INTRODUCTION

The specific effects of written plans for improving disease outcomes are unclear. However, because they enhance interaction between provider and patient, we assume there are benefits from having information and written instructions regarding disease states. Management plans may enhance patient compliance by promoting disease awareness in patients and family members. In rare diseases such as hereditary angioedema (HAE), management plans may serve to educate the community and facilitate proper treatment in an appropriate time frame. We have developed a management plan that helps our patients with HAE coordinate their health care. This plan potentially increases awareness of HAE and available treatments in our medical community, which may help health care providers coordinate care for the diagnosis and treatment of HAE.

BACKGROUND

HAE is a rare autosomal dominant disease characterized by deficient or dysfunctional C1 inhibitor (C1-INH), the main regulator of the early steps of the complement pathway. C1-INH also regulates the production of kallikrein, which increases bradykinin production. Medications are available to replace C1-INH or block kallikrein or bradykinin, which is the primary mediator in HAE.

The prevalence of HAE is ~1 in 50,000 in the United States. Until recently, treatment in this country was limited. Many medical personnel are not well acquainted with HAE or the newer treatment options. As a result, there are delays in diagnosis and treatment that increase morbidity and mortality. The burden of illness is significant, well documented, and compounded by limited access to appropriate care.

Because HAE is rare, it is not uncommon for the condition to remain undiagnosed for many years. Before newer therapy became available, the mortality rate for airway obstruction was as high as 40%. The first of several new US Food and Drug Administration (FDA)-approved medications for prevention and treatment of the symptoms of HAE became available in the United States in October 2008. Since then, 3 additional medications for treating acute attacks have been approved. Today, there are 5 FDA-approved treatments for HAE.

METHODS

In our experience, there has been insufficient access to the newer effective treatments. Although excellent HAE medications have been approved over the past 4 years, they may not be available for actual use during an attack for a number of reasons. A shortage also exists of experienced providers and treatment facilities that maintain a supply of HAE medications for acute attacks.

ABSTRACT

Background: Hereditary angioedema (HAE) is a rare disease for which treatment has been limited until recently. The burden of illness is significant and well documented. Patients have insufficient access to HAE treatments currently available in the United States, and US Food and Drug Administration–approved medications may also be unavailable for use during an attack. There is also a shortage of experienced providers as well as treatment facilities that stock medications for acute attacks. The dilemma of access to appropriate medications delays the early treatment of HAE attacks and may worsen morbidity and mortality.

Objective: Our goal was to educate and empower patients and their families about HAE treatment options, reduce the burden of illness, and improve quality of life.

Methods: An HAE management plan was developed to facilitate appropriate treatment. Patients were provided with a specific written or electronic letter of introduction and a personalized management plan. These documents explain how to treat acute attacks and access treatment options, and include references regarding HAE.

Results: Twenty-five of our patients with HAE now use this document. They have expressed feeling empowered by the management plan because it is individualized to their needs and has instructions related to their specific health care.

Conclusions: Our management plan improves the timely treatment of HAE attacks when patients need acute care. The plan educates and empowers patients with HAE and their families about treatment options, potentially reducing the burden of illness and improving their quality of life.

Management Plan for Patients With Hereditary Angioedema

Richard G. Gower, MD; E. Suzanne Levitch, ARNP; and Mary J. Brenner, AAS

Marycliff Allergy Specialists, Spokane, Washington
Many US medical facilities neither allow patients to bring their own medications for administration nor allow other institutions to supply those medications. This access dilemma may delay diagnosis and early treatment of HAE attacks, worsen the morbidity, and potentially increase the mortality from HAE. Early intervention has been shown to reduce morbidity and mortality in acute HAE attacks.6-9

We have developed a written HAE management plan to help educate our patients and community to facilitate proper treatment in an appropriate time frame.1 We provide our patients with a specific letter of introduction (Figure 1) to carry with them at all times, in either a paper or an electronic format. This letter explains how to treat an acute HAE attack and quickly access treatment options, and also has references regarding HAE. The management plan includes personalized information (Figures 2A and 2B), suggestions for maximizing quality of life, considerations for treatment by emergency department personnel, and contact information for the patient’s HAE specialist.

In the United States, several effective therapies are now available for prophylaxis and acute treatment of HAE.10-13 All can be used for home administration; however, not all patients are willing or able to self-administer these medications. Our management plan is designed to coordinate care and improve timely treatment of HAE attacks when patients need acute care and experienced providers or treatment options are not available. Our goal is to educate and empower patients and their families regarding treatment options, reduce the burden of illness, and improve patients’ quality of life.

RESULTS

Twenty-five of our patients with HAE have used this document and say they feel empowered by the management plan because it is individualized to their needs and has instructions related to their specific health care.3 The patients’ ages range from 6 to 66 years old, with the younger patients preferring the electronic version. Most of our patients are being treated at home. We have found that some emergency departments and infusion sites in our community are now stocking the newer HAE medications, thereby improving access to timely treatment of HAE attacks.

SUMMARY

Written management plans may enhance interaction between provider and patient, as well as provide education and instructions regarding disease treatment. Management plans may improve patient compliance by promoting disease awareness in patients, family members, and the community. Our plan potentially increases awareness of this rare disease, which may help health care providers coordinate care for the diagnosis and treatment of HAE. Our patients believe that the information and instructions in their individualized management plan have increased their awareness of HAE and improved their independence and quality of life.

Figure 1. Patient letter of introduction.
**Figure 2A.** Hereditary angioedema acute management plan: recommendations for emergency treatment of attacks.

### Recommendations for Emergency Treatment of Hereditary Angioedema (HAE) Attacks

**Patient Name:**

I have hereditary angioedema; it does NOT respond to antihistamines, corticosteroids, or epinephrine.

**I have taken the following medication for this HAE attack:**

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose (mg)</th>
<th>Time Taken</th>
</tr>
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<tbody>
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During an HAE attack, please consider:

- **Immediately give C1 inhibitor concentrate (1000-1500 units IV over 10-15 minutes) or octocinol (3:10)
- Injection of 'family' each, each) or localization (1:100 injection of 30 mg/mL) Indication of medication varies by age: the patient may have their own needs.
- If C1 inhibitor concentrate or octocinol or localization are unavailable, other options include:
  - Obtain C1 INH or octocinol or localization from local supplier: AHA, CINH, Providence Sacred Medical Center Pharmacy at 390, 342, 55 (and/or in their facility only) or octocinol: Oxy or octocinol: Oxy at 390, 342, 55 (and/or in their facility only).
  - Give 2-4 ml of octocinol solution of 10% per 100 mg to 30 mg.

Give supportive treatment - airway management, oxygen, IV access, treat pain, vomiting and hyperventilation. Strong evidence may be required.

- Check for electronic medical record (EMR) plan
- Alert my HAE Specialist
- If do not improve within 90 minutes, consider alternative diagnoses

### Patient Information

<table>
<thead>
<tr>
<th>HAE Specialist</th>
<th>Phone</th>
<th>Alternate #</th>
<th>Preferred hospital/phone</th>
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**Emergency Contact:**

<table>
<thead>
<tr>
<th>Phone</th>
<th>Relationship</th>
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### Medications I take for HAE:

#### Prophylaxis:

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage</th>
<th>IV</th>
<th>Oral</th>
<th>Frequency</th>
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<tbody>
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#### Treatment Location:

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage</th>
<th>IV</th>
<th>Oral</th>
<th>Frequency</th>
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#### My HAE attack triggers:

<table>
<thead>
<tr>
<th>Fatigue</th>
<th>Tingling</th>
<th>Non-rhythmic</th>
<th>Non-vocal symptoms</th>
<th>Nausea</th>
<th>Bowel movements</th>
</tr>
</thead>
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**Created:** July 9, 2011  **Revised:** February 13, 2013

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**Figure 2B.** Hereditary angioedema acute management plan: tips for living with the disease and barriers to medication availability.

### Hereditary Angioedema (HAE) Acute Management Plan

#### Tips for Living with HAE:

- Call 911 or proceed to the nearest emergency room if you notice:
  - Throat swelling / tightness
  - Swollen tongue
  - Lip / facial swelling
  - Nausea / vomiting
  - Shortness of breath
  - Whistling or wheezing when breathing
  - Palpitations or severe dizziness

- Early treatment of an attack is **ESSENTIAL**

- Self-administration of FDA approved treatments C1 Inhibitor and octocinol should be available for early administration.

- Recognize signs of an HAE attack so you can get help early and easily if needed.

- Implement an HAE emergency plan and make sure the people around you are also aware of them.

- Save important numbers in your cell phone or have an electronic version of this management plan.

- Include in your emergency kit:
  - List of medications, dosage, prescriber contact information, and reason for taking.
  - Carry a letter from your physician identifying you as someone with HAE.
  - Call the emergency department if your symptoms persist.

- If you are in a hospital, make sure the nearest medical facility is located in case of an HAE attack.

#### Barriers to Medication Availability:

- Excellent treatments are FDA approved but may not be available in all areas.
- Some facilities may not have access to these medications.
- Facilities are available to coordinate treatment access to patients by supplying medical facilities with medications.
- HAE is a rare disease and medical providers may not be fully aware of current treatments.

**Created:** July 9, 2011  **Revised:** February 13, 2013
Seven HAE patient deaths were reported by the US Hereditary Angioedema Association in 2010, no deaths in 2011, and 1 death in 2012 (not all of these deaths were directly related to HAE). Increased awareness of the disease, and availability and access to the newer treatments, may contribute to a decrease in morbidity and mortality from HAE. Several recently published guidelines recommend treating attacks as soon as they are recognized.6-9 Our observations suggest a substantial benefit from using this management plan to assist in the timely treatment of HAE attacks in our community.

REFERENCES

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CORRESPONDING AUTHOR:
Richard G. Gower, MD
Clinical Associate Professor of Medicine, University of Washington Marycliff Allergy Specialists
823 West 7th Avenue, Spokane, WA 99204
Phone: 509-838-3655, Fax: 509-838-1952
Email: rgower@marycliffallergy.com