience an immediate improvement in symptoms after the first ECT, and there is evidence that the initial ECT may be more potent than subsequent treatments [10]. Rarely, a patient will remit with a single ECT session [16,17].

One study of 253 patients with unipolar major depression who were treated three times per week with bilateral ECT found that remission occurred in [9]:

- 4 percent of patients at or before ECT number 3 (week one)
- 34 percent at or before ECT number 6 (week two)

- 60 percent at or before ECT number 9 (week three)

The median time to first response (> 50 percent reduction of baseline depression rating scale score) was one week (three ECT treatments) [9].

The speed of response with ECT contrasts with that for pharmacotherapy in typically less severely ill outpatients with major depression. Only about 66 percent of medication responses occur within four weeks of starting treatment [9]. Remission may not occur for weeks to months following response.

EFFICACY

Acute ECT — Meta-analyses have found that electroconvulsive therapy (ECT) is more efficacious than any other treatment used for severe major depression [18-21]. It is estimated that remission occurs in 70 to 90 percent of patients who receive ECT, based upon randomized trials [1,9,18,22,23]. This compares with a remission rate of approximately 30 percent for [citalopram](#) in outpatients with nonpsychotic unipolar major depression [24].

A meta-analysis of 18 randomized trials with 1144 depressed patients found ECT was more efficacious than pharmacotherapy, with a large clinical effect [19]. As examples, specific trials found:

- Remission of depression with ECT compared with [imipramine](#) was 93 versus 73 percent [25]
- Marked improvement (nearly symptom free) with ECT compared with [imipramine](#) was 76 versus 49 percent [26]
- Response (reduction of baseline symptoms \geq 50 percent) with ECT compared with [paroxetine](#) was 71 versus 28 percent [27]

A second meta-analysis of 15 randomized trials (585 patients) compared the effectiveness of ECT with other forms of treatment for depression that included antidepressant medication, rapid transcranial magnetic stimulation, cognitive-behavioral therapy, and simulated ("sham") ECT [20]. The analysis found a significant effect favoring ECT over other treatments, and the clinical benefit was large. In addition, the specific comparison of ECT with medication found a significant and large clinical effect favoring ECT. Patients with depression and psychosis had a better response to ECT than those with nonpsychotic depression.

Consistent with these results, in 2011 the United States Food and Drug Administration conducted its own systematic review and meta-analyses with the following findings [18,28,29]:

- An analysis of 5 randomized trials (202 depressed patients) estimated that improvement on the depression rating scale was about 7.1 points (95% CI -0.1-14.2) greater in patients who received ECT compared with sham.
- A review of 3 randomized trials (223 depressed patients) found that ECT was more effective than placebo.
- An analysis of 8 randomized trials (188 depressed patients) estimated that improvement on the depression rating scale was about 5.0 points (95% CI 0.8-9.1) greater in patients who received ECT compared with antidepressant medication.

Although the Food and Drug Administration analysis did not find a statistically significant benefit with ECT compared to sham ECT, the confidence interval was wide and consistent with the separate results that ECT was significantly superior to antidepressant medication, and the lower boundary of the confidence interval was -0.1 and thus close to zero. In addition, the sham ECT trials suffer from methodologic shortcomings, including the use of antidepressant treatments (such as ECT) in the “naturalistic” follow-up periods, potentially decreasing the difference between the active and sham groups [28,29]. As such, it is clear that ECT is effective for severe major depression and is superior to pharmacotherapy.

The position of the stimulating electrodes (bilateral, bifrontal, or right unilateral) appears to have little effect upon the overall efficacy of ECT [10,19,30]. However, individual patients who do not initially respond to right unilateral ECT may need to be crossed over to bilateral ECT. (See ["Technique for performing electroconvulsive therapy \(ECT\) in adults", section on 'Electrode placement'.](#))

Durability of response — Although ECT is efficacious for major depression, most patients who respond will subsequently relapse if they do not receive continuation and maintenance treatment with pharmacotherapy or ECT [31,32]. Thus, continuation/maintenance treatment is nearly always indicated following a successful course of acute ECT.

For patients with major depression who respond to ECT, continuation treatment with pharmacotherapy is beneficial. A meta-analysis of seven randomized trials compared antidepressants with placebo (n >400 patients) and found that antidepressants reduced the risk of relapse by 50 percent (relative risk 0.5, 95% CI 0.4-0.6) [31].

Nevertheless, many patients relapse despite continuation pharmacotherapy following successful treatment with ECT. A meta-analysis of 17 randomized trials and observational studies (n >700 patients receiving continuation pharmacotherapy) found that relapse occurred in 38 percent at six months [31].

Additional information about the efficacy of continuation/maintenance treatment with antidepressants or ECT is discussed separately. (See "[Unipolar depression in adults: Continuation and maintenance treatment](#)", section on 'Antidepressant medications' and "[Overview of electroconvulsive therapy \(ECT\) for adults](#)", section on 'Continuation and maintenance ECT'.)

Geriatric depression — Reviews of numerous studies have found that ECT is efficacious and safe for geriatric depression, including patients who are very old (eg, age >85 years) [33,34]. As an example:

- A randomized trial compared real ECT with simulated ECT in older adult depressed patients who completed six treatments (n = 23), and found that improvement was greater with real ECT [35].
- Prospective observational studies have found that older age patients with psychotic depression (n = 25) were more likely to remit with ECT compared with [nortriptyline](#) plus [phenelzine](#) [36], and that older age patients hospitalized for unipolar depression (n = 128) remitted more quickly with ECT than nortriptyline or [venlafaxine](#) [37].
- A retrospective study of older age patients hospitalized for depression (n = 192) found that during the subsequent five years, mortality was less in patients who were treated with ECT during the hospitalization, compared with patients treated with pharmacotherapy [38].

Many older age patients suffer poststroke depression after an acute cerebrovascular event [39]. A retrospective study of medically ill geriatric patients with poststroke depression (n = 20) found that ECT was effective and well tolerated for 95 percent [40].

Geriatric patients may also develop vascular depression, which occurs in association with chronic ischemic changes in the brain. A review of three studies found inconsistent results for ECT in patients with vascular depression [39]. (See "[Diagnosis and management of late-life unipolar depression](#)".)

Compared with transcranial magnetic stimulation — For treatment of major depression, ECT is more efficacious than repetitive transcranial magnetic stimulation (TMS) [41-43]. A pooled analysis of seven randomized trials (either open label or blinded rater) compared ECT (bilateral

or unilateral) with repetitive TMS (applied over the left or right dorsolateral prefrontal cortex) in 275 patients with major depression. Remission occurred in more patients who received ECT than repetitive TMS (53 versus 32 percent) [44]. In addition, discontinuation of treatment for any reason was comparable for ECT and repetitive TMS (12 and 14 percent). However, cognitive impairment in specific domains (eg, verbal fluency and visual memory) may be greater with ECT [44-46].

Additional information about repetitive TMS is discussed separately. (See "[Unipolar depression in adults: Indications, efficacy, and safety of transcranial magnetic stimulation \(TMS\)](#)".)

Ketamine plus ECT — [Ketamine](#) has long been used as an alternative anesthetic for ECT and appears to initially enhance the benefits of ECT. However, the benefit of the drug dissipates during the course of ECT. In addition, ketamine can increase blood pressure at higher doses and should thus be used cautiously in patients with a history of cardiovascular disease.

Based upon randomized trials, using [ketamine](#) to induce anesthesia can enhance the effect of ECT after the first session, but not throughout the course of treatment [47]. A meta-analysis of five trials (n = 163 patients) compared ketamine with either thiopental monotherapy or [propofol](#) monotherapy [48]. Ketamine was administered in conjunction with thiopental or propofol (three trials; dose of ketamine 0.4 or 0.5 mg/kg) or as monotherapy (two trials; dose of ketamine 0.8 or 1 to 2 mg/kg). Improvement of depression after the first ECT session was greater in patients who received ketamine, compared with patients who did not. However, after the course of ECT was completed, improvement of depression in the two groups was comparable.

Adverse effects that may be associated with using [ketamine](#) as an induction agent include post-ECT disorientation, restlessness, dissociation, dizziness, delirium, psychosis, nausea, and/or vomiting [48,49]. In addition, ketamine can increase blood pressure at higher doses. One trial administered ketamine to 12 patients at a dose of 0.8 mg/kg, and diastolic blood pressure >100 mmHg occurred during ECT in five cases (42 percent) [50]. Another trial found that systolic and diastolic blood pressures were often greater in patients who received ketamine monotherapy (1 to 2 mg/kg), compared with thiopental [51].

[Ketamine](#) can prolong or enhance ECT seizures because it is less anticonvulsant than other anesthetics [52]. A meta-analysis of randomized trials compared anesthetic regimens that included ketamine with regimens that did not, and found that ketamine prolonged seizure duration by 11.5 seconds, a significant and clinically moderate to large benefit [48].

Observational studies have investigated whether [ketamine](#) decreases the cognitive effects of ECT; although the data are inconsistent, they suggest a possible modest protective effect [53,54].

Anesthesia for ECT is discussed separately. (See ["Technique for performing electroconvulsive therapy \(ECT\) in adults", section on 'Anesthesia technique'.](#))

Maintenance ECT — The administration and efficacy of continuation and maintenance ECT is discussed separately. (See ["Overview of electroconvulsive therapy \(ECT\) for adults", section on 'Continuation and maintenance ECT'.](#))

ADVERSE EFFECTS

The adverse effects of ECT may be divided into medical or cognitive effects. Medical effects include cardiopulmonary events, aspiration pneumonia, fractures, dental and tongue injuries, headache, and nausea. Cognitive effects include acute confusion, anterograde amnesia, and retrograde amnesia. Adverse effects are discussed separately. (See ["Overview of electroconvulsive therapy \(ECT\) for adults", section on 'Adverse effects'.](#))

PREDICTORS OF RESPONSE

Based upon a meta-analysis of 34 prospective or retrospective observational studies ($n > 3200$ patients), response to ECT is more likely to occur in patients who are older (eg, age ≥ 60 years) or who have psychotic features or more severe episodes (eg, a PHQ-9 score ≥ 20 ([table 2](#))) [55]. Other studies suggest that sex and race are not associated with response [56-59].

In addition, melancholic features (anhedonia, depressed mood worse in morning, early morning awakening, marked psychomotor retardation or agitation, anorexia or weight loss, and excessive guilt) do not appear to be a clinically useful predictor of outcome in patients treated with ECT [55]. Although melancholia has historically been considered a predictor of good response to ECT, a pooled analysis of five observational studies ($n > 900$ depressed patients) found that melancholic features were associated with nonresponse to ECT, whereas a second pooled analysis found that melancholia did not predict outcome [59]. Heterogeneity across studies was substantial.

However, several other clinical factors appear to be associated with response to ECT, as follows.

Older age — ECT is particularly efficacious for older age patients with depression. In addition, many older age, depressed patients have contraindications to antidepressant medications, do not tolerate or respond to medications, cannot participate in psychotherapy or do not respond to it, or may develop severe symptoms and complications of depression that require immediate

relief [60-62]. One study found that ECT was used approximately three times more often in older adults (>65 years) than younger adults [63].

Geriatric depression typically remits with ECT. As an example, a prospective observational study enrolled 240 patients (mean age 70 years) with unipolar major depression and treated them with [venlafaxine](#) (target dose 225 mg/day) plus right unilateral, ultrabrief pulse ECT three times per week [64]. Remission occurred in 62 percent of patients; the mean number of ECT treatments in patients who remitted was 7.3 and the mean time to remission was thus about 2.5 weeks. In addition, global cognitive functioning at baseline and post-ECT was comparable. Other studies have found that remission occurs in up to approximately 80 percent of patients [15,65]. By contrast, the rate of remission among similar patients treated solely with antidepressants is roughly 30 percent [66].

Remission with acute ECT appears to be more probable in older patients with unipolar major depression compared with younger patients [15,18]. As an example, a study of bilateral ECT three times per week for unipolar major depression compared response in three age groups: younger (age 18 to 45 years, n = 79), middle-aged (age 46 to 64, n = 81), and older age (age 65 to 85, n = 93) [67]. The analyses found that remission occurred in more middle-aged or older age patients compared with younger patients (86 and 80 versus 57 percent). In addition, greater age (as a continuous variable) was associated with lower depression rating scale scores.

Maintenance ECT can also be beneficial for older patients. A systematic review identified two randomized trials (single blind) that compared ECT with pharmacotherapy as maintenance treatment in patients aged 60 years and older who had remitted from an episode of psychotic depression after acute ECT [68]. Relapse occurred less often with maintenance ECT. Additional information about maintenance ECT is discussed separately. (See "[Overview of electroconvulsive therapy \(ECT\) for adults](#)", section on 'Continuation and maintenance ECT'.)

Psychotic depression — ECT is particularly useful for psychotic depression. The efficacy of ECT for psychotic depression is discussed separately. (See "[Unipolar major depression with psychotic features: Acute treatment](#)", section on 'Electroconvulsive therapy'.)

Medication failure — Nonresponse to at least one antidepressant (medication failure) during the current depressive episode is associated with poorer response to ECT. A pooled analysis of 11 observational studies (n >1100 patients with unipolar or bipolar depression) found that response to ECT occurred in fewer patients with medication failure than patients without medication failure (58 versus 70 percent) [59].

Atypical depression — ECT may be as effective or better in atypical depression (mood reactivity, hyperphagia or increased weight, hypersomnia, leaden paralysis, and interpersonal

rejection sensitivity), compared with typical depression. Post hoc analyses of data from patients with unipolar major depression treated with bilateral ECT three times per week found significantly higher rates of remission in 36 patients with atypical depression compared with 453 patients with typical depression (81 versus 67 percent) [69].

Duration of depressive episode — A longer duration of the major depressive episode appears to be associated with decreased efficacy of ECT [70]. In a pooled analysis of seven observational studies (n >700 patients with unipolar or bipolar depression), the mean duration of the episode was longer in patients who did not respond to ECT than patients who responded (14 versus 7 months) [59].

Comorbid borderline personality disorder — Comorbid borderline personality disorder appears to be associated with decreased ECT efficacy [70,71]. A study evaluated the response to bilateral ECT or supratherapeutic right unilateral ECT three times per week in patients with unipolar major depression [71]. Patients with comorbid borderline personality disorder (n = 20) were less likely to remit from their depressive episode compared with patients with other comorbid personality disorders (n = 42) and patients with no comorbid personality disorder (n = 77) (20 versus 52 and 65 percent of patients).

Community hospitals — The efficacy of ECT in community settings may be substantially less than reported in clinical trials (see '[Acute ECT](#)' above). A prospective, observational study of 347 patients with unipolar or bipolar major depression treated with ECT in seven community hospitals found that only 30 to 47 percent of patients remitted [70]. These lower rates were partially attributed to premature termination of treatment before complete remission was achieved.

Biomarkers — There are no biologic predictors of sufficient utility to identify which patients are most likely to respond to ECT. However, preliminary studies suggest that differences in central nervous system structure and functioning may predict which patients will benefit. As an example, a prospective observational study using magnetic resonance imaging found that a small abnormality (higher pretreatment volume) in the subgenual anterior cingulate cortex was associated with a better clinical response to ECT [72]. In addition, prospective functional magnetic resonance imaging of neural networks centered in the dorsomedial prefrontal cortex and in the anterior cingulate cortex found that images in each network provided good sensitivity, specificity, and positive predictive value in predicting outcomes with ECT [73]. Nevertheless, the use of biomarkers to select patients for ECT is not standard practice. Rather, referral for ECT is determined by clinical features, such as severity and urgency of current symptoms [74].

Early improvement — Early improvement after six ECT sessions appears to be associated with remission by the end of treatment, suggesting that clinicians should continue ECT [9]. As an example, a prospective study of inpatients with unipolar major depression (n = 130) found that among patients with early improvement (defined as reduction of baseline symptoms by 20 to 30 percent), remission ultimately occurred in 73 percent (positive predictive value) [75]. However, it is not clear if lack of early improvement indicates that patients are unlikely to subsequently achieve remission, due to different results across studies [9,75]. Thus, we continue to administer ECT in patients not showing early improvement.

COST EFFECTIVENESS

The cost effectiveness of ECT compared with pharmacotherapy is not clear. A study that evaluated this was inconclusive because of the lack of data from randomized trials [76]. However, another study found that average total costs during treatment and the six-month follow-up period were significantly less for ECT compared with transcranial magnetic stimulation (6300 versus 10,600 pounds at 2003 and 2004 prices) [77].

OTHER PSYCHIATRIC AND MEDICAL INDICATIONS

ECT is used mainly to treat severe unipolar depression, but is also indicated for patients with other illnesses, including bipolar disorder, schizoaffective disorder, schizophrenia, catatonia, and neuroleptic malignant syndrome (See "[Bipolar disorder in adults: Indications for and efficacy of electroconvulsive therapy](#)" and "[Catatonia: Treatment and prognosis](#)" and "[Neuroleptic malignant syndrome](#)", section on 'Electroconvulsive therapy'.)

Although ECT can be used to treat the core motor symptoms of Parkinson's disease, the duration of benefit varies and ECT is not often used for this purpose, unless the patient has comorbid major depression [78]. Rarely, ECT has been used clinically to treat refractory status epilepticus [79-81]. ECT has also been reported to benefit chronic pain syndromes [82,83].

SOCIETY GUIDELINE LINKS

Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "[Society guideline links: Depressive disorders](#)".)

INFORMATION FOR PATIENTS

UpToDate offers two types of patient education materials, "The Basics" and "Beyond the Basics." The Basics patient education pieces are written in plain language, at the 5th to 6th grade reading level, and they answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10th to 12th grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or e-mail these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on "patient info" and the keyword(s) of interest.)

- Basics topics (see "[Patient education: Electroconvulsive therapy \(ECT\) \(The Basics\)](#)")
- Beyond the Basics topics (see "[Patient education: Electroconvulsive therapy \(ECT\) \(Beyond the Basics\)](#)")

OUTSIDE SOURCES OF PATIENT EDUCATION

One of the requirements for obtaining informed consent for ECT is that patients receive adequate information about the procedure. Additional written material is available for patients and family members to augment discussions with the psychiatrist at [the website](#).

Educational material explaining ECT is also available as part of a document entitled "Brain Stimulation Therapies" that is published by the National Institute of Mental Health. This publication can be obtained through a toll-free number, 866-615-646, or online at [the website](#). The website also provides information about depression in language intended for the lay public.

SUMMARY

- The primary indication for ECT is severe major depression that is life-threatening or significantly impairs functioning. ECT is also indicated for patients with other illnesses, including bipolar disorder, schizoaffective disorder, schizophrenia, and neuroleptic malignant syndrome. (See '[Other psychiatric and medical indications](#)' above and '[Indications](#)' above.)

- ECT is the most effective and fastest acute treatment for major depression. Remission occurs in 70 to 90 percent of patients who receive ECT, based upon randomized trials. (See ['Efficacy'](#) above and ['Speed of response'](#) above.)
- ECT is often indicated for patients with unipolar psychotic depression, severe suicidality or malnutrition secondary to food refusal, or catatonia, as well as patients who present with recurrent depression and were successfully treated with ECT in the past after multiple medication trial failures. (See ['Indications'](#) above and ["Catatonia: Treatment and prognosis"](#), section on ['Treatment'](#) and ["Unipolar major depression with psychotic features: Acute treatment"](#), section on ['Electroconvulsive therapy'](#) and ["Unipolar depression in adults: Choosing treatment for resistant depression"](#).)
- ECT may be less risky than antidepressant and antipsychotic medication for patients who are debilitated and older age. Pregnant and lactating patients worried about teratogenesis and other medication side effects can also be effectively and safely treated with ECT. (See ['Indications'](#) above.)
- Older age is associated with a good response to ECT. Comorbid borderline personality disorder appears to be associated with decreased ECT efficacy. (See ['Older age'](#) above and ['Comorbid borderline personality disorder'](#) above.)
- Early improvement (eg, reduction of baseline symptoms by 30 percent) after six ECT sessions appears to be associated with remission by the end of treatment. (See ['Early improvement'](#) above.)

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