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Effect of Hepatitis C Education on Patient Knowledge and Behavior

Jessie Casberg, PharmD, PGY-1 Pharmacy Practice Resident, Warm Springs Health & Wellness Center, Warm Springs, OR; Linda Crosby, PharmD, Clinical Pharmacist, Warm Springs Health & Wellness Center, Warm Springs, OR; Meghan Lelonek, MD, Family Practice, Warm Springs Health & Wellness Center, Warm Springs, OR. Corresponding author: J Casberg, Jessie.casberg@ihs.gov.

Background. Hepatitis C virus (HCV) infection has been identified as a growing national health concern. It is the most common chronic blood borne pathogen in the United States, with an estimated prevalence of 1.6%. HCV infection is the leading cause of complications from long-term liver disease, as well as the most commonly listed indication for liver transplant among adults. In addition to end stage liver disease including cirrhosis, HCV is commonly implicated in liver cancer.¹

While HCV infection is a concern for the entire nation, the American Indian and Alaskan Native (AI/AN) population is disproportionately affected. The Centers for Disease Control reported that the incidence of acute HCV infection among the AI/AN population was 1.09 per 100,000 persons in 2011. This represents a 7.9% increase from 2010, and over a 250% change from 2005 (increased from 0.31/100,000). When compared to other groups by race/ethnicity, the incidence of acute HCV infection in the AI/AN population is dramatically higher, with the next closest group being Whites at 0.47/100,000, followed by Hispanics, Blacks, and Asian/Pacific Islanders with incidences of 0.17, 0.14, and 0.05/100,000 respectively. HCV infection is also associated with higher mortality in the AI/AN population as compared to other racial/ethnic groups. The rate of death attributed to HCV infection in 2010 among the AI/AN population was 9.90/100,000 persons, which is nearly twice the national rate of 4.65/100,000.²

In 2013, the U.S. Preventative Services Task Force (USPSTF) recommended that all persons at risk for Hepatitis C be screened. Traditionally, risk factors for HCV infection

include injection drug use, long term hemodialysis, receipt of a blood transfusion prior to 1992, being born to a HCV infected mother, incarceration, intranasal drug use, getting an unregulated tattoo, accidental percutaneous exposure (ie needle stick), and high risk sexual behaviors. The USPSTF also identified adults born between 1945 and 1965 as a population that should be considered at risk, and offered screening at least once¹. Healthy People 2020 identified goals to increase the proportion of persons aware they have a Hepatitis C infection from a national average of 49% to 60%, and to reduce the number of new cases of Hepatitis C per year from 0.28/100,000 population to 0.25/100,000 population³. Data from the Warm Springs community between 2001 and 2010 has specifically identified chronic liver disease as the third leading cause of death in individuals of any age (13.2% of all deaths), and the leading cause of death for individuals aged 45 to 64 years old. This is dramatically higher than the national statistics which rank chronic liver disease as the twelfth leading cause of death (1.2% of all deaths). The death rate (per 100,000 persons) from chronic liver disease in Warm Springs was 80.7 (compared to 9.9 among AI/AN nationally²). While this data is for chronic liver disease in general, not HCV infection specifically, 29.6% of the deaths from chronic liver disease in the Warm Springs community include a diagnosis of HCV infection (local data according to an email from Dr. Miles Rudd [September 2013], Morbidity and Mortality Officer for the WSHWC).

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As a result of the increased emphasis on testing and prevention of Hepatitis C, and in light of the data showing increased morbidity and mortality risk in the AI/AN population, the Warm Springs Health and Wellness Center (WSHWC) implemented a HCV screening reminder in September of 2012. This reminder was intended to increase the percent of patients born between 1945-65 who are screened for HCV infection. As of August 2013, 43.6% of eligible patients had been screened, an increase from 10.9% screened in 2011. As of July 2013, 16 of 329 patients who received a HCV screen as a result of the reminder tested positive (4.5%). Of those 16 patients, ten underwent the next test for HCV RNA (56%), and of those 10, two tested positive for HCV RNA (22%), indicating active infection. To date, approximately 207 patients have HCV infection listed as a diagnosis at WSHWC. Of these, 56 are deceased, two have deferred treatment until expected new therapy options are available, one is receiving treatment at an outside clinic, and one is receiving treatment at WSHWC. This means that 148 patients (71%) have a positive HCV screen, and are currently not being treated. The majority of these patients have not had HCV RNA testing at this time.

Treatment for HCV infection is provided at WSHWC through a program called Project ECHO (Extension for Community Healthcare Options). This is a telemedicine partnership between the University of Washington and a number of clinics in rural and underserved areas. The purpose of Project ECHO is to provide support, and expert guidance for the screening, diagnosis, and treatment of HCV infection. Project ECHO allows primary care providers in participating clinics to manage the complicated care of patients with HCV infection with real-time support and clinical consults from experts in the field. This expands access to care for patients at these clinics, who might not otherwise be able to seek treatment due to limitations like cost or transportation.

Currently one provider at WSHWC participates with Project ECHO to offer treatment to patients with HCV infection, and the estimated capacity for treatment at WSHWC is 30 patients. Despite this opportunity, only one patient is currently receiving treatment for HCV infection at WSHWC. Barriers to treatment identified by clinicians at WSHWC include treatment ineligibility due to comorbidities such as uncontrolled diabetes mellitus, uncontrolled neuropsychiatric disease, and alcohol addiction, as well as lack of patient education about HCV infection. Providers have identified concerns that even patients who have been screened for HCV infection are often unaware of their status, and those who are aware of their status have not always been made aware of the implications of HCV infection.

There is a serious need for patient education about HCV infection within the community of patients who receive care at WSHWC. Increasing patient awareness and understanding of the disease can increase interest in personal status, promote lifestyle choices leading to prevention of HCV infection, and increase the number of patients with active HCV infection that seek treatment. Patient education

is a valuable tool for health promotion because it increases patient ownership and participation in their healthcare. Chronic diseases and those requiring rigorous treatment regimens like HCV infection require patient commitment for effective treatment, which cannot be accomplished without assisting patients to become active participants and personal advocates for their health. One systematic review evaluated the effect of patient education about viral hepatitis on knowledge level, healthy behaviors (testing/vaccination), willingness to enter treatment/adhere to treatment, and patient feelings of self-efficacy. The study found significant improvements ($p < 0.05$) in 8 out of 10 studies that evaluated the effect of patient education about HCV infection on one or more of these measures⁴. While studies evaluating the effects of educational interventions are difficult to control and often evaluate small populations, the results contribute positively to the understanding of ways to improve patient empowerment and delivery of patient care.

The Department of Health and Human Services (HHS), under the direction of Assistant Secretary for Health Dr. Howard Koh, has developed an action plan for the prevention, care and treatment of viral hepatitis. This report was developed by a Viral Hepatitis Interagency Working Group which included subject matter experts from various HHS agencies. The initial action plan was developed with a timeline of steps for implementation during 2011-2013. An updated report was published in 2014 with plans for the years 2014-2-16. The report estimated that full implementation of the action plan could result in an increase in the proportion of persons aware of their HCV infection to 66% (exceeding the Health People 2020 goal), and a 25% reduction in the number of new HCV infections. Included in the report are six topic areas for recommendations, the first of which is "Educating Providers and Communities to Reduce Health Disparities." This recommendation includes the following goals:

- 1.1 Build a U.S. health-care workforce prepared to prevent and diagnose viral hepatitis and provide care and treatment to infected persons.
- 1.2 Decrease health disparities by educating communities about the benefits of viral hepatitis prevention, care, and treatment.

The full outline of the steps to be taken for the implementation of these goals can be found in *Combating the Silent Epidemic of Viral Hepatitis: Action Plan for the Prevention, Care and Treatment of Viral Hepatitis*. Of note, Strategy 1.2.1 in the original action plan states "Increase the proportion of persons living with Hepatitis B and Hepatitis C who know that they are infected and are linked to timely care and treatment," and includes the following actions to be initiated in 2013: "Launch a national education campaign designed to increase awareness about Hepatitis B and Hepatitis C and to educate the public about risk and the benefits of prevention, care, and treatment..." and "Survey communities to assess viral hepatitis knowledge and conduct additional surveys to measure impact of campaign messages

on knowledge and health-seeking behavior.”⁵ Education strategies continue to be emphasized in the updated action plan.⁶

The purpose of this project aligns well with this national action plan, and can help WSHWC take a front line position in the effort to eradicate HCV infection both nationally and globally.

Objective. The purpose of this project is to increase awareness about Hepatitis C prevention and treatment options through a pharmacist-led patient education campaign in the Native population of the Warm Springs Confederated Tribes. The impact of the education campaign will be evaluated through the following endpoints:

- Anonymous pre and post-surveys for patients attending educational workshops
- Anonymous documentation of patients inquiring about their Hepatitis C status, including how they found out about Hepatitis C, in an attempt to capture the impact of educational sessions and clinic educational material on patient actions

This study is designed to evaluate the impact of patient education on patient behavior. Ultimately the goal of this project is to increase patient awareness and interest in Hepatitis C in order to decrease morbidity and mortality related to the disease. Baseline data will be discussed, but this trial is not designed to assess morbidity and mortality. Instead this study will report observational data. For survey results, pre-survey results will serve as controls for post-survey results. For patients inquiring about Hepatitis C in clinic, only raw numbers and percentages will be reported, with no comparator group.

Methods. This is an observational study, and all patient data will be blinded to the study researchers. Educational materials for this intervention will be developed by the pharmacy resident with input from other pharmacists, clinicians, and patient educators. Educational material will be distributed in the following ways:

- Live presentations at patient education venues including: Warm Springs Senior Center, Diabetes group, Diabetes prevention group
- Posters and slide shows to be displayed throughout the WSHWC clinics and pharmacy, in the mobile clinic, and around Warm Springs (as permission allows)
- Radio spots both to advertise patient education sessions, and to promote awareness about Hepatitis C and promote patient knowledge of their personal status

Educational material will cover the following topics about Hepatitis C:

- What is Hepatitis C
- How is Hepatitis C spread
- How can Hepatitis C be prevented
- Who is at risk for Hepatitis C/who should be tested for Hepatitis C

- How can someone find out if they have Hepatitis C
- How is Hepatitis C treated/what resources are available in the Warm Springs Area

Patients will be eligible for inclusion in the study if they are over 18 years of age. Patients will be excluded from the data collection component of the study if they are under 18 years of age, or do not grant consent. Patients under 18 years of age or not wishing to participate in the surveys will still be welcome at education sessions. No written consent will be collected from patients, in order to maintain anonymity of patients, but patients may refuse to participate in education sessions, surveys, and questionnaires.

Patients attending live presentations will be asked to complete a survey before and after the presentation, to assess the efficacy of the discussion in highlighting important information. No data will be collected on the survey that would lead to patient identification; however, patients will be asked an age range and gender, for demographic characterization. Patients may choose not to answer any or all of the survey questions. See Appendix C for a sample survey. Patients will be provided a handout with the survey to outline their right to refuse to participate, as well as information about who to contact should they feel the education session or survey process was inappropriate. No written consent forms will be collected, as this would lead to patient identification.

When a patient inquires about Hepatitis C in the clinic, they will be asked what prompted their interest. The inquiry and the motivating factor will be reported to the study researchers. This will be done in one of the 2 following ways:

- A card indicating their interest will be filled out and collected in clinic, and it will include a multiple choice question to ascertain what prompted their interest. This card will not include patient identity.
- A question will be included on the Hepatitis C template in EHR which answers the question about motivating factors in the same multiple choice format. This information will later be pulled from EHR with no patient identifiers.

Prior to the launch of the patient education campaign, an educational session for clinicians and staff in the WSHWC will be provided, to prepare everyone for new inquiries about Hepatitis C, and promote use of the cards or EHR template. This session will also review basic information about Hepatitis C, and the current efforts in the clinic to identify and provide treatment options to patients who have a Hepatitis C infection. A pre and post survey will also be collected for this presentation.

The educational campaign is expected to launch no later than October 15, 2013, pending approval.

Data Collection:

- Pre and post surveys will be collected at each educational session. These results will be recorded

in an excel spreadsheet. No patient identifiers will be collected.

- Patient inquiries about their Hepatitis C status, or about Hepatitis C in general will be collected at the time of the inquiry either via a question included in their evaluation template on EHR, or via a card with no patient identifiers.
- Answers from the template will be pulled in such a way as to prevent patient identification, and this information will be stored in an excel spreadsheet to include only the following information: positive patient inquiry, and reason for interest.
- Cards will be collected in the clinic and placed in a central location, to be picked up by the study researcher. Information will be stored in the same manner as above, and cards will be shredded as soon as information is recorded.
- At the conclusion of the study, the number of patients with Hepatitis C infection who have been identified since the initiation of the study and the number of patients with Hepatitis C who are currently in treatment or actively seeking treatment will be recorded. This is to provide another measure of impact, and can be compared to the number of patients in each of these categories prior to the implementation of the educational campaign.
- All data will be stored on password protected computers.

Data Analysis:

- Pre surveys will serve as controls to post surveys, and the differences in results will be discussed as percent of correct pre and post survey answers.
- Inquiries about Hepatitis C in the clinic will be discussed as raw numbers (number of inquiries), and percentages (number of inquiries as a result of each reason for inquiry).
- Patients identified as Hepatitis C positive patients and those in treatment or actively seeking treatment during the study period will be reported in raw numbers.

Data Storage. Following the conclusion of the study, all data and study results will become property of the WSHWC. No patient identifiers will be collected, so disclosure of patient identity is not anticipated.

Data storage: Upon collection, paper surveys (including education session pre and post surveys, and in clinic hepatitis C status interest questionnaires) will be temporarily stored in a locked file cabinet in the locked pharmacy (access only available to pharmacy staff via key card during business hours) until such time that the survey results can be entered into an Excel spreadsheet. No surveys collected will be in any way linked to personal patient identifiers at any time. Electronic data will be stored in a password protected file on a computer in the locked pharmacy throughout the study period.

Data retention: Once data from paper surveys has been recorded electronically, paper copies will be shredded. No paper copies will be maintained longer than necessary to record in electronic file. Electronic data will be maintained for the duration of the study period (Estimated study end: June 2014). Upon completion of the study period, only final write ups of data (poster presentation, slide show/handouts, articles, and manuscript) will be maintained. These write ups will not include any patient identifiers.

Data destruction: Paper copies of surveys will be shredded in a secure manner according to clinic procedures for destruction of personal protected health information. Raw data in electronic form (spreadsheets) will be permanently deleted from all files upon completion of the project. The time-frame for data retention and destruction is defined above. Data collection and analysis will cease by April 30, 2014. Study results may be presented throughout May and June, with the possibility of publication at a later date pending approval from the Tribal Council and the Portland Area Institutional Review Board (IRB).

The study results will be presented to the medical staff at WSHWC and the Health and Welfare Committee. If approved by the Tribal Council and IRB, the study proposal will be presented at the 2013 American Society of Health-System Pharmacists Midyear Clinical Meeting in Orlando, Florida. Additionally, the results of the research will be presented at the 2014 Western States Conference for Pharmacy Residents, Fellows, Preceptors, and Sponsors in San Diego, California..

Risks/Benefits to WSHWC. Minimal risks exist for individual participants and the community of Warm Springs. All data collected will be completely anonymous – no personal identifiers will ever be collected by researchers.

Hepatitis C infection is an international epidemic, and efforts are being made globally to promote prevention and treatment. Among the patient population at WSHWC, patient awareness has been identified as a major barrier to these goals. This project will provide educational material to both providers/staff at WSHWC and to patients to promote awareness about Hepatitis C in this population, with the goal of influencing behaviors leading to prevention and effective treatment. Healthy People 2020 has identified the need to increase the proportion of persons aware they have a Hepatitis C infection and reduce new Hepatitis C infections. This educational campaign is designed to increase the awareness and interest level about Hepatitis C in the population in Warm Springs, and could lead specifically toward meeting these goals. Additionally, the WSHWC has the capacity, through a partnership with Project Echo, to provide excellent treatment and care for patients with Hepatitis C infection. This service is currently underutilized, and patient awareness may be a major factor contributing to its lack of use. Promoting basic knowledge about Hepatitis C can empower patients to know their status, make choices in their lifestyles to protect those around them and promote prevention, and seek treatment, if necessary.

Results

During the study period, a total of 4 education presentations were provided in the community. One radio public service announcement and one newspaper public service announcement were published, and one health fair was attended. Live education session attendance ranged from 1 participant to greater than 30 participants (exact number not recorded). A total of 57 pre-surveys and 41 post-surveys were collected from the live education sessions. The number of participants reached via newspaper, radio, and health fair attendance is not assessable. Questionnaires to assess HCV test inquiries were handed out at all events, and participants were encouraged to return these to the WSHWC to ask about their HCV status. None of these questionnaires were returned. Additionally, it was found to be impossible to set up a template in the electronic health record to record data about patient HCV status inquiries in such a way to allow for anonymous data collection, and thus no template was created. The number of patients who had been screened before and after the education campaign was also not collected, because this data collection process was ongoing and performed by another provider, making it difficult to define discreet "before" and "after" results.

Fewer post surveys were collected as compared to pre surveys. This makes comparison of the number of correct answers difficult between the two, and this limitation should be kept in mind when assessing the data. In the post survey results, all correct answers were chosen by an increased percent of participants compared to the pre survey results, with the exception of the question of whether or not antibiotics were necessary for treating HCV infection, which had a lower percent of participants choosing the correct answer (No) on the post survey compared to the pre survey (2.6%). Additionally, 8 questions on the survey had a greater percent of incorrect answers identified on the post survey compared to the pre survey. Confusion appeared to be most prevalent among questions about the cause and transmission of HCV infection, who is at risk for HCV infection, and how HCV infection is treated. Only one question ("I can find whether or not I have Hepatitis C with a simple test") had a 100 percent correct response rate on the post survey.

Discussion

The survey results presented above appear to demonstrate an increase in overall knowledge about HCV infection in the community of Warm Springs. With the exception of one question, the post survey results had a greater percent of respondents choosing the correct answers. Unfortunately, one question had a lower percent of correct responses on the post survey, and eight questions had a greater percent of incorrect answers chosen on the post survey. There are a number of possibilities that may account for these discrepancies. Respondents may have felt the question had unclear language, may have randomly guessed at answers, or education session provided information that was unclear to participants. Most likely, the results represent a combination of all three of these possibilities. For example, a greater percent of respondents identified that Hepatitis C

has a vaccine on the post survey compared to the pre survey. This is likely a result of random guessing and unclear education, as the vaccines for Hepatitis A and B were discussed, but it may not have been as clearly emphasized that HCV does not have a vaccine available. The cause of Hepatitis C also had a number of incorrect answers that were chosen by a greater percent of respondents on the post survey. This may be due to some confusion about the difference between viruses and bacteria (respondents may have just remembered "infection"). Respondents may also have found the question confusing, as injection drugs can lead to infection with HCV, and alcohol can make HCV worse, which may be what they were identifying with these incorrect answers. Similar confusion may have resulted in the incorrect identification of "Eating bad food" and "Drinking alcohol" as routes of transmission for HCV infection, and Hepatitis A infection (oral-fecal route) was discussed, as were different causes of liver inflammation (alcoholic cirrhosis). A greater percent of respondents on the post survey identified that an antibiotic would be required for an HCV infection, which is likely due to a comparison of antiviral medications to antibiotic medications during the presentations. Finally, more respondents said that treatment was not available or not available at WSHWC. Because this statement identified two facts, rather than one, it is difficult to discern whether respondents believed that treatment for HCV infection was not available in general or was not available specifically at WSHWC.

One obvious limitation of the survey results is the lower number of post surveys returned as compared to pre surveys. This limits the comparability of results to percentages, rather than raw numbers, and it is impossible to say with certainty that more people knew the correct answers following the presentations as compared to before, because despite an increase in percent of correct answers, the total number of correct answers was the same or lower on many questions. Some questions had an obvious increase in the total number of correct responses, which lends confidence to the idea that at least some of the increases in the correct answers are reflections of information gained during the presentations. It is unclear why there were fewer post surveys returned as compared to pre surveys, but some reasonable explanations might include that participants left in the middle of the presentation, or right at the end of the presentation prior to completing a survey, that participants were reluctant to complete the survey a second time, as it was quite long and involved, or that participants were unwilling to return the survey a second time due to personal preference or the feeling that they had not gained knowledge during the presentation. All participants were provided with an informed disclosure document that outlined their right to refuse to answer any or all of the survey questions.

Another major limitation of the study was the lack of results for questionnaires returned to the clinic and the number of patients before and after the education campaign who had been tested for HCV infection, which would have helped assess the change in behavior as a result of education sessions and health fair participation. There was a positive

change between the pre and post surveys for the percent of respondents who identified that they did not know their HCV infection status (or who did not answer that question) who responded that they would like to be tested for HCV infection (46.3% on the pre survey, 80.9% on the post survey). Unfortunately this result can be called into question, as a lower total number of respondents fell into the category of not knowing their status or not answer the question, and a lower total number of respondents indicated that they would like to be tested for HCV infection on the post survey compared to the pre survey (19/41 compared to 17/21, respectively).

While limited in many ways, this study does provide some important insight that can be used for future work in HCV prevention and treatment efforts. It clearly identified a need for HCV infection education in the community of Warm Springs. Despite being the most common blood borne pathogen in the United States, and despite its clear impact on the community of Warm Springs, HCV infection remains poorly understood by the community. This study also identified successful and unsuccessful strategies for reaching the community. The most successful (best attended) outreach events were conducted as joint efforts with programs already established in the community, including the tribal Diabetes Prevention Program and the clinic Diabetes Program. Surveys were obviously too long and cumbersome to complete, and questions were not clearly worded in all cases. Additionally, the education provided could be more focused, and areas of confusion (such as route of transmission and causative agent for HCV infection) could be clarified in future presentations. During the time that this study was being completed, the Centers for Disease Control has developed a national campaign, Know More Hepatitis, that is designed to increase awareness about HCV infection and promote one time testing among those born between 1945 through 1965. While specifically targeted at this birth cohort, much of the material is suitable for providing HCV infection information to the general population, and its use is encouraged by the updated Action Plan published by the Department of Health and Human Services in April of 2014.

Moving forward, several strategies could be adopted to improve the HCV infection education provided to the Warm Springs community, promote testing, and connect patients to care. These could include:

- Continuing to involve established organizations and programs throughout the Warm Springs community (these might include the Warm Springs Jail, the Community Counseling Center, Community Wellness programs, and the Diabetes Programs)
- Adapt national education material (from Know More Hepatitis and others) and existing local education campaign material for use in the Warm Springs community to help make information more clear

- Continue to assess results of the education campaign through abbreviated and simplified surveys
- Identify patients who have an active HCV infection, and offer more detailed and focused education information regarding care options
- Track testing rates in the Warm Springs community to assess efficacy of HCV education on promoting HCV testing in at risk individuals

These strategies and recommendations are targeted at future efforts in the Warm Springs community, but could be adapted for any area interested improve HCV infection knowledge in their community. Other organizations planning to improve or initiate HCV infection education programs should take advantage of national and local resources for providing education and linking patients to care.

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*Indian Health Service
National Pharmacy and Therapeutics Committee
Antiepileptic Medications
NPTC Formulary Brief
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Background:

The Indian Health Service (IHS) National Pharmacy and Therapeutics Committee (NPTC) reviewed epilepsy and antiepileptic drugs at the Fall NPTC Meeting in November 2014, evaluating data on safety, efficacy and IHS utilization and procurement. The Committee evaluated carbamazepine, ethosuximide, lacosamide, lamotrigine, levetiracetam, oxcarbazepine, phenytoin, topiramate, valproic acid, and zonisamide in detail. Clonazepam, clobazam, ezogabine, felbamate, gabapentin, pregabalin, rufinamide, and tiagabine were also evaluated briefly.

Discussion:

In the United States, 5-10% of people experience a seizure in their lifetime; approximately 1/3 of those will have a recurrence. At any given time, epilepsy, which is defined as two or more seizures unrelated to an immediately reversible condition, affects two million Americans (1% of the population). Nearly 3% of the population will be diagnosed with epilepsy during their life. Total direct and indirect costs related to the disease in the United States are estimated at \$15.5 billion per year.¹

Most antiepileptic drugs have unique chemical structures but their clinical utility can be categorized as either narrow spectrum, indicated for treatment of focal-onset seizures, or broad spectrum, indicated for both focal-onset and primary generalized seizures. Mechanisms of action differ but, in general, medications for seizures act to reduce the excitability of neurons in the brain through effects on ion channels, synaptic transmission, or neurotransmitter concentrations.²⁻¹¹

Findings:

Efficacy:

A multi-source comparison of epilepsy medications, including a PubMed search of clinical trials, an exhaustive review by the Agency for Healthcare Research and Quality, and meta-analyses from The Cochrane Library, yielded no consistent differences in terms of efficacy.¹²

Safety:

Newer antiepileptic drugs, i.e. those developed in the past 25 years, are better tolerated than older medications.¹² Most antiepileptic drugs can cause sedation, cognitive changes, nausea, dizziness, and imbalance. Many can also cause changes in liver function or blood counts. To mitigate common side effects, treatment is initiated at the lowest dose and increased gradually until an acceptable clinical response is reached. Slow titration is especially essential for drugs such as lamotrigine that are associated with high risk of severe skin rash during adjustments in dosage.²⁻¹¹ Many antiepileptic drugs have distinct side effects. For example, levetiracetam can cause or aggravate behavioral problems and valproate causes tremor in some patients. No drug has been proved superior overall so treatment for an individual is chosen from among a number of first line medications based on epilepsy syndrome, seizure type, and side effect profile.

Portability is an additional factor used to select medications for the National Core Formulary (NCF). The response to therapy varies from person to person so experts recommend inclusion of a number of drugs of choice to ensure, should patients move or travel, drug availability across medical centers.

Antiepileptic drugs can be teratogenic. Many are classified as pregnancy category D, with documented risk to the unborn fetus. None are classified better than pregnancy category C. Valproic acid is currently considered the highest risk drug.²⁻¹¹ Despite potential teratogenicity, antiepileptic medications, even valproic acid, should not be stopped during pregnancy due to the danger to an unborn fetus of prolonged or frequent seizures.¹³

Conclusion:

No single antiepileptic medication is superior for all seizure types and for all individuals. Clinical guidelines indicate that a variety of medications are needed to treat epilepsy effectively, with treatment selection based on characteristics of the anticonvulsant, including side effect profile, ease of administration, and potential drug interactions (Table 1) as well as characteristics of the individual, including seizure type and epilepsy syndrome.^{13,14}

Table 1: Selection of Antiepileptic Medication

Patient						
Focal Onset Seizure	P	P	P	P	P	P
Generalized Onset Seizure	X	P	P	X	P	P
Behavior Problems		X				
Poor Compliance			X	P	X	P
Elderly	X	P				
Hepatic Dysfunction		P	P			X
Obesity					P	X
Potential for Drug-Drug Interactions	X	P	P	X		
TCA Allergy	X					
Women of Childbearing Age				X	X	X

Adapted from Northern Navajo Medical Center Epilepsy Clinic Nomogram for Choosing an Antiepileptic Medication Preferred – P, Consider Avoiding – X

The NPTC **added** carbamazepine, lamotrigine, levetiracetam, and phenytoin to the existing NCF which includes topiramate, divalproex, gabapentin, clonazepam, and lorazepam, providing two narrow spectrum and four broad spectrum antiepileptic medications. Gabapentin, clonazepam and lorazepam, though not drugs of choice for specific seizure types, can be used as adjunctive antiepileptic therapy, and were retained on the NCF primarily for their use in other disease states.

If you have any questions regarding this document, please contact the NPTC by email at IHSNPTC1@ihs.gov. For more information about the NPTC, please visit the NPTC website at <http://www.ihs.gov/nptc/>

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