OFP

Osteopathic Family Physician

THE OFFICIAL PEER-REVIEWED PUBLICATION OF THE AMERICAN COLLEGE OF OSTEOPATHIC FAMILY PHYSICIANS

January/February, 2016

Volume 8 | Number 1

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Official Notice to the ACOFP Membership

Proposed Amendments to the ACOFP Constitution & Bylaws

CONSTITUTION

According to the Constitution of the American College of Osteopathic Family Physicians, Inc.

Article IX – Amendments: Section 1. *This Constitution may be amended at any annual meeting of the Congress of Delegates by a three-fourths vote of the total number of delegates credentialed for voting, provided that the proposed amendment shall have been filed with the Executive Director of the College at least 60 days before the first day of the meeting of the Congress of Delegates and that the Executive Director shall have notified the membership of the College in writing of the proposed amendment at least 30 days preceding the first day of the meeting of the Congress of Delegates.*

Section 2*. All amendments to the Constitution shall not be effective until they are submitted to and approved by the Board of Trustees of the AOA.*

The ACOFP Board proposes the following amendments to the Constitution. Approval of the amendments will be voted on at the ACOFP Congress of Delegates at its April 7, 2016 meeting. If adopted by the ACOFP Congress of Delegates, approval will be sent to the American Osteopathic Association Board of Trustees for approval. (New material in all caps and old material in strike out.)

CONSTITUTION OF THE AMERICAN COLLEGE OF OSTEOPATHIC FAMILY PHYSICIANS, INC.

ARTICLE II – MISSION & OBJECTIVES

Section 2.8

To abide by the Code of Ethics of the College ~~and its affiliated organizations, which shall conform to the Code of Ethics of the AOA;~~

ARTICLE II – MISSION & OBJECTIVES

Section 2.10

To conduct at least two educational programs annually - one ~~being~~ OF WHICH MAY BE in conjunction with the annual scientific seminar of the AOA.

BYLAWS

According to the Bylaws of the American College of Osteopathic Family Physicians, Inc.

Article XVI - Amendments Section 1*. Notification. These Bylaws may be amended at any annual meeting of the Congress of Delegates by a two-thirds vote of the total number of delegates credentialed for voting, provided that the proposed amendment shall have been filed with the Executive Director of the College at least 60 days before the first day of the meeting of the Congress of Delegates and that the Executive Director shall have notified the membership of the College in writing of the proposed amendment at least 30 days preceding the first day of the meeting of the Congress of Delegates.*

Section 2*. Approval. An amendment to these Bylaws shall not be effective until they are submitted to and approved by the Board of Trustees of the AOA.*

The ACOFP Board proposes the following amendments to the Bylaws. Approval of the amendments will be voted on at the ACOFP Congress of Delegates at its April 7, 2016 meeting. If adopted by the ACOFP Congress of Delegates, approval will be sent to the American Osteopathic Association Board of Trustees for approval. (New material in all caps and old material in strike out.)

BYLAWS OF THE AMERICAN COLLEGE OF OSTEOPATHIC FAMILY PHYSICIANS, INC.

ARTICLE XVII – CODE OF ETHICS:

The Code of Ethics of this College shall ~~conform to the Code of Ethics of the American Osteopathic Association~~ BE APPROVED BY THE CONGRESS OF DELEGATES AND ADMINISTERED IN ACCORDANCE WITH POLICIES ADOPTED BY THE BOARD OF GOVERNORS.

For the full version of the ACOFP Consitution & Bylaws and the Code of Ethics, visit www.acofp.org.

OFFICIAL CALL • 2016 CONGRESS OF DELEGATES OF THE ACOFP

YOU ARE HEREBY NOTIFIED THAT THE ACOFP CONGRESS OF DELEGATES WILL CONVENE ON APRIL 6 - 7, 2016 AT THE PUERTO RICO CONVENTION CENTER IN SAN JUAN, PUERTO RICO.

Credentialing of Delegates and Alternate Delegates will take place on the afternoon of Wednesday, April 6 before the start of Session I, and Session II which will convene on the morning of Thursday, April 7. Each ACOFP Affiliate State Society shall certify the names of its Delegates and Alternate Delegates to the ACOFP Executive Director by March 1, 2016.

Any reports, resolutions, or other business for this meeting should be submitted by March 1 to Annie DeVries at annied@acofp.org so that they can be posted on the ACOFP website and available to Delegates to review in advance.

Mark E. Sikorski, DO, FACOFP *dist.*
Speaker of the Congress of Delegates

EXAM SCHEDULE

CERTIFICATION & OCC (RECERTIFICATION)

AOBFP EST. 1972

EXAMS	LOCATION	POSTMARK DATE
Pain Medicine CAQ Certification Exam	**Chicago, IL** May 14, 2016	**January 4, 2016** *Late fee through February 5*
	AOA OMED Conference	
Family Medicine / OMT Certification / OCC Performance Evaluation only	**Anaheim, CA** September 16 - 20, 2016 September 16 - 18, 2016	**April 1, 2016** *Late fee through June 1*
Family Medicine / OMT Initial Certification / OCC Cognitive Exam	**Electronic Testing** Regional Sites September 24, 2016	**April 1, 2016** *Late fee through June 1*

AMERICAN OSTEOPATHIC BOARD OF FAMILY PHYSICIANS
If you have questions, please call 847.640.8477 or email aobfp@aobfp.org.

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Osteopathic Family Physician
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2016 CALL FOR PAPERS

Osteopathic Family Physician **is the ACOFP's official peer-reviewed journal.** The bi-monthly publication features original research, clinical images and articles about preventive medicine, managed care, osteopathic principles and practices, pain management, public health, medical education and practice management.

INSTRUCTIONS FOR AUTHORS

Reserve a review article topic today by emailing ACOFP Managing Editor, Belinda Bombei at belindab@acofp.org. Please provide your name and the review title you would like to reserve.

Once you reserve a review article topic, you will receive an email confirmation from ACOFP. This will initiate a three-month deadline for submission. If the paper is not received within three months, the system will release the review article topic for other authors to reserve.

Articles submitted for publication must be original in nature and may not be published in any other periodical. Materials for publication should be of clinical or didactic interest to osteopathic family physicians. Any reference to statistics and/or studies must be footnoted. Material by another author must be in quotations and receive appropriate attribution.

ACOFP reserves the right to edit all submissions. Visit ofpjournal.com to view author guidelines, policies, and manuscript checklist.

CLINICAL IMAGES

We are seeking clinical images from the wards that covers essential concepts or subject matter to the primary care physician. Please provide a brief synopsis of how the case presented along with 1-4 questions and approximately 1 page of education with reference to the image and questions.

REVIEW ARTICLE TOPICS:

- Abnormal Loss of Weight
- Direct Primary Care: Emerging Practice Alternative
- Direct Primary Care: Legal Aspects
- Knee Pain in Adults with OMT component
- Monetary Incentives in Care - Both the Ethics & How Do I Calculate My RVU Bonus
- Nausea with Vomiting
- Osteopathic Consideration in the Infections of the Respiratory Tract
- Osteopathic Principles in Pain Management
- Otitis Media, Acute

Amy Keenum, DO, PharmD
Editor-in-Chief

Ronald Januchowski, DO, FACOFP
Associate Editor

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Guide for...

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OFP

2015-2016

Osteopathic Family Physician

The Official Peer-Reviewed Publication of the
American College of Osteopathic Family Physicians

INSTRUCTIONS FOR AUTHORS:

Articles submitted for publication must be original in nature and may not be published in any other periodical. Materials for publication should be of clinical or didactic interest to osteopathic family physicians. Any reference to statistics and/or studies must be footnoted. Material by another author must be in quotations and receive apporpriate attribution. ACOFP reserves the right to edit all submissions. To submit a manuscript or to access additional submission guidelines visit mc04.manuscriptcentral.com/ofp.

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- Familiarity with the Osteopathic Family Physician editorial standards and compliance with those standards.
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- A good article takes 1-3 hours to review and a flawed article may take up to 10 hours.

We recognize the time and effort and will be respectful to send articles that are worthy of reviewing and respect your time and limitations. Please email belindab@acofp.org your CV and what type of articles you are qualified to peer review based on your specialty area(s).

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- Available for a 8am EST conference call with the OFP editors on a predetermined Friday to discuss, rank and decide which articles will be slated to a bimonthly issue for OFP; choose an image for the cover of a bimonthly issue; choose a topic for patient education handout.

Please email belindab@acofp.org your application with the subject line "Student Writing Intern." You will be asked to sign a letter of commitment that outlines your duties and professional expectations.

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- Respect the confidentiality inherent in the review process.
- A good article takes 1 – 3 hours to review and a flawed article may take up to 10 hours.
- You will be asked to peer review at least 1 article during the 2016 journal year.
- You will be provided with peer reviewing how to's and an evaluation by an OFP editor of your submitted peer review.

Please email belindab@acofp.org your application with the subject line "Student Peer Review Intern." You will be asked to sign a letter of commitment that outlines your duties and professional expectations.

EDITOR'S MESSAGE

Be the Author of the Article You Want to Read

Amy J. Keenum, DO, PharmD, Editor, Osteopathic Family Physician

Many of the articles submitted to Osteopathic Family Physician are about rare conditions and this month we are featuring discussion of these rare disorders submissions along with more typical presentations in the family physician office.

Asthma is common and not many new treatments are available. This review article keeps us up-to-date on the current diagnosis and provides a stepwise treatment approach to asthma. The prevention, assessment, maintenance treatment and treatment of asthma exacerbations are discussed.

Smoking cessation is an important issue in health care. The article this month focuses on the role of the pharmacist in smoking cessation. The article cites several other articles that indicate pharmacists have a role in helping patients stop smoking. Inter-professional education is partly teaching each other what we can do.

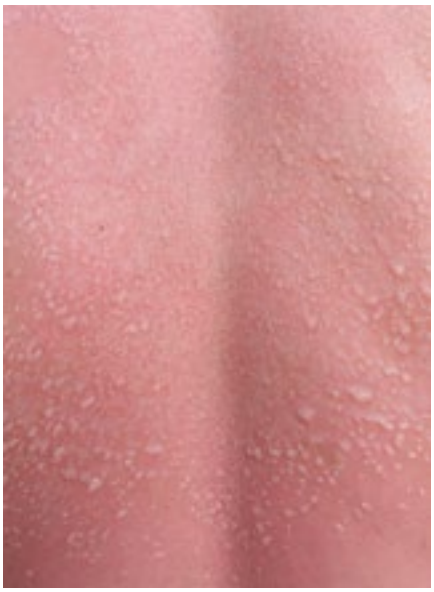
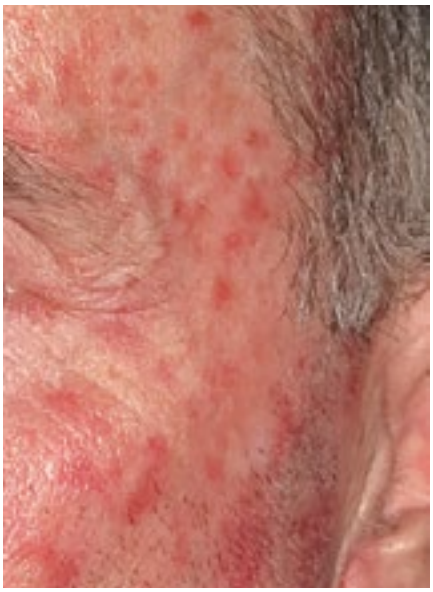
Ovarian cancer is not common but not rare. The big problem with ovarian cancer is that it is often not diagnosed before it is an advanced disease. It is difficult to catch early, as we presently do not screen for this condition. The article in this edition discusses an osteopathic approach to this disease including osteopathic manipulative therapy. Not all chemo is created equal and, wow, is that area changing quickly. This article does not discuss chemotherapy in detail.

There is an article looking at obesity in children and rates of influenza. Association is not causation.

What would you like to read in Osteopathic Family Physician? Be the author of that article. Write about what you are doing or researching. Want to float an idea for an article? Contact the editors at ofpeditor@acofp.org. We encourage articles about common osteopathic family medicine issues.

NOW SEEKING

CLINICAL IMAGES


Osteopathic Family Physician

ACCEPTING SUBMISSIONS FOR THE SECTION TITLED "CLINICAL IMAGES."

This section showcases clinical images from the wards that cover essential concepts or subject matter to the primary care physician.

Each installment of "Clinical Images" comprises 1 or 2 medical images along with a brief synopsis of how the case presented along with 1-4 questions and approximately 1 page of education with reference to the image and questions.

Submissions should be submitted online at ofpjournal.com via our Scholar One publication process.

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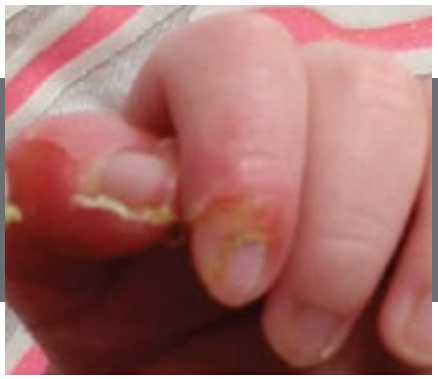

FROM THE PRESIDENT'S DESK

Charting a Course for the Future

Kevin de Regnier, DO, FACOFP *dist*.
2015 - 2016 ACOFP President

For more than five months, the ACOFP Board of Governors has been developing our 2016-18 Strategic Plan. By the time you read this, we will be finalizing the plan after receiving comments from members and our state affiliates. So why write about it now?

I wanted to use this space for two purposes. First, it is not too late for you to let us know your thoughts. See the end of this article to learn how you can read the Strategic plan and submit your comments. Second, while I hope you will read the strategic plan for yourself, I wanted to explain the process we used and provide some highlights of the final draft.

We began our work with an analysis of the current environment in which our members practice and the ACOFP operates. Immediately two major issues rose to the top of our list; payment reform and the Single Accreditation System (SAS).

In a previous issue, I wrote about the coming changes in Medicare physician payment policies.[1] It is clear that changes in the way physicians will be paid will have a major impact on physician practices over the next three years. The ACOFP must be active in forming this new payment system and ready to assist our members to prepare for it.

As we discussed the SAS, several things quickly became clear. First, the ACOFP would no longer have a direct role in the education of osteopathic family physician residents. In the current American Osteopathic Association (AOA) accreditation system, the ACOFP is responsible for nearly 300 osteopathic family physician residencies. We develop the residency standards for our programs, monitor program adherence to those standards, conduct periodic reviews of resident progress, and determine when a resident's training is complete.

In the SAS we face several challenges and unanswered questions. How many of our AOA accredited programs will choose to become accredited by the Accreditation Council for Graduate Medical Education (ACGME)? How many of those programs will decide to pursue osteopathic recognition? How many of our current dually accredited programs will decide to seek osteopathic recognition? How will we maintain contact with residents in ACGME programs? How will … well you get the idea, we had a lot of questions and not a lot of answers.

Yet to chart a course for the future, we had to make some assumptions and decide now on what actions we need to take to prepare the ACOFP for the future. Ultimately, we came to this conclusion: "The most likely scenario is that fewer DOs will participate in family medicine residencies that provide osteopathically-distinctive training, thereby yielding fewer AOA/AOBFP certified physicians and fewer ACOFP members. At the same time, there will likely be an opportunity for ACOFP to provide osteopathic and allopathic family medicine residencies with its comprehensive OMT curriculum, videos, and textbook." [2]

Given our analysis of the anticipated environmental factors and the desired futures, four "Cornerstone Initiatives" stood out over the next three years as having the greatest impact for members, for the specialty of osteopathic family medicine, and for the ACOFP. Our four Cornerstone Initiatives are: Family Medicine for America's Health, Practice Enhancement & Quality Reporting, Continuing Medical Education (CME), and the Single Accreditation System & Osteopathic Distinctiveness.

I have previously written on both physician payment reform and the SAS[3], so I will not elaborate further on those issues here. The ACOFP has widely publicized our participation in Family Medicine for America's health as well. Therefore with the limited space I have here let me briefly explain why CME was included as a Cornerstone Initiative.

In repeated surveys over several years, members have told us that quality osteopathic CME is one of the ACOFP's most valuable member benefits.[4] Additionally, the ACOFP has one of the largest on-line CME catalogs in the osteopathic profession. In anticipation of the AOA allowing an increase in the current limit to on-line CME, we want to make sure the ACOFP is prepared to expand our CME offerings and to be able to provide that CME using the most convenient and cost effective methods for our members.

I hope you will take time to go to the ACOFP website at www.acofp.org and read our strategic plan. If you have any comments, please email me at president@acofp.org.

CORRESPONDENCE:
Kevin de Regnier, DO, FACOFP *dist*. | president@acofp.org

1877-5773X/$ - see front matter.

REFERENCES

1. de Regnier K. Physician Payment After SGR - What's Next? Osteopathic Family Physician 2015;4:2
2. The American College of Osteopathic Family Physicians (2015). 2016-2018 Strategic Plan of the American College of Osteopathic Family Physicians. Unpublished manuscript
3. de Regnier K. Single Accreditation Progress. Osteopathic Family Physician 2015;5:2
4. American College of Family Physicians. Data on file

ORIGINAL RESEARCH

The Relationship of Pediatric Obesity & Non-Pandemic Influenza

William Bungarz, MD,[1] Lauren Little, OMS III,[2] Matthew Rohloff, OMS III,[2]
Richard Thomas, OMS III,[2] Heather Bendyk, MBA,[1] & Adrienne Z. Ables, Pharm D[2]

[1] Medical Group of the Carolinas-Center for Pediatrics
[2] Edward Via College of Osteopathic Medicine

KEYWORDS:
Pediatric
Obesity
Influenza
Vaccinations
BMI

Background: Very little research has been performed examining obesity and non-pandemic flu contracture in pediatric patients. The hypothesis of this study was that patients aged 2 through 12 years of age with a body mass index (BMI) of greater than or equal to the 85th percentile for their age have a significantly greater chance of contracting non-pandemic influenza.

Methods: This was a retrospective cohort chart review. Patients aged 2 through 12 with a positive rapid flu test between the 2010 through 2014 flu seasons were identified and categorized into two groups; patients with BMIs greater than or equal to the 85th percentile and patients with BMIs less than the 85th percentile for their age.

Results: Patients aged 2 through 12 years with a BMI of greater than or equal to the 85th percentile for their age had a significantly higher rate of influenza than those less than the 85th percentile, 46.55% v. 28.47%, respectively ($p = 0.0201$). Additionally, the average BMI of patients with positive rapid influenza tests was significantly higher than those with negative influenza tests, 20.3 vs. 15.8, respectively ($p<0.0001$).

Discussion: In this study, patients 2 through 12 years of age with a BMI of greater than or equal to the 85th percentile had a significantly greater chance of contracting non-pandemic influenza. To confirm these results, a larger population needs to be studied. If true, the results serve as evidence that clinicians may need to focus on targeting non-pandemic influenza vaccinations toward the obese pediatric population more aggressively.

INTRODUCTION

Obesity is a well-known growing epidemic within the United States. In 2012, childhood obesity affected 12.5 million children, comprising 33% of children between the ages of 2 and 19 years.[1] The CDC classifies children as overweight if their BMI is at or greater than the 85th percentile for children of same height and sex and obese if their BMI is at or greater than the 95th percentile. Previous research in adult populations regarding influenza has demonstrated an inadequate immune response in obese populations is associated with increased infection.[2,3,4] Some research has examined the association of pandemic H1N1 influenza and obesity in adults and pediatric populations; however, very little research has been performed to examine obesity and non-pandemic flu contracture in pediatric patients.[5,6]

The 2013-2014 influenza season brought about 7,725 hospitalizations and 65 pediatric influenza deaths in the United States, highlighting the importance of examining possible risk factors in the pediatric population.[7,8] The influenza vaccine is one of the most effective ways of providing prophylaxis for the seasonal flu; if the list of most at-risk groups is not reevaluated regularly to identify new at risk populations, the ongoing ability to prevent influenza on a seasonal basis may be lost.

Children less than 5 years of age are already targeted as high-risk populations to receive influenza vaccines; however, overweight and obese individuals in the pediatric population have not been specifically targeted.[9] Demonstrating that overweight and obese children are at more risk of developing influenza than their normal weight counterparts would allow more aggressive vaccine targeting to at-risk populations and further impetus to adopt aggressive lifestyle modifications to target a healthy weight.

The aim of this study was to examine overweight and obese pediatric patients and their risk of contracting non-pandemic influenza. The hypothesis was that patients aged 2 through 12 years of age with a BMI of greater than or equal to the 85th percentile for their age have a significantly greater chance of contracting non-pandemic influenza during the CDC defined flu season from October 1st and March 31st than those with a normal BMI falling between the 6th and 84th percentiles.

METHODS

A retrospective cohort chart review of pediatric patients from a single center pediatric practice in Spartanburg, South Carolina was conducted based on records from the 2010 through the

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William Bungarz, MD | WBungarz@srhs.com

2014 flu seasons. Data of patients were collected from electronic medical records and identity was removed prior to analysis. Data was obtained for all patients who received an in-office rapid influenza A/B test (sensitivity: 50-70%; specificity 90-95%)[10] from 2010 to 2014. Patients were included in the study if they received a rapid influenza A/B test between October 1st and March 31st and they were between the ages of 2 and 12 at the time of flu testing.

The following data were collected: age, gender, race, date of office visit and rapid flu test, medical record number, height, weight, and body mass index percentile for age. Abstracted data also included chronic conditions such as asthma, diabetes, or immunocompromised due to disease or drug therapy such as use of chronic corticosteroids or other immunosuppressants. Vaccination status and route of administration for each patient was documented, as well as hospitalizations, emergency room visits and mortality due to non-pandemic flu, if applicable.

All patients who were identified with a positive rapid flu test within the 2010-2011, 2011-2012, 2012-2013 and 2013-2014 flu seasons were categorized into two groups. One group contained patients with BMIs greater than or equal to the 85th percentile for their age. The second group contained patients with BMIs less than the 85th percentile for their age. The number of patients with a positive rapid flu test in each group was identified.

The difference between average age in years was compared using a Wilcoxon Rank Sum, in gender a Binomial Proportions Test and in race a Fisher's Exact Test. Subsequently, a Two-Tail Fisher's Exact Test compared the likelihood of contracting flu based on BMI. This study was approved by the Spartanburg Regional Healthcare System Institutional Review Board.

RESULTS

A total of 517 patients were identified between the 2010 and 2014 influenza seasons in this retrospective cohort. Patients were then separated into two categories. One hundred ninety-five patients met our inclusion criteria. Of the 195 patients, 58 tested positive for influenza and 137 tested negative. Of the 58 patients that tested positive for influenza, 27 patients had a BMI greater than or equal to the 85th percentile and 31 patients were below the 85th percentile (*Figure 1*).

The average age of patients that tested positive for influenza was slightly higher than the age of those who tested negative, 4.98 v. 4.55 years, respectively (p = 0.0534). Other demographic characteristics were not significantly different between the two groups (*Table 1*).

Pediatric patients in our cohort aged 2 to 12 with a BMI of greater than or equal to the 85th percentile for their age had a significantly higher rate of influenza infection identified by rapid testing than those with BMI less than the 85th percentile, 46.55% v. 28.47%, respectively (p = 0.0201) (*Figure 2*). Additionally, the average BMI of patients with positive rapid influenza tests was significantly higher than those with negative influenza tests, 20.3 vs. 15.8 kg/m2 (p<0.0001) (*Figure 3*).

FIGURE 1:

Patient Selection Process

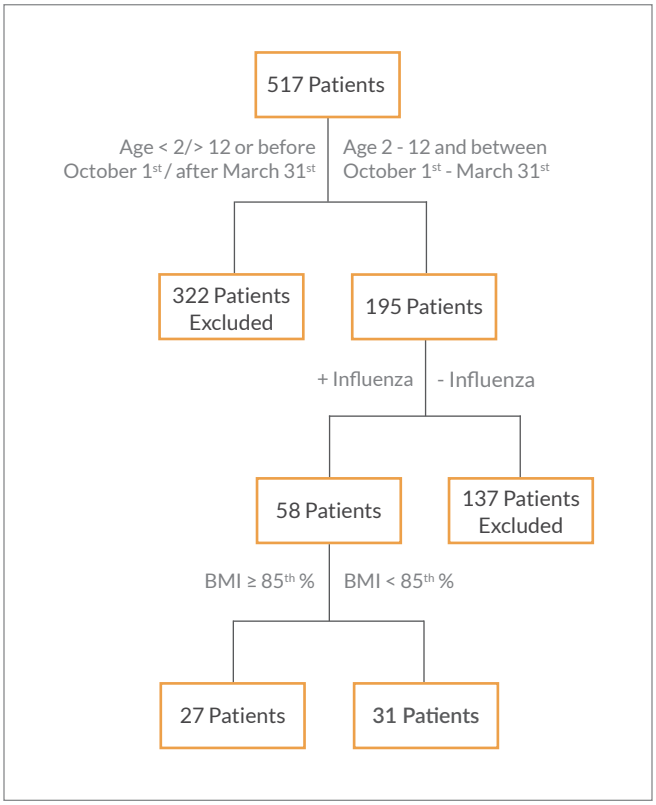


TABLE 1:

Patient demographics

	Positive for Flue	Negative for Flue	p-value
Average Age (years)	4.98	4.55	0.0534
GENDER			
Female	26	67	0.6228
Male	32	70	
RACE			
Hispanic	19	27	0.1572
Caucasian	18	65	
African American	21	45	

FIGURE 2:

Comparison of positive influenza rates and BMI percentiles

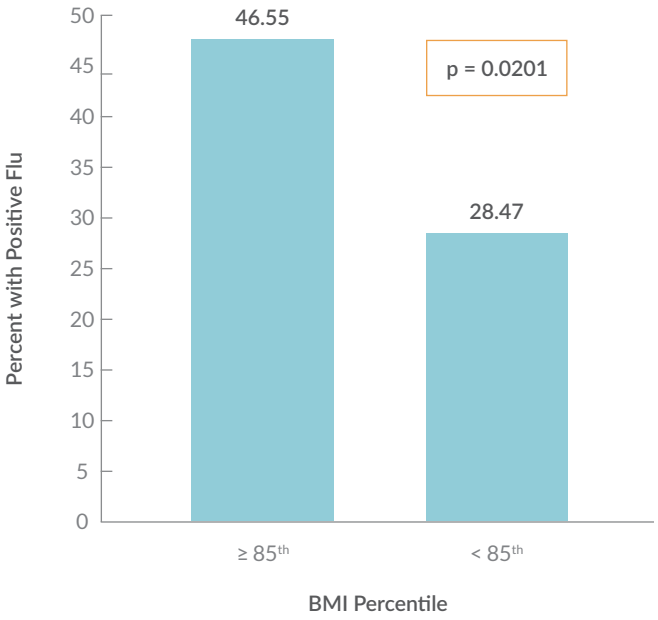
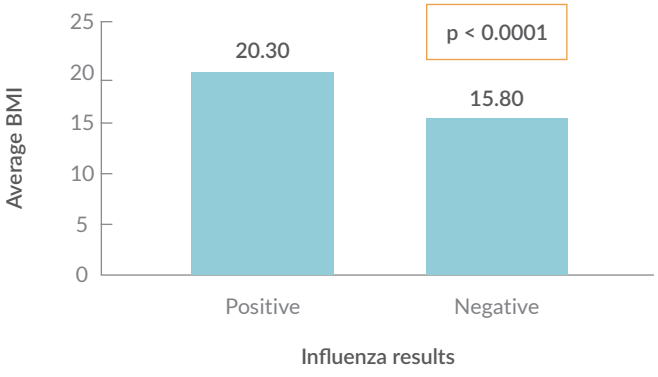


FIGURE 3:

Comparison of BMI between children positive and negative for influenza



CONCLUSION/DISCUSSION

In our single center introductory study, patients aged 2 through 12 years of age with a BMI of greater than or equal to the 85th percentile had a significantly greater chance of contracting non-pandemic influenza than those with a BMI between the 6th and 84th percentiles. A major limitation of this study was the sample size and single center distribution. Additional research including multiple centers and environments would allow a more robust generalization of our preliminary data. A prospective study would allow for better stratification where vaccination, route of administration and BMI at initiation could be controlled. Stratifying these factors would allow researchers to examine whether vaccinations in obese children are as effective as those in non-obese children.

Prior studies in adults have demonstrated that obesity confers decreased serum titers to influenza vaccination; until this point no research has been performed concerning pediatric populations.[2,3] A continuation of this study with the aforementioned stratification measures and data from a larger multi-site study could include testing serum antibody titers to influenza vaccines in children. Additionally, a prospective study could look at timing of influenza vaccination and association between obesity and contracture of flu.

Studies such as this are becoming more important for education and awareness due to the growing population of arents refusing vaccines for their children. Confirming that overweight and obese children are at increased risk of contracting influenza than their normal weight counterparts provides an opportunity for osteopathic family physicians to offer more counseling to a previously unrecognized at-risk population of obese and overweight children.

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REVIEW ARTICLE

Primary Care Approach to Asthma Management

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KEYWORDS:

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Osteopathic Management of Asthma

Asthma Management

Asthma is a common heterogeneous syndrome characterized by airflow obstruction, bronchial hyper-responsiveness, and underlying inflammation. It is a major cause of lost work and school, lower quality of life and increased emergency room visits. Treatment involves a comprehensive step-wise approach to patient care, matching symptom severity with appropriate therapeutic intervention and close monitoring of clinical response. Well established guidelines have outlined the diagnosis and management of asthma, however it remains critical that clinicians educate patients and encourage active participation in their own care.

INTRODUCTION

Asthma is a common heterogeneous syndrome characterized by airflow obstruction, bronchial hyper-responsiveness, and underlying inflammation.[1] It is a major cause of lost work and school, lower quality of life and increased emergency room visits.[2] Treatment involves a comprehensive step-wise approach to patient care, matching symptom severity with appropriate therapeutic intervention and close monitoring of clinical response. Well established guidelines have outlined the diagnosis and management of asthma, however it remains critical that clinicians educate patients and encourage active participation in their own care.

PREVALENCE

Asthma affects approximately 300 million people worldwide, including 22 million Americans and 6 million children.[1] According to the Center for Disease Control, asthma prevalence has increased from 7.3% in 2001 to 8.4% in 2010.[2] Though asthma can present at any age, peak incidence is from 8-17 years of age. In childhood, males are affected more than girls, but the prevalence reverses by adulthood. With better comprehensive care, the rate of death secondary to asthma decreased by 26% between 1999 and 2009.[3]

ETIOLOGY AND TRIGGERS

The etiology of the reversible inflammation observed in asthma is multifactorial. Although the exact underlying cause is unknown, it is believed that there is an interplay between geneticand environmental factors. Genetic phenotypes are now emerging which may help guide future approaches to treatment. Major environmental factors include dust mites, viral respiratory infections such as respiratory syncytial virus, tobacco smoke, air pollution and diet.[4] It is the interaction of these features that determines the clinical manifestations and severity of asthma, as well as treatment response.

DIAGNOSIS

Assessment of asthma begins with a thorough history, as often times, physical exam may appear benign. Patients may report symptoms such as recurrent wheezing or worsening cough. Further history regarding triggers, time of day, and nighttime awakenings characterize asthma and help in initial staging and long-term management. Clinical history and presenting symptoms are reviewed in Table 1. The presence of a reversible obstructive pattern on spirometry is used to confirm the clinical diagnosis of asthma in patients five years or older.[1] Spirometry demonstrates obstruction when the ratio of forced expiratory volume in one second (FEV1) to forced vital capacity (FVC) is less than 70%. Reversibility is confirmed by an increase in FEV1 of >200mLand ≥ 12% from baseline measure after inhalation of a bronchodilator, usually a short-acting beta-2 agonist (SABA).[1]

When spirometry is normal but clinical suspicion remains high, methacholine bronchoprovocation testing can demonstrate airway hyperresponsiveness with a 95% negative predictive value.[4] Provocation testing can be positive in a number of other conditions including chronic obstructive pulmonary disease, congestive heart failure, cystic fibrosis, bronchitis and allergic rhinitis.[5] Absolute contraindications to a methacholine challenge include severe airway obstruction, recent myocardial infarction, stroke, uncontrolled hypertension or aortic aneurysm.[5] Recent

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studies have evaluated the safety and utility of various diagnostic markers such as immunoglobulins, sputum eosinophils, and nitrous oxide levels. Further research is needed to determine their role in the workup and monitoring of asthma.[6,7,8]

DIFFERENTIAL DIAGNOSIS

The differential diagnosis of asthma remains broad as the signs and symptoms are found in a wide range of conditions. In the uncontrolled asthmatic patient, it is important to investigate untreated comorbidities, such as gastroesophageal reflux disease, obesity/obstructive sleep apnea, sinusitis and vocal cord dysfunction.[9] Diagnostic workup can include but is not limited to chest radiography, trial of proton pump inhibitors, polysomnography, and laryngoscopy. Treating these underlying comorbidities has shown to improve quality of life.[10] A more extensive list of differential diagnosis and comorbidities is found in Table 2 *(page 18)*.

INITIAL THERAPY

Treatment of asthma is guided by appropriately classifying patients and assessing severity of symptoms. Severity is measured by the level of impairment of symptoms on daily living and the risk of recurrent exacerbations.[1] Impairment has many components, including symptom frequency, nighttime awakenings, SABA usage, interference of daily activity, and lung function measured by spirometry. The number of prior exacerbations requiring oral corticosteroids, severity of exacerbation and lung function correlate with an increased risk of future exacerbations. Based on the various components of severity, patients are classified as either intermittent or persistent asthmatics. See Figure 1 *(page 19)*.

Patients must be educated about symptom recognition, adherence to treatment regimen, proper technique for use of inhaled medication, and environmental trigger control at each severity level. Patient education can improve compliance with asthma management and improve control of the disease. After asthma severity is appropriately classified, therapy may be initiated in a step-wise manner.[11] Each medication class works at different levels of bronchospasm or inflammation and is utilized for either acute or chronic control. Intermittent asthma can be controlled with a SABA as needed, while persistent asthma requires daily medications with longer durations of action. First line therapy for persistent asthma starts with inhaled corticosteroids followed by long-acting beta agonist (LABA). Patients who frequently use SABA despite long acting medications may benefit from a consultation with an asthma specialist. Table 3 and Figure 2 (*page 20*) correlate symptom severity with the indicated therapeutic intervention. Table 4 *(page 21)* gives a detailed summary of the different mechanisms and side effects of each medication class.

MAINTENANCE & STEP DOWN THERAPY

After initiating therapy, patients generally are followed in two to six week intervals until the disease is controlled. The goal of therapy is for the patient to have minimal symptoms while on therapeutic intervention and be able to participate in activities of daily living.[1] Asthma control can be measured qualitatively using a number of easily accessible clinical tools. The Asthma Control Test and Asthma Therapy Assessment Questionnaire can be used to reliably measure changes in control symptoms.[12] Once control is achieved, patients can follow up at one to six month intervals for monitoring. Spirometry should be measured every one to two years in clinically stable patients.[1] Patients with moderate to severe persistent disease can monitor disease activity with daily peak flows.

Once control of asthma is attained for a period of at least three months, step-down therapy is indicated using the same step-wise approach. Though some debate remains regarding the ideal approach to step-down therapy in asthma, LABA's generally should be used for the shortest duration possible owing to their increased risk of worsening asthma, hospitalization and death.[13] However, some studies suggest that removing inhaled corticosteroids prior to LABA's is associated with better symptom control, improved FEV1, peak expiratory flow (PEF) and quality of life.[14,15]

PREVENTATIVE CARE

Preventative care is critical in the management of any chronic medical condition. Vaccination for both pneumonia as well as influenza is currently recommended for patients with asthma. There are currently two pneumonia vaccinations available, the pneumococcal polysaccharide vaccine (PPSV23) and the 13-valent conjugate vaccine (PCV13). PPSV23 is indicated for

TABLE 1:

Clinical History

HISTORY	COMMENTS
Recurrent Symptoms: Cough, wheeze, dyspnea, chest tightness	• Wheeze more prominent in children • Normal physical exam does not exclude asthma
Worsening Symptoms	• Induced by exercise, viral infection, weather changes, stress, irritants, and allergies
Timing	• Occurs or worsens at night. • May report frequent night time awakenings

Clinical history often shows patterns, which should lead the clinician to consider asthma. Key points include questions regarding recurrence, triggers and the time of day of symptoms. (adapted from [Guideline] Expert Panel Report 3 (EPR-3): Guidelines for the Diagnosis and Management of Asthma-Summary Report October 2007.) [1]

TABLE 2:

Asthma Differential Diagnosis[1]

ORGAN SYSTEM	DIFFERENTIAL DIAGNOSIS	WORKUP
Respiratory	Vocal Cord Dysfunction	Laryngoscopy
	Laryngotracheomalacia, Tracheal Stenosis, and Bronchostenosis	Laryngoscopy
	Bronchiolitis	High resolution computed tomography
	Recurrent cough secondary to medication	Recurrent cough secondary to medication
	Laryngeal Webs	Laryngoscopy
	Cystic Fibrosis	Sweat Chloride Testing
	Aspiration	Chest x-ray
	COPD	Pulmonary Function Testing
	Pulmonary Embolism	D-dimer, Ventilation-Perfusion scan, and Computed tomography angiography
	Obstructive sleep apnea	Polysomnography
	Allergic Rhinitis	Thorough history
	Foreign Body	Chest x-ray
Cardiovascular	Congestive Heart Failure	Clinical history +/- Echo
	Coronary Artery Disease	Stress Testing or Catheterization
Gastrointestinal	GERD	Trial proton pump inhibitor
Miscellaneous	Enlarged Lymph Nodes/Malignancy	Chest x-ray or computed tomography

The differential diagnosis for asthma is extensive. Other comorbidities should be considered if patient remains uncontrolled despite optimal medication adherence. (adapted from [Guideline] Expert Panel Report 3 (EPR-3): Guidelines for the Diagnosis and Management of Asthma-Summary Report October 2007.)

all immunocompetent adults with asthma older than 19 years of age with an additional dose after the age of 65. PCV13 is recommended for adults older than 65 years of age. Currently guidelines recommend that unvaccinated patients with an age greater than 65 should receive the PCV13 vaccine followed by the pneumococcal polysaccharide vaccine (PPSV23) in 6-12 months. In children, PCV13 is approved for children 6 weeks to 71 months - especially patients currently taking high dose oral corticosteroids. The inactivated yearly influenza vaccine is recommended for all persons 6 months or older with asthma.[16]

Limiting exposure to environmental triggers is vital in the management of asthma and preventing acute asthmatic attacks. Common triggers include aspirin, NSAIDs, cockroaches, dust mites, pets and sulfites in foods such as shrimp, beer, wine and processed potatoes.[1,17,18] Allergens are prevalent in multiple areas of the house and outside. Patients should be advised to take simple measures to limit exposure if a specific trigger or allergen is suspected. Common preventative measures are listed in Table 5 (*page 22*). One measure that reduces environmental trigger exposure is high efficiency particulate air (HEPA) filters, which can reduce the amount of animal, mold, and tobacco allergens. Data, however, has not shown improvement in lung function.[19,20] HEPA filters provide little benefit for dust-mite and cockroach allergens which are better controlled with extermination and low humidity.[1]

Patient education and active participation is a critical component of the asthma treatment plan. Patients should be aware of the signs of poor control and exacerbations because prompt identification of worsening symptoms and appropriate step up in therapy, as outlined in Figure 2 *(page 20)*, reduces urgent care, emergency room and hospital visits.[21] Their skills using inhalers, spacers, nebulizers and valve holding chambers should be assessed on a regular basis. Poor technique has been associated with worsening asthma control, decreased response to therapy and increased exacerbations requiring systemic steroids.[22] Asthma action plans are an important tool for those with moderate to severe persistent asthma. These plans guide patients and families in the management of asthma, lists important warning signs of clinical decompensation and need for emergent therapy. One study noted that patients and families found action plans useful; unfortunately only 32% of patients reported having such a plan.[23]

FIGURE 1:

Classifying Severity For Patients Not Taking Long-Term Control Medications

COMPONENTS OF SEVERITY		CLASSIFICATION OF ASTHMA SEVERITY (YOUTHS ≥ 12 YEARS OF AGE & ADULTS)			
		INTERMITTENT	PERSISTENT		
			Mild	Moderate	Severe
IMPAIRMENT Normal FEV_1 / FVC: 8 - 19 years 85% 20 - 39 years 80% 40 - 59 years 75% 60 - 80 years 70%	SYMPTOMS	≤ 2 days / week	> 2 days / week *(but not daily)*	Daily	Throughout the Day
	Nighttime awakenings	≤ 2x's / month	3 - 4x's / month	> 1x / week *(but not nightly)*	Often as 7x's / week
	Short-acting $beta_2$-agonist use for symptom control *(not prevention of EIB)*	≤ 2 days / week	> 2 days / week *(but not > 1x / day)*	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung fuction	• Normal FEV_1 between exacerbations • FEV_1 > 80% predicted • FEV_1 / FVC normal	• FEV_1 ≥ 80% predicted • FEV_1 / FVC normal	• FEV_1 > 60% but < 80% perdicted • FEV_1 / FVC reduced 5%	• FEV_1 < 60% perdicted • FEV_1 / FVC reduced > 5%
RISK	Exacerbations requiring oral systemic corticosteroids	0 - 1 / year *(see note)*	≥ 2 / year *(see note)*		
		Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time for patients in any severity category.			
		Relative annual risk of exacerbations may be related to FEV_1			

Severity is multifactorial which involves assessing both impairment and risk. Severity worsens with increasing symptoms, medication use and exacerbations. Lung function alone should not determine severity. (Obtained from [Guideline] Expert Panel Report 3 (EPR-3): Guidelines for the Diagnosis and Management of Asthma-Summary Report October 2007.)[1]

MANAGEMENT OF AN ACUTE EXACERBATION

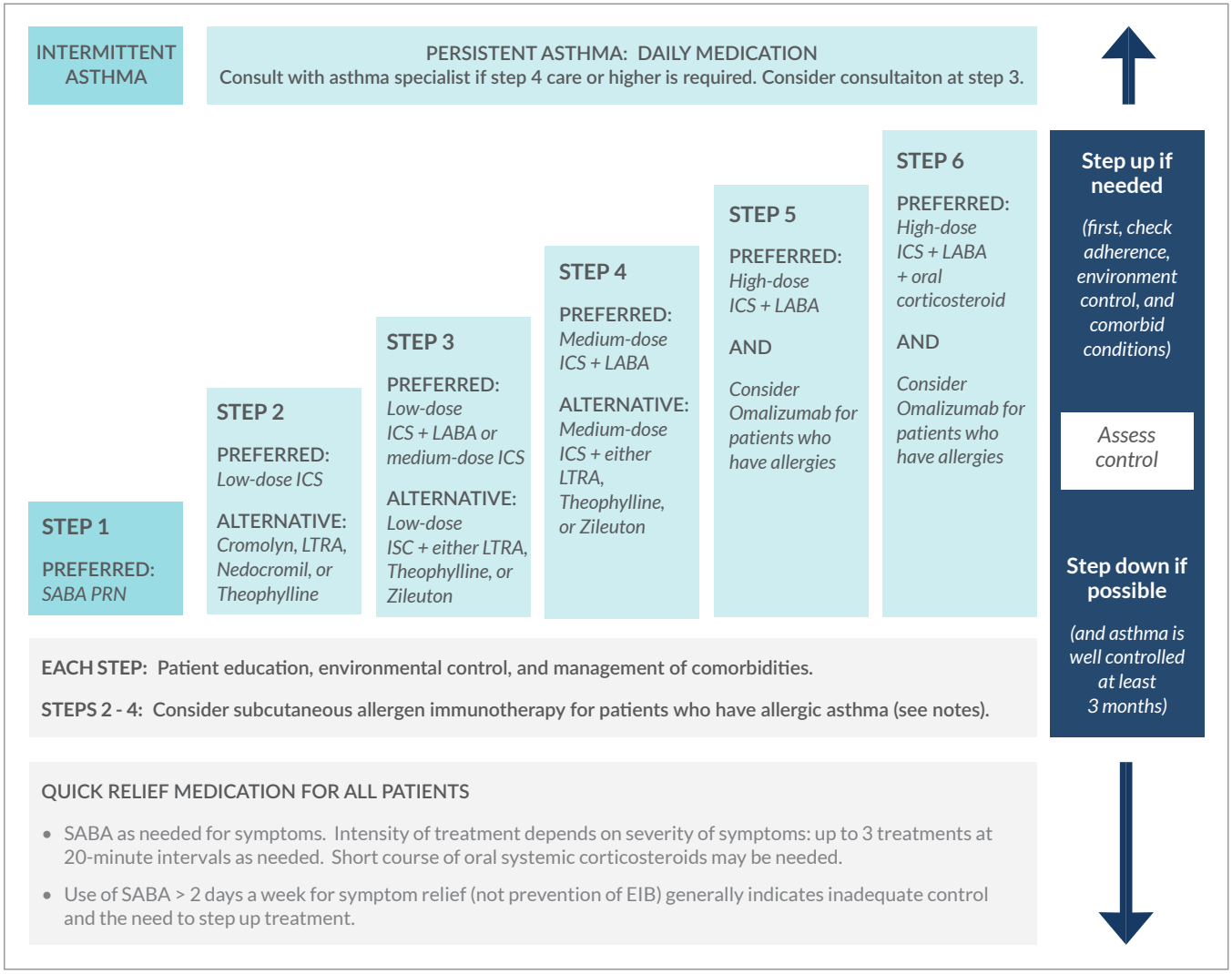
Acute asthma exacerbations are managed by assessing severity and treating appropriately. Severity can be measured clinically by noting worsening dyspnea and cough with daily activities or objectively with a peak expiratory flow (PEF) meter. A PEF ≥40% is considered a mild to moderate exacerbation while <40% is severe.[1]

Patients should refer to their predetermined asthma action plan as soon as they begin to experience signs of an exacerbation. If they are experiencing a mild to moderate exacerbation, they can increase their SABA by taking up to six puffs of a rescue SABA every 20 minutes for up to one hour. Any identified trigger should be removed.[1] Patients who have resolution of their wheezing, no tachypnea and a PEF ≥80% are considered to have a good response and should continue with scheduled SABA every four hours for up to 48 hours. If there is incomplete resolution of symptoms or only a mild increase in PEF to 50-79%, they should be seen urgently by a physician, whether in an urgent care clinic or at the primary care office, to determine the need for additional treatment with oral or inhaled corticosteroids in addition to the SABA.[1] Patients with mild to moderate exacerbations with partial responses can be admitted to the hospital for further observation based on clinical judgment. There, patients can receive scheduled SABA treatments, oral or intravenous glucocorticoids and oxygen.

A patient with a severe exacerbation (PEF < 40%) or no improvement with initial self-management should be evaluated in the emergency room. Patients may require hourly SABA and ipratroprium, oxygen, and oral corticosteroids. The response to treatment is again monitored clinically using PEF measurements. If again there is no improvement, admission to the intensive care unit may be warranted where they can continue nebulized SABA and ipratropium treatments, receive intravenous corticosteroids and be monitored for possible intubation. A $PaCO_2$ that begins to normalize in a previously tachypnic patient is a sign of respiratory fatigue and may warrant mechanical ventilation.[1] Clinicians should be aware of other risk factors for asthma related death listed in Table 6 (*page 23*). Upon discharge, patients should be seen by their primary care physician or asthma specialist within one to four weeks depending on the severity. Patients receiving close follow up, a customized medical regimen, and intensive teaching are three times less likely to have hospital readmissions over the next two years.[25]

FIGURE 2:

Stepwise Approach for Managing Asthma in Youths ≥ 12 Years of Age and Adults



All patients should be screened for adherence to medication regimen, proper technique and control of other comorbidities. Patients taking daily medications for persistent asthma who still require frequent SABA should step up in therapy. An asthma specialist should be considered if uncontrolled at step 3 for further recommendations such as multiple medication management or immunotherapy. (Obtained with permission from [Guideline] Expert Panel Report 3 (EPR-3): Guidelines for the Diagnosis and Management of Asthma-Summary Report October 2007.)[1]

TABLE 3:

Therapeutic Management based on Asthma Severity

ASTHMA SEVERITY	THERAPEUTIC MANAGEMENT
Intermittent	Step 1
Mild Persistent	Step 2
Moderate Persistent	Step 3 - 4
Severe Persistent	Step 5 - 6

Clinical history often shows patterns, which should lead the clinician to consider asthma. Key points include questions regarding recurrence, triggers and the time of day of symptoms. (adapted from [Guideline] Expert Panel Report 3 (EPR-3): Guidelines for the Diagnosis and Management of Asthma-Summary Report October 2007.) [1]

TABLE 4:

Common Medications used in Asthma Management[1,11]

MEDICATION CLASS *(example)*	MECHANISM OF ACTION	RECOMMENDED USAGE	MISC.
Cortico-steroids *(inhaled: fluticasone, budesonide, flunisolide, beclomethasone, mometasone, ciclesonide)*	Reduces migration and activation of inflammatory cells such as mast cells and eospinophils	• Inhaled corticosteroids (ICS) are initiated with mild persistent asthma and titrated accordingly. • Oral corticosteroids are used in acute exacerbations. Consider initiation with severe persistent asthma.	Side effects include voice hoarseness and oral thrush. To prevent candidiasis, use spacer and rinse mouth after ICS. Evaluate for cataracts and osteoporosis with increasing steroid usage. Steroids can decrease growth in children.
Short/ Long Acting Beta agonists (LABA) *(SABA: albuterol, levalbuterol)* *(LABA: salmeterol, formoterol)*	Bronchodilates through activation of B2 receptors in respiratory smooth muscles.	• SABAs are used as rescue therapy for acute exacerbations • LABAs are initiated in combination with ICS for moderate persistent asthma in patients >5 years old.	• SABAs duration of action is 3-6 hours. Side effects include tremor and palpitations in the elderly. • LABAs duration of action is >12 hours. Increased mortality associated with LABAs may be due to corticosteroid noncompliance.
Anti-Cholinergics *(tiotropium)*	Inhibits muscarinic cholinergic receptors and reduces intrinsic vagal tone in airways	Can be used in conjunction with SABA in the emergency or hospital setting	Produces less cardiac stimulation than SABA. Side effects include dry mouth, urinary retention and glaucoma
Cromolyn Sodium and Nedocromil	Mast cell stabilizer	Alternative treatment for persistent asthma	Effective in blocking trigger associated asthma. Short duration of action
Leuktriene Modifiers *(montelukast, zafirlukast)*	Decreases bronchoconstriction by inhibiting inflammatory leukotriene release	Alternative treatment for persistent asthma	Monitor liver function.
Methyl-Xanthines *(theophylline)*	Inhibits phosphodiesterase resulting in increasing cAMP levels and bronchodilation	May be used in addition to ICS in patients > 5 years old	Plasma concentrations of 5-10 mg/L help bronchodilation when in combination with ICS. Higher concentrations can cause arrhythmias, seizures and death.
Immuno-modulators *(omalizumab)*	Prevents binding of IgE to receptors	May be used in addition to regular therapy for severe persistent asthma in patients >12 years old.	Very expensive. Patient should be clinically monitored as anaphylaxis has been seen occasionally.

Different medication classes work synergistically to decrease bronchoconstriction and inflammation at different molecular levels. Goals of therapy are to decrease symptoms, exacerbations, usage of SABA and control adverse effects of medications. (adapted from [Guideline] Expert Panel Report 3 (EPR-3): Guidelines for the Diagnosis and Management of Asthma-Summary Report October 2007.)

TABLE 5:
Prevention of Common Environmental Triggers

ALLERGEN	ENVIRONMENT	COMMENTS
Dust Mites	Around the house	Avoid cloth furniture and remove carpets. Wash stuffed toys weekly, or place in freezer or dryer.
	Bedroom	Dust-mite covers are available for mattresses and pillows. Wash pillow and bedding in hot water or mixture of detergent, bleach and cold water.
	Humidity	Reduce indoor humidity to 30-50% using dehumidifiers or central air conditioning.
Animal Dander	Around the house	Cats, furry pets, carpets and cloth furniture should be removed.
	Bedroom	Keep pet out of bedroom and keep bedroom door closed.
Cockroach	Around the house	Keep food and garbage in closed containers. Avoid exposure to aerosolized extermination products. Powders, gels, traps are good alternatives.
	Bedroom	Keep all food out of the bedroom.
Mold	Indoor	Fix any leaking source of water; clean moldy surfaces; dehumidify basements.
	Outdoor	Spore counts highest in afternoon. Remain indoors at this time.

Allergen exposure can be controlled by ensuring proper cleaning and removal of objects which attract allergens. Special attention should be given to the bedroom as many hours are spent sleeping in this area. (adapted from NHLBI Figure 26 pg 26-27[1])

OSTEOPATHIC MANIPULATIVE TREATMENT OF ASTHMA

Osteopathic manipulative treatment (OMT) enhances the interaction between the musculoskeletal and respiratory system improving physiological function. This may lead to decreased utilization of medications.[26,27] OMT treats thoracic cage somatic dysfunction, normalizes autonomic function and improves lymphatic flow.[28] The Osteopathic physician should thoroughly examine the following areas in the asthmatic patient:[27]

Skeletal Structures	Upper thoracic and lumbar vertebrae, ribs, sternum
Sympathetic Innervation	T2-T7
Parasympathetic Innervation	OA, AA, C2
Diaphragm	C3-C5
Cranial	Extension dysfunction commonly found
Chapman's Reflexes	Lung and Sinuses

A variety of osteopathic treatments are effective in the treatment of asthma. These include but are not limited to muscle energy, HVLA, counterstrain or myofascial release, rib raising, treatment of rib dysfunction, scapula release, and lymphatic drainage techniques.[27] These techniques have been shown to potentially increase vital capacity, improve mobility and function of the rib cage and diaphragm and increase airway secretions clearance.[29]

Absolute contraindications for direct techniques such as HVLA include, but are not limited to: fractures, malignancy and Down's syndrome for manipulation of the OA and AA. Relative contraindications include acute whiplash, osteoporosis and metabolic bone disease. Absolute contraindications to indirect techniques are inability to consent or lack of cooperation. Relative contraindications include cancer, chronic infection and coagulopathies.

ASTHMA IN THE PEDIATRIC POPULATION

Distinct differences exist in the diagnosis and management of asthma in the pediatric population. Unlike the adult population, impairment in daily activities is less indicative of severity as children tend to be asymptomatic between episodes.[1] Chronic inflammation can start early in children. Up to 80% of children have asthma symptoms before their fifth birthday.[1] Viral upper respiratory infections should be recognized early as it is a common cause for severe exacerbations.

Criteria of severity for younger children, less than four years of age, does not rely on spirometry testing. For those children able to perform spirometry, the normal FEV1/FVC ratio in children is >85% whereas in adults older than 20 years of age, FEV1/FVC is >80%. The criteria for asthma severity in children varies by age as shown in Figure 3 and 4 *(page 24)*. Long term control therapy should be initiated based on severity, however, other factors to consider include parental history of asthma, atopic dermatitis, food allergies, peripheral blood eosinophilia, and wheezing apart from colds.[1] Similar to adult asthma, therapeutic goals are to reduce episodes of acute exacerbations, decrease

TABLE 6:

Risk Factors for Asthma Related Death

Past Medical History	Previous ICU admission for exacerbations requiring intubation
	Two or more hospitalizations in 1 year or > three ED visits in 1 year
	Chronic heart and lung disease
Medications	Consuming > 2 SABA canisters in 1 month
Social History	Low socioeconomic status, illicit drug use, psychosocial problems

Peak expiratory flow does not necessarily predict risk for asthma related death. Several historical factors can guide clinical judgment on sending patients earlier to the emergency department for close monitoring. (adapted from NHLBI page 53 and Emerman et al. [1,24])

hospitalizations, minimize medication side effects and participate in physical activity.[1,30] Approved FDA control medications include inhaled corticosteroids such as fluticasone and budesonide, LABA such as salmeterol and leukotriene antagonist such as montelukast.

EXERCISE INDUCED BRONCHOSPASM

Exercise induced asthma is thought to be a result of mast cell activation due to airway cooling and increased ventilation.[31] Onset of symptoms typically occurs after high intensity exercise and can spontaneously remit.[11] Diagnosis is made by exhibiting a 15% decrease in PEF or FEV1 measured 20-30 minutes after exercise at 5 minute intervals.[1] Treatment typically consists of SABA 2-3 hours prior to exercise, however, leukotrienes, cromolyn, or nedocromil can also be added. LABAs are not recommended as it may mask poorly controlled asthma.[1] Exacerbations can be reduced by decreasing the intensity of activity, warming up prior to exercise and wearing warm, protective clothing in cold weather.[1,31] Patients should be educated about this condition and continue to exercise as tolerated.

ASTHMA AND PREGNANCY

Asthma control during pregnancy is important for both the mother and developing fetus. Uncontrolled asthma increases a mothers risk for hyperemesis, preeclampsia, pneumonia, complicated labor and caesarean delivery. It is associated with intrauterine growth restriction, neonatal hypoxia, perinatal death, preterm birth, and low birth weight.[1] Treatments with the highest level of clinical benefit and safety during gestation and breastfeeding, include albuterol and budesonide.[1,11] Other treatments have been evaluated, however less data is available.

ASTHMA AND SURGERY

Asthma related peri-operative complications can be as low as 1.7%.[32] Bronchoconstriction can be caused by multiple factors such as intubation, hypercapnia, hypoxemia, decreased effective cough, or respiratory infection.[1] This complication can lead to anxiety, increased work of breathing, greater sedation and eventual respiratory depression. Risk factors which predispose patients to complications include recent exacerbations requiring hospitalization and systemic steroids, poor disease control and older age.[32] Patients should be medically optimized either by stepping up pharmacological management or giving a short course of oral steroids.[1,33] If patients have recent exacerbations requiring systemic corticosteroids in the last six months or have high dose inhaled steroids dependency, more intensive steroid therapy may be needed during the procedure.

CONCLUSION

Asthma is a common condition of reversible inflammation where control of symptoms and severity decrease morbidity and mortality. Well established guidelines outline the diagnosis, step-wise management with frequent evaluations assessing the rapeutic response. A comprehensive, patient centered approach emphasizing patient education and participation is critical in the effective management of both acute and chronic asthma.

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FIGURE 3:

Assessing Severity and Initiating Therapy in Children who are Not Currently Taking Long-Term Control Medication Ages 0-4 years of age

COMPONENTS OF SEVERITY		CLASSIFICATION OF ASTHMA SEVERITY (0 - 4 YEARS OF AGE)			
		INTERMITTENT	PERSISTENT		
			Mild	Moderate	Severe
IMPAIRMENT	SYMPTOMS	≤ 2 days / week	> 2 days / week *(but not daily)*	Daily	Throughout the Day
	Nighttime awakenings	0	1 - 2x's / month	3 - 4x's / month	> 1x / week
	Short-acting $beta_2$-agonist use for symptom control *(not prevention of EIB)*	≤ 2 days / week	> 2 days / week *(but not daily)*	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
RISK	Exacerbations requiring oral systemic corticosteroids	0 - 1 / year	≥ 2 exacerbations in 6 months requiring oral systemic corticosteroids, or ≥ 4 wheezing episodes/1 year lasting > 1 day AND risk factors for persistent asthma		
		Coniser severity and interval since last exacerbation. Frequency and severity may fluctuate over time. Exacerbations of any severity may occur in patients in any severity category.			
RECOMMENDED STEP FOR INITIATING THERAPY		STEP 1	STEP 2	STEP 3 & Consider short course of oral systemic corticosteroids	
		In 2 - 6 weeks, depending on severity, evaluate level of asthma control that is achieved. If no clear benefit is observed in 4 - 6 weeks, consider adjusting therapy or alternative diagnoses.			

Severity is not defined by lung function secondary to the difficulty in performing pulmonary function testing in this age group. In younger children, exacerbation frequency is measured every six months whereas children older than four years of age are measured on a yearly basis. The number of exacerbations is associated with higher morbidity as children are often symptom free in between exacerbations. (Obtained with permission from NHLBI page 40).

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FIGURE 4:

Assessing Severity and Initiating Therapy in Children who are Not Currently Taking Long-Term Control Medication Ages 0-4 years of age

COMPONENTS OF SEVERITY		CLASSIFICATION OF ASTHMA SEVERITY (5-11 YEARS OF AGE)			
		INTERMITTENT	PERSISTENT		
			Mild	Moderate	Severe
IMPAIRMENT	SYMPTOMS	≤ 2 days / week	> 2 days / week *(but not daily)*	Daily	Throughout the Day
	Nighttime awakenings	≤ 2x's / month	3 - 4x's / month	> 1x / week *(but not nightly)*	Often as 7x's / week
	Short-acting $beta_2$-agonist use for symptom control *(not prevention of EIB)*	≤ 2 days / week	> 2 days / week *(but not daily)*	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung fuction	• Normal FEV_1 between exacerbations • FEV_1 > 80% predicted • FEV_1 / FVC > 85%	• FEV_1 = > 80% predicted • FEV_1 / FVC > 80%	• FEV_1 = 60 - 80% perdicted • FEV_1 / FVC = 75 - 80%	• FEV_1 < 60% perdicted • FEV_1 / FVC < 75%
RISK	Exacerbations requiring oral systemic corticosteroids	0 - 1 / year *(see note)*	≥ 2 / year *(see note)*		
		Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time for patients in any severity category.			
		Relative annual risk of exacerbations may be related to FEV_1			
RECOMMENDED STEP FOR INITIATING THERAPY		STEP 1	STEP 2	STEP 3 & 4 medium-dose ICS option AND consider short course of oral systemic corticosteroids	
		In 2 - 6 weeks, evaluate level of asthma control that is achieved, and adjust therapy accordingly.			

Impairment for children older than five years old includes pulmonary function. FEV1/FVC ratio is higher than in adults older than 20 years of age. (Obtained from NHLBI page 40).

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REVIEW ARTICLE

Childhood Obesity: an Evidence-Based Review of Assessment & Treatment by Family Medicine Physicians

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KEYWORDS:

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BMI

Child

Family

Primary Care

This article provides an evidence-based review of assessment and treatment tools for childhood obesity that can be implemented under the time constraints and within the skill set of a family medicine physician. Family medicine practitioners often form long-term relationships with patients and their families based on trust and familiarity. Despite this ideal position to help children and their families, many family medicine physicians meet barriers, such as lack of time or skill in addressing weight issues. Currently, there is a significant need for practical strategies to be applied in a family medicine setting. This article reviews evidence-based recommendations from expert committee guidelines and meta-analysis data. Universal assessment of risk for obesity through Body Mass Index percentiles, eating habits, activity level, and other medical risk factors is described. The use of motivational interviewing and supportive language to help engage families is also discussed. Comprehensive, family-based lifestyle interventions are found to be the most effective for long-term improvements in health. Patient education and physician resources are provided.

INTRODUCTION

Childhood obesity and associated conditions have been identified as a critical public health concern for the United States.[1] Recently, National Center for Disease Control (CDC) data have shown that the weight of nearly one-third of children aged 2 to 19 in the United States is in the range of overweight or obesity. This proportion is even higher in certain demographic groups.[2] Short-term adverse health, social, emotional, and economic outcomes have been reported to occur in childhood.[3] Long-term consequences of childhood obesity can also manifest and persist in adulthood through increased rates of morbidity and mortality.[4-6]

In response, the American Academy of Pediatrics, American Medical Association, American Osteopathic Association (Figure 1), Institute of Medicine, Center for Disease Control, and U.S. Preventative Services Task Force have published evidence and expert-based recommendations for primary care screening and treatment of overweight and obesity in the pediatric population.[7-10] In particular, the Institute of Medicine recommends a "systems approach" to change the multiple environments that affect a child's food intake and physical activity level. The settings include home, healthcare, education, community, and government policy. From a clinical level, the United States Preventative Services Task Force currently provides a Grade B recommendation for clinicians. Children aged 6 years and older should be screened for obesity and start or be referred for intervention.

However, family medicine physicians often meet practical barriers in implementing prevention and treatment of childhood obesity. A recent national survey found that only 39% of all family practice providers routinely assessed obesity risk through BMI percentiles in children.[11] Also, family medicine physicians were less likely to provide guidance on nutrition and physical activity compared to pediatricians. Lack of time, awareness, and comfort or skill in counseling families have all been identified as barriers to addressing the issues of unhealthy weight .[10-12]

As a result, there is currently a significant need for effective strategies to be utilized within the primary care clinical setting. In particular, family medicine physicians with long-term relationships in caring for children and their families have a vital role to play in the prevention and treatment of childhood obesity. Additionally, osteopathic physicians, who are trained in holistic lifestyle treatments, are particularly well suited to lead or be a part of early childhood obesity interventions.[13]

The purpose of this review article is to provide family medicine physicians with a practical evidence-based approach to addressing childhood and adolescent obesity. First, the physician screens weight using BMI percentiles and specific factors associated with obesity are assessed to determine health risks. Then, as appropriate, a comprehensive family-based intervention is implemented in a staged approach. Lastly, behavioral strategies and patient education resources are provided to support long-term patient and family engagement.

SCREENING WEIGHT USING BMI PERCENTILES

Increased levels of body fat are associated with increased health risks in children.[14] The body mass index (BMI) is traditionally used to assess body fat by measuring body weight adjusted for height. While BMI values are not diagnostic of adipose levels, they correlate to total body fat.[15] BMI has been found to be the most appropriate adiposity screening test in children.[16] High childhood BMI has been associated with atherosclerosis,[6] adult obesity,[4] and increased total mortality[5] in the longitudinal Bogalusa Heart studies.

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In children and adolescents, the use of BMI percentiles is recommended since the categorization of body fat is based on age and gender.[17] This differs from the standard adult categorization based on absolute BMI.[18] In children, a "healthy" BMI falls in the range of the 5th to 84th percentile. Potentially concerning excessive weight begins at the 85th percentile and can be further classified by percentile to "overweight," "obesity," and "severe obesity" (Table 1).

In a clinical setting, routine assessment of BMI percentile is often calculated automatically through electronic medical records. A BMI percentile should be plotted at each visit using the appropriate CDC growth charts, which are available online.[19] This allows for monitoring health changes over time and starting intervention when risks are present.

FIGURE 1:

American Osteopathic Association (AOA) Policy Statement on Pediatric Obesity.[7]

The American Osteopathic Association (AOA) encourages:

A. Dissemination of research related to pediatric obesity and continuing medical education (CME)

B. Primary care physicians to teach and use body mass index (BMI) measurements

C. Physicians providing health care to children to:

1. Monitor their patients for excessive weight gain
2. Discuss the possible long- and short-term consequences of excessive weight gain (e.g., cardiovascular and respiratory problems) with patients and parents and institute a treatment plan or a referral as appropriate
3. Advise patients to engage in moderate, physical activity daily, limit television, computer and video games, and spend family time together in physical activities
4. Advise parents to eat together as a family, set goals for the appropriate number of fruits and vegetables per day, serve portion sizes that are right for a child's age, limit snacking on empty calorie foods, and serve as role models for eating healthy foods

TABLE 1:

Terminology for BMI percentiles in children and adolescents.[8]

WEIGHT CATEGORIES	BMI PERCENTILES
Underweight	Less than 5th percentile
Healthy Weight	5th to 84th percentile
Overweight	85th to 94th percentile
Obesity	95th to 98th percentile
Severe Obesity	Greater than 99th percentile

CONFIRMING OBESITY THROUGH RISK ASSESSMENT

Once a patient is identified as having a BMI percentile corresponding to overweight or obesity (higher than 85th percentile), a comprehensive child-specific assessment must be performed to determine any health risks. The physician should evaluate medical risk, behavioral risk, and motivation to change.

MEDICAL RISK

The evaluation of medical risk consists of a review of comorbidities and complications associated with obesity. This includes family medical history, review of systems, vital signs, and physical exam signs.[8] A thorough examination should be completed since obesity can affect all body systems.

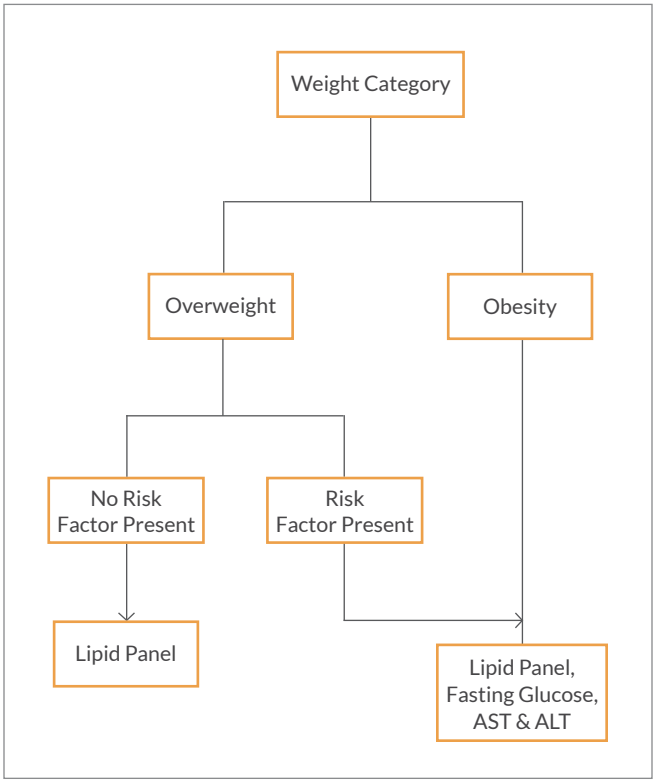
Physicians are encouraged to follow an algorithm for conducting laboratory testing based on medical risk (Figure 2). Screening laboratories may be required, such as a lipid panel, fasting glucose, aspartate transaminase (AST), or alanine transaminase (ALT). Laboratory screening should begin at age 10 and be performed every two years.

BEHAVIORAL RISK

A brief nutritional assessment of the eating habits of the child should be conducted and include the frequency of eating meals outside of the home, intake of calorie-containing beverages, nutrient dense food habits, and school lunch patterns.[20] In addition, an assessment of activity level including sedentary and physical

FIGURE 2:

Algorithm for laboratory testing based on weight category and risk factors.



activity should be done. Examples of sedentary behavior risk factors include the presence of a television in the child's bedroom, as well as screen time (i.e. television viewing, computer and video game use) greater than two hours in children over 2 years old.[21] Physical activity consists of free play and organized sports or activities in the home and school. Although brief, these assessments are useful in determining health risks and identifying precise areas of intervention.

MOTIVATION TO CHANGE

Lastly, the perception of a child's health by herself or himself and by the family should be assessed. Children and parents may not recognize excess weight, even when the child's weight is categorized in the range of obesity.[22-24] Cultural and socioeconomic influences can affect the manner in which a child's weight is perceived. Patients and families often demonstrate a greater focus on immediate and short-term effects of obesity versus long-term effects.[25] For this reason, scare tactics that emphasize long-term consequences are often ineffective.[26]

The patient-centered counseling style of motivational interviewing can be a helpful technique to assess the readiness of a patient and family to change.[27, 28] The goal of this approach is to elicit the specific motivations for change and an understanding of thoughts or behaviors that may become barriers.[29] With a reflective listening style as such, physicians can encourage patients to find their own solutions.

PREPARING FOR INTERVENTION

Once a patient is identified as having evidence of a health risk, the discussion of weight and associated comorbidities with families may be a sensitive issue. Stigma and discrimination against children and adults with obesity are pervasive and exist within the medical community itself.[30] Furthermore, the occurrence of negative attitudes (e.g. shame, bias, embarrassment, blame) towards children and families with obesity often leads to health disparities and interference with effective intervention.[31] However difficult discussions may be, it is necessary to appropriately address the medical issue.

Family medicine physicians can engage families by using sensitive and supportive language. For example, the terms "weight problem" and "unhealthy weight" were found to be more desirable and motivating for weight loss compared to terms such as "fat," "obese," and "extremely obese" in a national U.S. survey of parents.[31] The trust and mutual respect established from long-standing patient-doctor relationships also facilitate discussions. Specifically mentioning that genetic and epigenetic factors do play a role in the susceptibility to obesity[32] can be helpful in acknowledging the predisposition to excess weight in certain families. Emphasizing modifiable factors for weight management further enables families to engage in behavioral changes.

IMPLEMENTING A STAGED INTERVENTION

After a risk assessment is completed, the physician can begin to implement intervention through comprehensive lifestyle modifications. Programs have been found to be most effective when they include dietary, physical activity, and behavioral counseling components.[9,33] It is recommended to follow a staged approach that gradually transitions from general preventive education to more patient-specific treatment options. The clinical decision to advance from one stage to the next is based on the evaluation of the patient's health risks and level of success achieved.

The "Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity" can be used as a standard of care.[8] Family medicine physicians may begin the initial stages of intervention within a typical primary care setting (Figure 3). The goal of the intervention differs by stages. Patients who do not meet the health goals of the initial stages should be referred to multidisciplinary teams with obesity specialists, which may utilize pharmacotherapy or surgery, as appropriate.[20]

For patients in the range of healthy weight and overweight without any complications, intervention starts with general prevention messages (pre-stage) delivered at wellness visits, with the goal of encouraging lifelong, healthy behaviors. As a general rule, the next level of treatment should be considered when a patient does not show desired improvement over a 3 to 6 months period.

Stage 1 further reinforces healthy eating and activity habits with the additional goal of decreasing BMI percentile. Patients in the range of overweight with associated complications and obesity can be started at this level. Family- and patient-specific goals can be set. Stage 2 introduces structured weight management and is appropriate for patients who have not met goals in previous stages. This stage involves more support and structured behavioral modification recommendations with monthly follow-ups. The goal is to improve BMI percentile through weight maintenance or loss. Of note, weight loss should not exceed more than 1 lb (0.5 kg) per month for children age 2 to 11 years old, or more than 2 lb (1 kg) per week for older children and adolescents.

INCREASING SUCCESS IN ACHIEVING LIFESTYLE GOALS

Behavioral interventions are practical tools in making incremental lifestyle changes. Self-monitoring, stimulus control, goal setting, and positive reinforcement have been found to be effective.[34] With the adoption of behavioral interventions, children can form life-long habits.

Self-monitoring of target behaviors through logs can help patients and families to have a greater awareness of their triggers and behaviors. Once written in a log, unhealthy behaviors can be identified and acted upon more objectively. The family medicine physician can review logs with patients to provide personalized feedback.

Stimulus control involves encouraging healthier foods or activities that promote exercise. For example, unhealthy snacks can be removed from the household. With a modified environment, parents can impose fewer restrictions on the child's behavior. Thus, children may feel more trusted and empowered to make their own health decisions.

Goal setting should focus on specific and quantifiable results. During a visit, the physician can encourage the patient to set attainable activity or nutrition goals. For instance, a patient may commit

FIGURE 3:

Family medicine stages for treatment of child and adolescent obesity.[8]

	NUTRITION GUIDELINES	ACTIVITY GUIDELINES	MONITORING	GOALS
	PREVENTION			
Pre-Stage Healthy weight Overweight, *no health risk*	• Limit sugar-sweetened beverages • Encourage consumption of fruits and vegetables • Eat a healthy breakfast daily • Most meals eaten at home at a family table	• ≤ 2 hours daily screen time. No screen time for children under 2 years of age • Moderate to vigorous physical activity for ≥ 1 hour daily	• Reinforce goals at preventive care visits	• Adoption of healthy lifestyle habits and attitudes • Maintenance of BMI • Prevention of medical complications
	PREVENTION PLUS			
Stage 1 Overweight, *health risk* Obesity	Pre-Stage, *plus*: • Patient specific healthy eating goals • Allow self-regulation of meals for children over 12 years of age	Pre-Stage, *plus*: • Patient specific activity goals • Activity may be structured or unstructured	• Reinforce at each visit • Follow-up frequency tailored to patient • Reassess at 3 to 6 months	• Adoption of healthy lifestyle habits and attitudes • Improved associated conditions
	STRUCTURED WEIGHT MANAGEMENT			
Stage 2	Stage 1, *plus*: • Daily eating plan for all meals and snacks *(by dietician or experienced physician)* • Limit portion size • Emphasize low engergy density foods	Stage 1, *plus*: • ≤ 1 hour of screen time daily • 1 hour of daily planned, supervised physical activity	• Monthly office visits • Monitor through logs • Rewards for target behaviors	Stage 1, *plus*: • Gradual weight loss

to limit soda to one serving a day. Progress should be reviewed at subsequent visits. By reaching goals, children may enjoy increased self-confidence and engagement in making changes in their own lives.

Praise and nonfood rewards may also be used to provide positive reinforcement for reaching goals. A physician can demonstrate to parents how to praise a child for his or her efforts during a follow-up visit. A parent may reward a child by engaging in his or her favorite activity, such as riding bicycles together.

The likelihood of achieving lifestyle goals can be further strengthened through family involvement.[8, 33, 35-38] The importance of parents and other caregivers in helping their child or adolescent develop healthy habits has been demonstrated to result in greater success than targeting the child alone. With a healthier home environment, parents also serve as role models to enable and enforce improved nutrition and increased physical activity. The strong evidence for family involvement during intervention highlights the unique advantages of family medicine physicians, who can counsel and treat all members of the family.

PROVIDING PATIENTS AND FAMILIES WITH EDUCATIONAL RESOURCES

Professional organizations and governmental agencies make evidence-based resources available to help children and their families improve nutrition and increase physical activity. These resources typically leverage community and family settings to improve underlying health behaviors responsible for overweight and obesity. Families and patients can be referred to these resources directly, or information may be provided at office visits. Below and on page 30 is a list of select patient resources available at a national level:

- The "We Can!" initiative, or "Ways to Enhance Children's Activity and Nutrition", was created by the National Institutes of Health[39] and offers a website with healthy weight education and tips, worksheets, and community resources to change behaviors in families. A health professional's section provides training and curriculum to use with families. The "We Can!" curriculum focuses on parents and families as primary influences for change in youth, following successful obesity prevention strategies reported by the Institute of Medicine's Committee on Prevention of Obesity in Children and Youth.[40] Upon completion of the curriculum, parents and children were found to have improved their knowledge, attitudes, and

behaviors related to healthy eating and physical activity.[41] Specifically, data have shown statistically significant improvements in 12 out of 15 measures (80%) related to energy balance, portion size, healthy eating, physical activity, and screen time.

- "5-2-1-0 Let's Go!" is a national campaign with a focus on families.[42] This campaign promotes daily behavioral targets of 5 fruits and vegetables, 2 hours or less of screen time, 1 hour or more of physical activity, and 0 sugar-sweetened beverages. A healthcare toolkit contains office posters and handouts for patients. A provider section also includes screening questionnaires and additional education. Implementation of the "5-2-1-0 Let's Go!" campaign in pilot communities has been shown to increase fruit and vegetable consumption while decreasing sugar-sweetened beverage intake in children.[43]
- "Let's Stop Childhood Obesity!" is a brochure by the American College of Osteopathic Pediatricians that can be distributed to families.[44] Information on the definition, causes, complications and prevention of childhood obesity is reviewed. The American College of Osteopathic Family Physicians has developed a patient education poster that can be displayed in an office setting,[45] which discusses the effects of childhood obesity and offers tips for families. Additional tips on healthy eating and physical activity can be found on the American Osteopathic Association's website.[46] Strategies outlined in the brochure, poster and website are aligned with American Osteopathic Association Policy Statement on childhood obesity.[7]

CONCLUSION

Family medicine physicians have the opportunity to play an important role in decreasing the rates of childhood obesity by tailoring evidence-based recommendations to patients and their families. In particular, family medicine physicians have distinctive advantages such as longstanding doctor-patient relationships, an increased understanding of family dynamics, and an ability to treat all members of the family. Children with health risks can be identified through routine monitoring of body mass index percentiles and comprehensive risk assessment. Use of motivational interviewing and supportive language can help to engage families in a staged approached to comprehensive lifestyle interventions. Behavioral interventions and educational resources are also useful tools for families. As the understanding of childhood obesity expands, guidelines continue to evolve and will need to be periodically reviewed by the medical community. In clinical practice, family medicine physicians remain essential in the diagnosis and treatment of childhood obesity.

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REVIEW ARTICLE

Outpatient Interventions for Smoking Cessation: the Pharmacist's Role as an Extender

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As the number of patients who have cardiovascular and metabolic disease grows, tobacco cessation should be a prime target for risk reduction. Physicians, already rushed during chronic care visits, often do not have the time to thoroughly address or follow up with smoking cessation efforts. As there is a move toward an interprofessional team-based approach and patient-centered care, physicians may consider utilizing extenders of the team, such as pharmacists, to help manage chronic diseases as well as aid patients on the journey to ending tobacco use. Pharmacists continue to be highly rated on Gallup's Poll of Most Trusted Professionals and are one of the most accessible healthcare providers. This manuscript will review the current evidence for pharmacist-based smoking cessation interventions. Fourteen studies were reviewed. These studies report positive outcomes in both the clinic setting as well as the community setting, indicatingthat pharmacists may serve two beneficial roles: to alleviate the physician's workload through extension of care and to follow a patient throughout the process of smoking cessation. Team-based approach to chronic care and behavior change can have a positive impact on patients and should be explored further and implemented more routinely in chronic care.

INTRODUCTION

Human use of tobacco dates as early as the late 1400s when first introduced in Europe.[1] While early tobacco practice was frequently deemed spiritual or medicinal, the first recorded history describes both belief and skepticism of health and financial benefits. After becoming popular throughout Europe in the 1500s, it was not until one hundred years later the first commercial crop was grown in the United States in Virginia.[2] Although some evidence still supported tobacco usage, evidence against it began to grow. In 1689, The Medical School of Paris released an official statement that smoking shortens life. In the mid-1800s, British Parliament passed a bill requiring several railway cars to be smoke-free while the United States was beginning to manufacture cigarettes for the first time.[1] Data supporting the dangers of tobacco through cigarette smoking began surfacing during the early to mid-1900s. Finally in 1964, evidence from more than 7,000 articles in the United States literature elicited the Surgeon General to place a warning on the use of cigarettes.[3-6]

According to the Centers for Disease Control and Prevention (CDC), 1 of every 5 American adults smoked cigarettes in 2013. Moreover, smoking is the leading cause of preventable death and is linked to 1 in 5 deaths each year (Figure 1). Contributing risk factors include living in poverty and having a lower education level, as well as a disability.[5,7] Since the official warning set forth by the Surgeon General in 1964, cigarette smoking has been linked to an increased risk of reproductive complications, cardiovascular disease, and cancer.[8,9] Additionally, smoking has been linked to an increased risk of type 2 diabetes mellitus and insulin resistance as well as a general decrease in overall health.[10] While addressing the nicotine component is important, it would be remiss not to mention cigarettes contain a number of carcinogens lending to the dangers of smoking.[11]

Despite the universal awareness surrounding the health risks associated with smoking, attempts at quitting often fail. Notable factors contributing to the challenge of cessation include physical addiction to nicotine, accelerated delivery of nicotine to the brain through inhalation, and emotional and behavioral associations connected to the act of smoking.[12] Consequently, support is required for successful cessation. Organizations, such as the American Cancer Society and the American Lung Association, offer support focused on how to quit while also addressing the three components of addiction: physical, psychological, and behavioral.[13] Additionally, successful smoking cessation programs have been designed to assist with these components as well.[14] While healthcare providers frequently treat the physical component by recommending appropriate pharmacologic therapy, they should also address the psychological and behavioral components. Providers can utilize the 5 A's of Intervention (Ask, Advise, Assess, Assist, and Arrange) to open up conversation, identify triggers, and enable the patient to determine a plan of action by use of motivational interviewing.

It is well-recognized that episodic, uncoordinated care by a single provider or a small group of providers does not assist in effective change for chronic behavior or disease. The journey to smoking cessation is no exception. Chronic patient-centered care, including work with behavior and lifestyle changes, requires a

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FIGURE 1:

Percentage of smokers by state in 2013 according to the CDC

STATE	YEAR	PERCENTAGE OF SMOKERS
Arizona	2013	16.3
Arkansas	2013	25.9
California	2013	12.5
Colorado	2013	17.7
Connecticut	2013	15.5
Delaware	2013	19.6
District of Columbia	2013	18.8
Florida	2013	16.8
Georgia	2013	18.8
Hawaii	2013	13.3
Idaho	2013	17.2
Illinois	2013	18.0
Indiana	2013	21.9
Iowa	2013	19.5
Kansas	2013	20.0
Kentucky	2013	26.5
Louisiana	2013	23.5
Maine	2013	20.2
Maryland	2013	16.4
Massachusetts	2013	16.6
Michigan	2013	21.4
Minnesota	2013	18.0
Mississippi	2013	24.8
Missouri	2013	22.1
Montana	2013	19.0
Nebraska	2013	18.5
Nevada	2013	19.4
New Hamshire	2013	16.2
New Jersey	2013	15.7
New Mexico	2013	19.1
New York	2013	16.6
North Carolina	2013	20.3
North Dakota	2013	21.2
Ohio	2013	23.4
Oklahoma	2013	23.7
Oregon	2013	17.3
Pennsylvania	2013	21.0
Rhode Island	2013	17.4
South Carolina	2013	22.0
South Dakota	2013	19.6
Tennessee	2013	24.3
Texas	2013	15.9
Utah	2013	10.3
Vermont	2013	16.6
Virginia	2013	19.0
Washington	2013	16.1
West Virginia	2013	27.3
Wisconsin	2013	18.7
Wyoming	2013	20.6

coordinated team-approach. An interprofessional team, with complementary skill sets and an open platform of communication, can provide the best outcomes for patients. This team may include direct care providers such as physicians, physician assistants, and nurse practitioners, but additionally we must consider what extenders, such as nurses, medical assistants, educators, mental health practitioners, pharmacists, social workers, and nutritionalists can bring to the table.

Acknowledging the heterogeneity of the United States health care system, the interprofessional team may look different in varying healthcare settings depending on the health care location, availability of each specialist, and reimbursement issues. Pharmacists can participate in many of these settings. Commonly considered in the commercial (community) role only, pharmacists are now routinely embedded in hospital-based clinical teams, patient centered medical homes (PCMHs), and chronic disease clinics in settings such as academic medical centers, federally qualified health centers (FQHCs), and Veterans Affairs (VA) clinics. These placements provide a change in focus from dispensing medication to direct patient care and counseling. For example, pharmacists may enter

collaborative practice agreements to manage chronic diseases, such as diabetes, hypertension, and heart failure. Involvement of pharmacists in these settings has been helpful, as each member of the team can assume a smaller, more specific role in care and population management.

In the community setting, pharmacists are often considered the "most accessible healthcare professional to the public,"[15] and they are stepping out from behind the counter to counsel patients, conduct medication therapy management (MTM) interventions, and immunizations (Table 1). As extenders to providers, with at least 4-6 times as many touches a year and the trust of the public according to the annual Gallup Poll relating to public perceptions of honest and ethical standards,[16] pharmacists are perfectly suited to provide smoking cessation services. This is especially important as primary care providers continue to trend toward a projected shortage. Pharmacists can address the physical component through recommendation of therapy and may counsel patients on proper use of medication while utilizing motivational interviewing to encourage patients to identify triggers and determine plans of action. During monthly visits, a pharmacist is uniquely positioned to maintain regular follow up throughout the process. This manuscript explores two roles the pharmacist may play to assist in smoking cessation efforts.

METHODS

Materials for this review were obtained by a PubMed search.Articles considered for inclusion were of original research between 2000 and 2014, using combinations of keywords such as pharmacist, smoking cessation, tobacco cessation, pharmacy, community, outpatient, and intervention; English language; clinical trials; published in a peer-reviewed journal; and focused on evaluations of

TABLE 1:

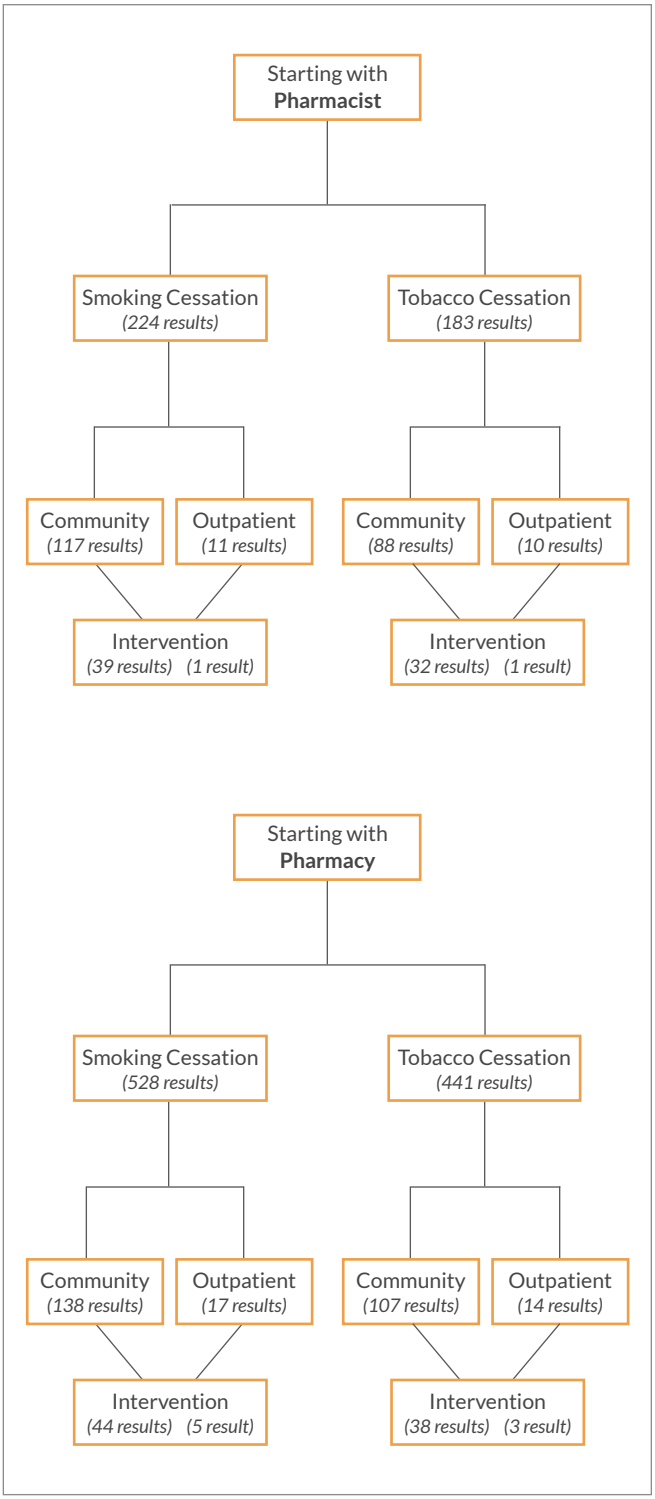
Description and distribution of pharmacist roles in various settings according to the American Association of Colleges of Pharmacy (AACP) Alumni Survey in the 2014 national report.

PHARMACY SETTING	DESCRIPTION	DISTRIBUTION *(% of pharmacists employed)*
Chain Community Pharmacy	Traditional roles of dispensing medications and educating patients.	31.3 %
Independent Community Pharmacy	Dispense medications and educate patients. Not affiliated with a chain or publicly traded company.	7.4 %
Hospital / Impatient	Fill medication orders, screen for allergies and adverse drug reactions, serve as a medication experts to hospital staff.	32.1 %
Clinic-Based Pharmacy / Ambulatory Care	Direct patient care and medication management in an outpatient setting.	6.9 %
Consultant	Provides expert advice on medication use and pharmacy services.	1.4 %
Home Care	Provides a range of medications, including IVs, for patient home administration.	0.7 %
Nursing Home / Long Term Care	Manage dosing, interactions, therapy regimens tailored to this specific patient population.	2.0 %
Academia	Disciplines within academic pharmacy include administration, biological sciences, clinical science, continuing education, experiential education, drug discovery, medicinal/natural products, and pharmacology.	5.6 %
Association Management	Hold nation and state positions in pharmacy associations with administrative roles.	0.1 %
Pharmaceutical Industry	Marketing, research and product development, quality control, sales, and administration.	1.8 %
Managed Care	May work for health plans or pharmacy benefit management companies to provide the highest quality drug therapy management.	2.4 %
Government or Regulatory Agency	Direct patient care with affiliation to national services and or armed forces.	2.9 %
Other		3.8 %
Not applicable		1.5 %

smoking cessation programs implemented in outpatient clinics or community pharmacies. Articles were excluded if they were published before 2000, compared pharmacologic therapy as the main objective, were not original research, or evaluated smoking cessation services provided by a non-pharmacist healthcare provider. Advanced keyword combination searches in PubMed yielded many results and were narrowed down by including additional keywords (Figure 2). Articles were selected from the unique searches according to inclusion criteria. Additionally, references from selected articles were explored to include articles not indexed in PubMed. Twelve articles that met the inclusion criteria were selected for review.

FIGURE 2:

Schematic of search results



ROLE OF THE PHARMACIST

While pharmacists have provided intermittent smoking cessation services for over 20 years, there has been a movement over the last 15 toward developing sustainable programs. Despite having differing responsibilities in each role, smoking cessation services have been provided in inpatient and outpatient settings. This review will examine the smoking cessation services provided by the pharmacist in the outpatient setting as part of an interprofessional team in clinic or in community practice.

CLINIC SETTING

Selected studies in the clinic setting primarily focus on the successful implementation of pharmacist-managed programs and the comparison of an intervention group to routine care. These studies provide valuable insight to the potential influence of a pharmacist-managed smoking cessation clinic on successful quit attempts.

Three studies reported on the impact on quit attempts in patients participating in pharmacist-managed smoking cessation clinics.[17-19] In the first study (N=21), successful quit attempts were demonstrated at 3 months (47.6%) and 6 months (52.4%) in a program consisting of 6 counseling sessions over 8 weeks with intention to treat follow up. Patients could be referred by a provider, pharmacist, or self-referred and were recommended appropriate pharmacotherapy based on choice and appropriateness. Notably, quitters found the counseling sessions and discussion regarding medication options to be helpful, although not statistically significant compared to non-quitters.[17]

The second study (N=31) demonstrated successful quit rates in a similar pharmacist-managed program. In this program, participants attended once weekly group sessions for one hour. Sessions lasted 12 weeks with an additional 12 weeks for relapse prevention. Trained pharmacists provided behavior modification counseling alongside nicotine replacement therapy (NRT) as patches or gum. Self-reported abstinence data was collected weekly at the group sessions and confirmed by carbon monoxide (CO) detected in the breath at 3 and 6 months. Tests of less than 10 parts per million of CO confirmed abstinence. About half (16) of the original participants completed 3 months, and 10 participants completed the full 6 month program. At 3 months, 13/16 participants were abstinent while 8/10 were abstinent at 6 months.[18]

The third study (N=198) focused on a physician-referred, pharmacist-managed smoking cessation clinic at a VA Center and found that abstinence rates fell quickly between 6 and 12 weeks. The authors concluded either regular follow up is necessary during the first 6 weeks of a quit attempt, or a longer timeframe for follow up is needed to improve quit rates.[19]

When comparing outcomes of pharmacist-based services to routine care, a study in a VA clinic (N=100) showed higher success rates in the treatment group, who received 6 hours of group counseling in 3 sessions spread over 5 weeks. Routine care was described as one 5-10 minute counseling session similar to the 1-800-QUIT-NOW line. Higher success rates in the treatment group were observed at the 7-day point prevalence cotinine-confirmed (p=0.041), 30-day point prevalence (p=0.014), and 6 month abstinence (p<0.041). All patients were offered either bupropion IR or nicotine patches. Following intention to treat, all patients lost to follow up were assumed to be smokers.[20]

A retrospective analysis (N=1006) at a different VA clinic compared patients receiving pharmacist-managed telephone counseling and medication to routine care, defined as those patients receiving pharmacologic therapy alone. This study identified cessation trends and abstinence as documented in Tobacco Cessation Clinic Reminders, a section of the electronic health record. Patients were offered NRT or bupropion SR. There were significantly more patient-reported abstinences at 1, 3, and 6 months (p<0.0001 for all time periods) in the treatment group (N=503). While smoking history was not different between groups, the routine care group had fewer quit attempts (p<0.001) and were more likely to use NRT alone rather than bupropion or a combination (p<0.001). It is important to note this data may not be generalizable due to the specific patient population in this study. Additionally, data was collected retrospectively, so it is possible the standard of care group was misrepresented if abstinence was not properly documented.[21]

COMMUNITY

Selected community-based studies have demonstrated the role of pharmacists providing smoking cessation services. Of the studies chosen to review, three main themes were identified: assessing tobacco users' perception of counseling in the community setting, assessing feasibility of implementing these services, and identifying intervention outcomes.

Tobacco users' perceptions of pharmacist services have been positive overall. A toll-free number provided to patients who purchased NRT in one study (N=103) invited patients to participate in a survey assessing methods for quitting, the patient's perception of community pharmacy-based interventions, and the types of interventions patients find to be helpful. The responses were analyzed descriptively. Overall, patients found pharmacist assistance to be appealing with over 60% of patients surveyed reporting they would either probably or definitely quit as a result of pharmacist intervention. Additionally, 46% of patients were either very likely or extremely likely to work one-on-one with a pharmacist for a co-pay while 68% of patients would meet if there was no charge. Preferred types of interventions varied suggesting they should be tailored to the individual's needs.[22]

A second study (N=24), also utilizing the interview method, assessed patients' perceived appropriateness of an Ask-Advise-Refer (AAR) intervention as part of a larger study. Sixty-three percent (63%) of respondents reported pharmacists conducting smoking cessation counseling in the community setting as being appropriate. Additionally, patients reported they would prefer to initiate the conversation and that advertising the AAR service would prompt them to do so.[23] These studies lend to the theory patients are willing to work with the pharmacist.

Feasibility of implementation was considered in chain pharmacies from a previous study. Participating pharmacies (N=16) were blindly randomized to either a control group (offered 1-800-QUIT-NOW cards and/or enrolled in the Fax to Quit (FTQ) program) or the experimental group (FTQ plus training for AAR, suggestions for integration into workflow, and advertisements). Pharmacists (N=32) and technicians (N=48) were asked to record data on a day-to-day basis. The experimental group asked, advised, and enrolled more patients to quit ($p < 0.001$, $p < 0.001$, $p < 0.001$) and gave out more quit cards ($p < 0.05$) than the control group, while no baseline differences existed between pharmacies. While quit rates were not assessed and data was analyzed using a regression model, feasibility of one model of implementation was demonstrated.[24]

In a second feasibility study, pharmacists (N=192) were surveyed during a conference regarding their likelihood to address the US Clinical Practice Guideline 5 A's, in addition to their interest in and the feasibility of implementing smoking cessation services. They were given the opportunity to provide information regarding any barriers to this process. Eighteen percent of state-licensed pharmacists were in attendance, and of those over half (54%) reported they were most likely to advise a patient to quit smoking, the same number would advise on proper use of prescription (54%), and 62% would advise on nonprescription medication. Barriers to implementation included lack of time (52%), lack of reimbursement (26%), and lack of training (19%).[25] This is consistent across professions. While physicians reported that they were comfortable with providing smoking cessation counseling, 38% felt that it took too much time.[26] Overall, pharmacists are confident in addressing the issue (76%) and feel it is feasible to provide these services (56%).[25]

In a third feasibility study, a group of community pharmacists (N=9) utilizing the AAR model were asked to place a value with the service. They ranked counseling as the most expensive service they provide compared to discussing cessation, enrolling patients in the quit line, and contacting a patient's provider.[27] Overall, the studies above demonstrate that it is likely feasible to implement the AAR model in a community pharmacy with a trained and willing team.

Outcomes of smoking cessation programs have shown potential as well. When comparing smokers referred to the quit line (N=100) to those counseled using a tailored electronic counseling aid, Exper_Quit, either with (N=100) or without (N=100) nicotine patches, those being counseled were more likely to make a quit attempt ($p < 0.02$) and demonstrated higher 7-day point prevalence abstinence than the observation group ($p < 0.01$). Those receiving patches were twice as likely to quit as those only receiving counseling ($p < 0.01$).[28] Similarly, pharmacists in another study (N=6987) providing either one or three counseling sessions found that patients who completed three counseling sessions were more likely to quit ($p < 0.001$).[29] A third study (N=346), focused on a pharmacist-managed smoking cessation service with follow up at 1, 3, and 6 months, found that 40-50% of patients were likely to respond to follow up calls at all three intervals, and abstinence rate held steady around 25% at each follow up session. Of those participants, 50% were initially confident that they could quit, and the most commonly prescribed medication was nicotine patches at 30% compared to other NRT, varenicline (Chantix), and bupropion SR (Zyban).[30]

Generally, these community studies recognize that tobacco users' accept pharmacists as a tool for intervention, the feasibility of one particular implementation model of a smoking cessation service in the community setting has been described, and pharmacists in the community setting are uniquely situated to support patients during the quitting process. Each study, with certain limitations, provides evidence that pharmacy-managed smoking cessation services in the community should be further explored.

CONCLUSION

Smoking is the single biggest lifestyle behavior leading to premature mortality. It is widely known that there are no health benefits from smoking, yet 18% of adults and 23.3% of children smoke.[9]

Providing patient education about smoking cessation is a responsible public health action and is cost effective. Unfortunately, the time allotted for family physician office visits is not long enough to address current lifestyle-based, chronic conditions. As we move from episodic care to a patient centered, shared decision making care model in the PCMH, the skill set for physicians and the health care team must adapt. It is unreasonable to expect that a single individual with less than a handful of visits per patient per year will successfully navigate every behavioral change needed for chronic disease.

Behavioral change requires a different skill set than other medically related encounters. When a patient develops an infection, a diagnosis, as well as effective and safe treatment options, is desired. This is also true of behavioral change; however, unlike an infection, chronic health care and behavioral-related conditions are largely self-managed. The health care team is not present during times of typical problem solving.[31] Quit-lines have been useful in providing access to experts during times of need; however, many smokers still remain reluctant to call and discuss a subject as intimate as cessation with someone they do not know.

There is not enough provider time per week to complete all preventive and chronic care necessary. It is estimated that if a physician is going to meet the USPSTF recommendations, it would take 1,773 hours per year or 7.4 hours per day to provide all preventive services.[32] Further, this research team took the ten most common chronic conditions and applied them to a family physician's panel of 2,500 patients. To provide high quality chronic disease care to the practice, it would require 3.5 hours per day for a controlled disease and up to 11 hours per day for uncontrolled diseases.[33] Clearly, the treatment team must adjust to meet these challenges.

Utilizing the interprofessional health care team, including extenders into the community, will likely provide timely interventions and enough "touch points" to enable patients make difficult behavioral changes and maintain healthy lifestyle habits.

One of the most challenging behavioral changes is tobacco cessation. Pharmacists have demonstrated success in aiding this process in the clinic and community settings. Further expanding the treatment team to include pharmacists will increase accessibility to health advice for patients and potentially improve adherence. Using this evidence-based approach, patients may be more likely to stop deleterious behavior and physicians can focus on other aspects of the visit, while patients have access to the expanded health care team.

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REVIEW ARTICLE

An Osteopathic Approach to the Treatment of Ovarian Cancer

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Ovarian cancer remains a highly lethal and prevalent disease in the United States currently being the fifth leading cause of cancer-related death for women for the year of 2014. Despite advances in surgical and medical management, this disease usually carries a poor prognosis. Current guidelines to the management and treatment of ovarian cancer outlined by the National Comprehensive Cancer Network (NCCN) are utilized by both osteopathic and allopathic physicians to improve the outcome of this disease in their patients, but there has yet to be an integration of the NCCN recommendations and core osteopathic principles. The osteopathic approach to ovarian cancer (OstOCA) described in this paper addresses the treatment and management of ovarian cancer by synthesizing the NCCN's recommendations and the key principles, evidence-based manipulation techniques, and philosophy of osteopathic medicine. This novel approach holds promise to improve both diagnosis and treatment ovarian cancer and potentially improve outcomes for patients with this disease. Future studies designed to properly test this model in its intended population are the next step into defining a role for osteopathic concepts in the treatment and management of ovarian cancer. Such a study, should it demonstrate benefit, would also open the door for new proposals of protocols for osteopathic management of other neoplastic processes and provide a new frontier for osteopathic medicine and research.

INTRODUCTION

The constellation of human malignancies collectively referred to as "ovarian cancer" remains highly prevalent and lethal in the American population despite major advances in our molecular and biological understanding of the disease, along with improved treatment modalities. Ovarian cancer currently is the fifth leading cause of cancer-related deaths among American women with an estimated 21,980 new cases and 14,270 estimated deaths nationwide in 2014.[1] Because symptoms associated with the disease are typically nonspecific and often silent before reaching an advanced stage, more than two-thirds of cases of ovarian cancer are only diagnosed when the disease has progressed to stage III or IV and involves the peritoneal cavity or other organs.[2] Such stages confer a much poorer prognosis as compared with stage I disease: When ovarian cancer is detected and treated while still at stage I, where the malignancy is confined to the ovary, the five-year survival rate approaches 90% whereas when it is detected at the far more common stage III or IV, the rate drops to around 33%, even when the most aggressive and advanced therapies are employed.[3] Due to the lack of a consistent and reliable screening methodology for this disease, stage I disease is often missed and ovarian cancer treatment remains a challenge for the medical community.

Current guidelines for the management of ovarian cancer, specifically in the scope of epithelial ovarian cancer, fallopian tube cancer and primary peritoneal cancer, are outlined by the National Comprehensive Cancer Network (NCCN).[4] Although these guidelines are used by osteopathic physicians in the field, there has yet to be an integration of the NCCN's recommendations and core osteopathic principles of practice. The following osteopathic approach to ovarian cancer (OstOCA) would serve to enhance treatment and management of ovarian cancer by synthesizing the NCCN's recommendations and key principles, evidence-based manipulation techniques, and philosophy of osteopathic medicine. The addition of these components would make critical improvements to the areas of diagnosis and treatment that current strategies insufficiently address, namely, early detection, response to treatment, and long-term recovery. By addressing these difficulties that currently mar the successful treatment of this disease, the OstOCA holds promise to potentially improve patient outcomes and make ovarian cancer a more manageable and treatable disease.

THE OSTOCA'S OSTEOPATHIC PHILOSOPHY

Osteopathic physicians recognize the body's ability to regulate itself and mount its own defenses against most pathological conditions. However, when key structures are altered, a dysregulation of homeostasis can occur, requiring medical intervention and treatment. Medical treatment, from an osteopathic perspective, includes the combination of pharmacological, surgical, psychosocial, and osteopathic manipulative treatment (OMT) specific to the disease or condition as appropriate. Regarding ovarian cancer, the osteopathic approach not only considers the treatment of the disease to include these four components, but also focuses on identifying predisposing factors to anticipate risk, using both biochemical and osteopathic structural examination methods for diagnosis,

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and exploring opportunities for prevention as part of the management strategy. By properly emphasizing and applying these aforementioned components, the OstOCA provides a more thorough and efficacious plan to detect and treat this disease in addition to understanding how this disease relates to each patient's individual and unique situation.

IDENTIFYING PREDISPOSING FACTORS

A key principle of medical practice, regardless of the specific approach, is to first conduct a thorough yet focused history and physical exam on all patients. As is the case with essentially every disease process, there are known risk factors that, through taking a proper history, can be elucidated and provide clues as to whether or not there is a likelihood of the presence of a particular disease. Thus, the OstOCA should first start with stratifying a given patient's risk through critical analysis of that patient's predisposing factors for this disease. In contrast to other cancers, ovarian cancer lacks reliable and sufficient tissue or biomarker information to allow clinicians to identify women at risk, thus risk identification is primarily based on epidemiological components; the most important of which include hereditary and inflammatory factors.[2-3, 5]

HEREDITARY FACTORS

One of the most consistent and significant risk factors for ovarian cancer is a family history of ovarian cancer, particularly in first-degree relatives.[6] At least two defined inheritable genetic aberrations are known to predispose to ovarian cancer. Mutations in the breast cancer-associated genes, BRCA1 and BRCA2, account for approximately 90% of the ovarian cancers in the hereditary breast-ovarian cancer (HBOC) syndrome and as high as 85% of all hereditary ovarian cancers.[7-9] Mutations in at least four mismatch repair (MMR) genes, including MLH1, MSH2, MSH6, and PMS2, have also been implicated in hereditary nonpolyposis colorectal cancer (HNPCC) or Lynch syndrome, which accounts for up to 15% of hereditary ovarian carcinomas.[9-11] Among these mutations, there are many more genetic targets being investigated in the hopes that one or more will serve as a suitable screening biomarker. Naturally, patients may not present with a known history of these genetic mutations, but may present with certain factors suggestive of an inherited disposition to breast and/or ovarian cancer, such as a family history of breast cancer in a first-degree relative.[12] Criteria for further genetic risk evaluation are well outlined by the NCCN13 regarding breast and/or ovarian cancer, HBOC, Li-Fraumeni Syndrome, Cowden Syndrome, and others, and should be recognized and utilized when taking a history. Following the OstOCA, women who mention any historical items raising suspicion for this disease should be referred for counseling and consideration of genetic testing.

PRESENCE OF CHRONIC INFLAMMATION

As early as 1999, chronic inflammatory states have been implicated in ovarian carcinogenesis.[14] More recently, evidence suggests that the ovarian epithelium and fallopian tubes are exposed to chronic inflammation related to the normal functions of ovulation and menstruation as proven by the presence of pro-inflammatory cytokines and elevated levels of C-reactive protein, a marker for acute inflammation.[15-17] This normal inflammatory state is exacerbated in diseases such as endometriosis, as evidenced by abnormal increases in these markers in addition to endometriosis carrying an increased risk of ovarian cancer itself.[18] Another inflammatory disease to consider when approaching ovarian cancer is pelvic inflammatory disease (PID). This disease occurs most commonly as a result of untreated sexually transmitted diseases and manifests clinically as inflammation of the uterus, fallopian tubes, and ovaries. Evidence has suggested that there is an increased risk of ovarian cancer among women who have had PID, most pronounced at a young age or who are infertile, which is also, in itself an ovarian cancer risk factor.[19] Given these associations, when approaching ovarian cancer, concurrent diseases or chronic inflammatory states should be considered and asked about when taking a history.

DIAGNOSIS AND PREVENTION

As was mentioned earlier in this discussion, ovarian cancer remains a difficult problem for the medical community because of the lack of a reliable and accurate method to detect the disease at an early stage. Criteria for disease screening are set by the World Health Organization and are used to evaluate the effectiveness and benefit that screening for a certain disease would provide. Ovarian cancer meets some of these criteria, but falls short in others, thus routine screening of the general population who are asymptomatic or do no present with any known genetic aberrations at this time is not recommended by any professional society, including the U.S. Preventative task force, American Cancer Society, American College of Obstetricians and Gynecologists, and National Comprehensive Cancer Network.[13, 20-22]

UTILITY OF TUMOR MARKERS

Serum tumor markers have been evaluated for the early detection and treatment success of ovarian cancer, the most widely used of which is cancer antigen 125 (CA-125). Using tumor markers has been attractive to the medical community for a potential screening tool because the measurement of the markers is broadly available, can be repeated at appropriate intervals, minimally invasive, and does not rely on operator interpretation, which makes it preferable to ultrasonography where there is greater subjectivity of results and is more costly. CA-125 is frequently elevated in advanced-stage ovarian cancer, but is only elevated in less than 50% of stage I ovarian cancers.[23-24] Given this relationship, the use of CA-125 and other biomarkers have a niche mainly in the investigation of the disease only if there is a history of risk factors, suspicious clinical presentation suggestive of the disease, or known disease state, be it active disease or remission, but not in the asymptomatic phase.

UTILITY OF THE OSTEOPATHIC MUSCULOSKELETAL EXAM

In addition to conventional means of diagnosing a patient's medical concerns, osteopathic physicians use palpatory findings of the musculoskeletal system to aid in the physical examination of their patients. These findings provide additional information to either help aid in the diagnosis of a disease or monitor a known disease state.[25] These physical exam findings, collectively referred to as somatic dysfunctions, manifest themselves by means of viscerosomatic reflexes, the character and location of which depend on the specific organ or organs involved. Because of the dual innervation of certain viscera and somatic tissue, irritation of specific organs or organ systems in the body may produce impaired or altered function of the related components of the somatic system, namely the skeletal, arthroidal, and myofascial components in ad-

dition to their related vascular, lymphatic, and neural elements.[25-29] This viscerosomatic relationship can also be identified on physical exam more directly by the presence of Chapman's reflex points. Chapman's points are gangliform contractions or excessive tissue congestion that reflect these viscerosomatic reflexes: Visceral dysfunction is mediated by the sympathetic arm of the autonomic nervous system, thus excessive sympathetic tone from an irritated, diseased, or stressed organ leads to lymphatic stasis manifested by these myofascial nodules, or "points," which may feel boggy, ropy, shotty, and/or thickened and always exhibit tenderness to palpation on physical exam.[28-30] These changes can be identified on physical exam by physicians utilizing the OstOCA for a more revealing and targeted physical exam.

It is worth noting that because some neoplastic diseases often arise independent of innervations, these otherwise significant pathologies lacking afferent input to the CNS may not result in a significant viscerosomatic reflex response. In these cases, it is not until sufficient inflammation is established in the tissues displaced by the tumor that reflex somatic dysfunction may be identified.[27] Nevertheless, given the inflammatory nature of this disease at its origin and the known association between this disease and inflammatory diseases described previously, it is reasonable to use this in the OstOCA and expect it to be worthwhile from a diagnostic standpoint.

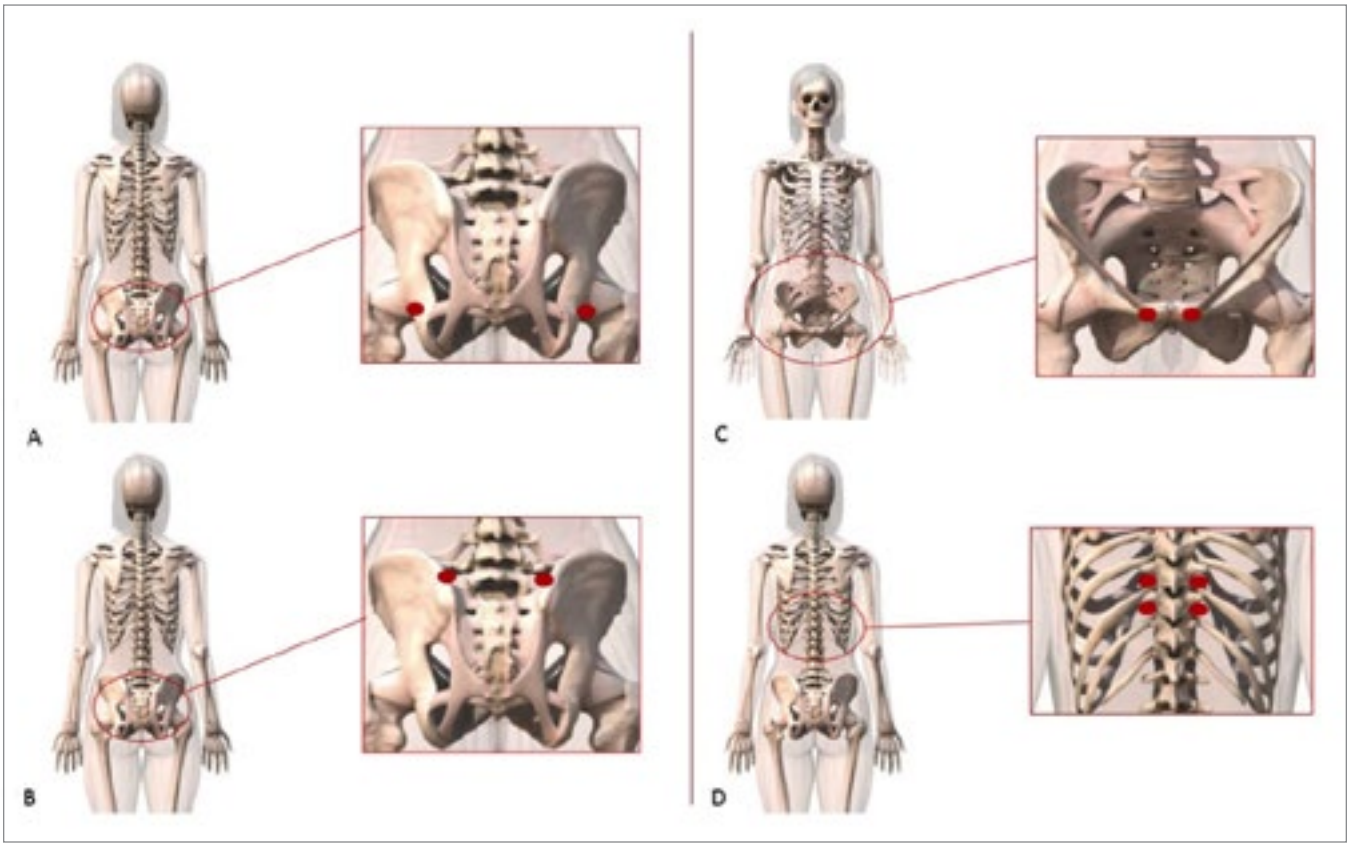
When using a musculoskeletal exam for the potential diagnosis or monitoring of ovarian cancer, the visceral components that are the prime focus are the ovaries and fallopian tubes because these structures are primarily involved in the disease process[31-32] as shown in Figure 1. Proper identification of these viscerosomatic reflexes when present allows for the detection of an otherwise clinically silent disease state and is a useful diagnostic tool when using the OstOCA.

THE ROLE OF OSTEOPATHIC MANIPULATIVE TREATMENT IN THE OSTOCA

The role of OMT in neoplastic diseases has been one of great debates among the osteopathic medical community. Despite speculation, there has not been any evidence that manipulations promote metastasis of malignant cells by increasing circulation of blood and lymphatic fluid. In fact, an argument can be made that by enhancing lymphatic flow, the neoplastic cells would be subject to identification and removal by the natural anti-tumor components of the immune system[25] that may reduce tumor burden. Complicating this debate is the fact that the plethora of different neoplastic processes each exhibits its own specific and unique behavior, pathogenesis, and response to treatment and thus cannot be approached in the same manner.

FIGURE 1:

Chapman's Reflex Points Associated with the Ovaries and Fallopian Tubes.



A) Fallopian tubes, anterior: a gangliform state can be fund midway between the acetabulum and the sciatic notch. **B)** Fallopian tubes, posterior: a gangliform contraction can be found between the posterior superior iliac spine of the ilium and the spinous process of the fifth lumber vertebrae on the iliolumbar ligament. **C)** Ovary, anterior: a gangliform contraction can be found on the anterior surface of the pubic bone from the pubic tubercle inferiority to the origin of the adductor muscles. **D)** Ovary, posterior: a gangliform contraction between the 9th and 10th transverse space indicates an involvement of the inner half of the ovary, while a gangliform contraction between the 10th and 11th dorsal intertransverse space indicates an involvement of the outer half of the ovary.

Therefore, a blanket statement relating the benefits or risks of the use of OMT in the treatment of cancer is not one that can be made with any accuracy or appropriateness. So where does OMT fit into the osteopathic approach to the treatment and management of ovarian cancer? According to the OstOCA, OMT is most appropriately utilized following surgical primary treatment (set forth by the NCCN protocol). The proposed benefits of the postoperative OMT, as outlined in the OstOCA, include: preventing cancer dissemination and metastasis, reducing the need for analgesics postoperatively, and enhancing the body's immunity and return to homeostasis postoperatively, as discussed below.

PREVENTING CANCER DISSEMINATION & METASTASIS

Surgery of the primary tumor is known to create profound metabolic, neuroendocrine, inflammatory, and immunological stress due to the nature of the procedures required to identify and remove the cancerous tissue.[33-34] This surgical stress response involves the release of chemical mediators that have been implicated in carcinogenesis, and it is these mediators that can cause an up regulation of major pro-malignant pathways promoting local and distant metastasis. After surgical removal of the primary tumor, an intact cell-mediated immune response is thought to be important for elimination of residual disease and micrometastases.[35-38] Natural Killer (NK) cells have been shown to have a significant role in controlling these metastases, and intactness of the perioperative NK cell response is thought to be involved in tumor control.[39] OMT in the OstOCA aims to reduce these deleterious effects of perioperative stress that have been implicated in tumor genesis and blunted NK cell response.

REDUCING THE NEED FOR ANALGESICS

Postoperatively, patients will inevitably experience pain, which itself, has been shown to cause suppression of NK cell activity and promotion of tumor development in animal models.[40-41] To control this pain, opioids are commonly used, which have been shown to inhibit cellular and humoral immune function in humans in addition to promoting angiogenesis, which tumors use to their advantage. Morphine, a popular post-operative analgesic, specifically has been shown to inhibit spontaneous and cytokine-enhanced NK cell cytotoxicity, and thus is implicated in increased risk of tumor genesis and recurrence.[42-44] OMT has been shown to reduce patient opioid analgesic use postoperatively through reducing hypersympathetic tone and nociceptive facilitation caused by the stress of surgical treatment.[45-46] By providing a reduced need for opioid analgesics postoperatively, the OstOCA confers a decreased insult to antitumor mechanisms of the immune system, specifically the NK cell response.

ENHANCING THE BODY'S IMMUNITY

In addition to managing pain postoperatively, surgical treatment presents several more challenges to a patient's recovery, including an increase in sympathetic tone, nociceptive facilitation, decreased respiratory effort, lymphatic congestion, postoperative ileus, and threat of infection,[28] all of which impair the body's natural immunity.[25, 28, 34] To combat these adverse results of essential surgical treatment of ovarian cancer, the OstOCA utilizes specific osteopathic techniques that have been shown to reduce hypersympathetic tone and somatic nociceptive stimuli,[47-52] diminish lymphatic congestion by improving flow,[47, 53-54] and stimulating the immune system by enhancing the functions of the spleen.[54-56]

An important consideration for enhancing the body's natural immunity when using the OstOCA is detecting the presence of preoperative somatic dysfunction noted on musculoskeletal examination. The presence of somatic dysfunction in a preoperative patient may be a factor complicating an otherwise normal outcome due to increased pain, decreased arteriolar circulation, and decreased venous and lymphatic return. As somatic dysfunction can cause nociceptive activity and facilitation independent of similar effects that occur postoperatively, it is important to normalize any somatic dysfunction to not further exacerbate the adverse effects of surgical treatment and weaken the body's ability to heal.[53, 57]

MANIPULATION TECHNIQUES USED IN THE OSTOCA

The techniques that the OstOCA involves include sequential occipitoatlantal (OA) decompression, Sibson's fascial release, soft tissue treatments, indirect sacral myofascial release, balanced ligamentous tension, rib raising, paraspinal inhibition, direct splenic stimulation, and pectoral retraction. The descriptions of how these techniques are to be performed[25, 28] is summarized in Figure 2 *(page 46)*. The conditions they affect and location are summarized in Figure 3 *(page 47)*. These techniques should be performed postoperatively in unconscious, pharmacologically paralyzed patients as to achieve the best possible results of treatment and also to reliably reproduce the conditions to which previous studies have used to demonstrate efficacy of these treatments.[47]

While each of these techniques work together in a step-wise manner to achieve the overall aforementioned treatment goals, they each have individual functions to attain postoperative improvement and cancer prevention. O-Yurvati et al[47] studied the use of OA decompression, Sibson's fascial releas, indirect myofascial release, balanced ligamentous tension, and rib raising to provide beneficial, physiologic improvements in fluid homeostasis, lymphatic flow, balance of sympathetic flow by addressing both sympathetic and parasympathetic components, and respiratory function postoperatively, which has been shown to quicken recovery in patients who have undergone surgical procedures. Additionally, rib raising has been shown by Herman[48] to decrease the incidence of postoperative ileus by 99.7% and was supported by a more recent study by Baltazar et al.[49] that demonstrated OMT applied after major gastrointestinal operations was associated with decreased time to flatus and decreased length of postoperative hospital stay. Herman discusses the protective benefit of rib raising at spinal levels T5-L2, but given that L1-L2 spinal levels do not have rib heads to use, an equivalent technique of paraspinal inhibition[25, 28] is suggested by the OstOCA to achieve the same benefits. The use of OA decompression, rib raising, and thoracic pump (substituted by pectoral retraction in OstCA) has been used and shown to demonstrate benefits to the immune system, specifically demonstrated in a study by Saggio et al.[58] This study demonstrated OMT's ability to increase secretory IgA (sIgA), and thus, potentially improve immune system function in a stressed but otherwise healthy individual. OstCA has replaced the thoracic pump with pectoral retraction because this technique has shown greater efficiency—two minutes of pectoral retraction is believed to provide as much assistance to lymphatic flow as up to 10 minutes of thoracic pump treatment.[28] sIgA, being the major immunoglobulin secreted by the mucosal system, makes it a major determinant in the immunity of the viscera involved in the region of the pelvis and abdomen,[59] thus techniques that

FIGURE 2:

Proposed order and descriptions of the osteopathic manipulative treatment techniques used in this approach to ovarian cancer.

Occipitoatlantal Decompression	The osteopathic physician contacts the posterior base of the skull (occiput) with fingers of both hands and applied gentle superior, posterior, and lateral pressure traction. This is done to release tension between the occipital condyles and the first cervical vertebra (atlas) within the occipitoatlantal articulation.
Sibson's Fascial Release	From the head of the bed, the osteopathic physician's thumbs contact Sibson's fascia bilaterally posterior to the clavicles and press caudally to stretch the fascia.
Soft Tissue Treatments	The osteopathic physician, while the patient is in the supine position, a gentle, rhythmic lifting of the back in the thoracolumbar and lumbosacral areas is performed, causing a slight extension movement of the spine. This is performed until tissue relaxation occurs but not for more than five minutes.
Indirect Sacral Myofascial Release	The osteopathic physician makes light contact on the sacral fascia of the sacrum with both hands and assess the direction of rotation of greatest ease. This position is held maintaining light pressure until a release is felt and strain is released.
Balanced Ligamentous Tension	The osteopathic physician places both hands under the patient's back beneath the bed sheet and contacts the spinous processes of the T10-L2 and posterior ribs where present, feeling for ligamentous tension. Very gentle pressure and minor movements of the vertebrae and ribs are applied until a point of balanced tension is felt and strain is released
Rib Raising	From the head of the bed, the osteopathic physician's hands are slid under the patient's upper back, contacting the rib heads at the thoracic level. Upward and lateral pressure is then applied. This is done to address thoracic levels T5-T9 to encourage lymphatic drainage and then T10-T12 to reduce hypersympathetic tone relating to the pelvic viscera.
Paraspinal Inhibition	Producing the effects of rib raising in these segments cannot be performed through rib heads in the L1-L2 spinal areas, therefor paraspinal inhibition is used to treat the effects of hypersympathetic outflow in this area in addition to aiding in ileus prevention. The osteopathic physician, with the patient in the supine position, passes both hands under the back of the patient contacting the erector spinae mass. The hands are then closed, pulling the two muscles toward each other between the fingers and the eminences of the operator. The physician alternates pressure until a there is a sense of relaxation.
Direct Splenic Stimulation	With the patient in the supine position with their knees flexed, the osteopathic physician applies alternating bimanual compressions and relaxations to the tissues in front of and behind the spleen at a rate of 20 times per minute with the compressions being slow and deliberate and the relaxations abrupt.
Pectoral Retraction	With the patient in the supine position with their knees drawn up and hands on the abdomen, the osteopathic physician at the head of the patient gently grasps the anterior axillary fold (pectoralis muscles) and gentle traction is applied in a medial, anterior, and cephalic direction. This is held while the patient breathes normally or with slight increase in volume. Two minutes of this technique provides as much assistance to lymphatic flow as five or more minutes of thoracic pump treatment.

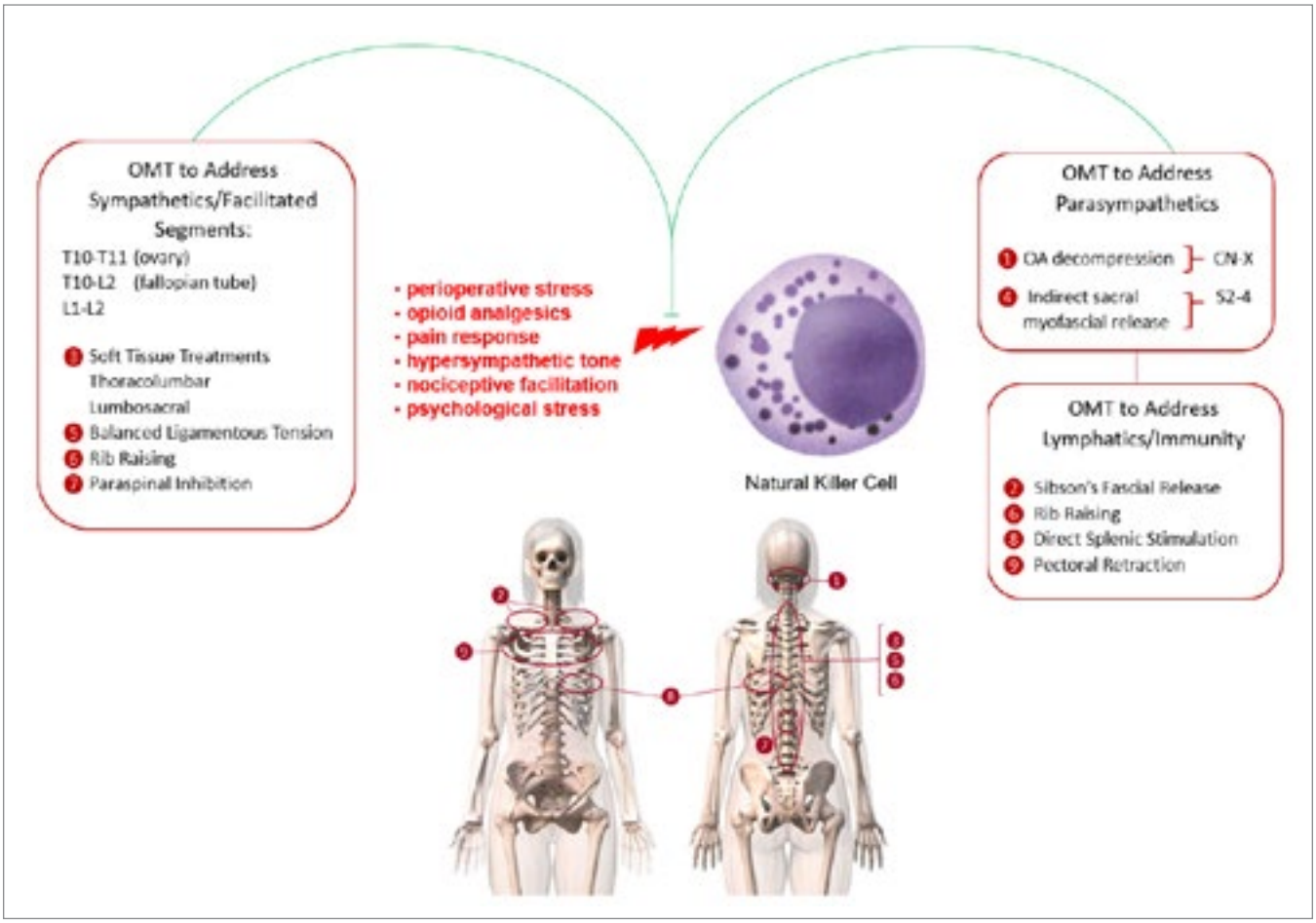
enhance this arm of the immune system may potentially prove very important when concerning recovery from surgery for ovarian cancer.

Another major player in the OMT protocol that may provide immunological benefit is direct splenic stimulation. The benefits of this technique were first introduced in a study by Castilo and Ferris-Swift[55] and was further clarified by Noll et al.[56] and Measel.[54] The original study by Castilo and Ferris-Swift used direct splenic stimulation in patients with acute infectious diseases and showed that splenic stimulation causes a post-treatment rise in serum leukocyte counts, a decrease in erythrocyte counts, and generally stimulates the immune system. These findings were supported by Measel et al., who reported an enhanced immunologic response in subjects who received OMT as compared with a control group by measuring antibody response to pneumococcal polysaccharide assayed by bacterial agglutination and passive heagglutination. In another, larger study, Jackson et al.[60] supported Measel's findings when they found subjects who received OMT had an apparent enhancement of immunologic response after the application of the lymphatic and splenic pump techniques (which is equivalent to pectoral retraction and direct splenic stimulation respectively in OstOCA).

Collectively, these techniques address two of the three goals of OMT treatment in the OstOCA, namely, "enhancing the body's immunity and return to homeostasis postoperatively" and "preventing cancer dissemination and metastasis." The remaining goal of OMT treatment mentioned in the OstOCA, "reducing the need for analgesics postoperatively" is addressed by manipulation techniques of soft tissue treatment and indirect sacral myofascial release. Goldstein et al.[45-46] demonstrated that preoperative intravenous morphine sulfate with these manipulation techniques postoperatively reduces patient analgesic use after a total abdomi-

FIGURE 3:

Effects and location of the osteopathic manipulative treatment techniques used in this approach to ovarian cancer.



nal hysterectomy (TAH) in the immediate 48-hour postoperative period. This study is of particular significance for OstOCA because TAH is a commonly required surgery for the treatment ovarian cancer. Therefore, the efficacy of these manipulation techniques at reducing the need for analgesics following this essential surgical treatment bolsters their position as a key component of the OMT protocol.

IMPORTANCE OF PSYCHOSOCIAL SUPPORT IN THE OSTOCA

According to the osteopathic concept of health and disease, a person is a total biochemical, biophysical, and psychic entity. Therefore, in treatment and management of a disease, primary consideration is given to the individual who has the disease rather than the disease itself. The severe emotional distress accompanying a diagnosis of cancer and its initial treatment is a significant and often overlooked component of the treatment and management, especially when the disease outcomes are known to be poor.[61] Osteopathic physicians in the field of psychiatry have postulated that an altered emotional state can cause somatic dysfunction,[62] and have shown that certain psychiatric diseases, such as schizophrenia, produce consistent somatic dysfunctions in patients that thereby lower their potential for immunity and inherent defense mechanisms against disease.[63]

More recently, the resulting adverse effects of severe emotional stress have been shown to cause deleterious effects on the immune response in cancer, particularly effecting NK cell activity. A study by Lutgendorf et al.[64] established a relationship between psychosocial factors and a functional cellular immune parameter in immune cells isolated from a human tumor of ovarian cancer: Patients with greater social support had higher levels of NK cell activity at the tumor level, whereas patients with greater distress had more impaired NK cell activity. Although the exact mechanisms by which psychosocial factors affect the immune response in ovarian cancer is not well understood, Lutgendorf et al. notes that there are beta-adrenergic receptors on normal ovarian tissue, and direct connections between the ovary and the CNS via the sympathetic nervous system (the organization and relevance of which were discussed earlier in the viscerosomatics section and form a key component of OstOCA). Both of these components may provide direct pathways by which psychological states could modulate ovarian catecholamines, and thereby, explain how psychological factors affect the local immune response within the ovary. This thought process lends its support to the utility of the viscerosomatic relationships in both diagnosis and treatment of this disease.

Given the integral relationship between psychosocial factors and ovarian cancer, it is paramount that these factors are not only addressed when utilizing OstOCA, but that proper support and treatment of those factors are employed with as much priority as the primary treatments.

APPLYING THE OSTEOPATHIC APPROACH TO THE TREATMENT AND MANAGEMENT OF OVARIAN CANCER

The protocol for applying OstOCA for the primary treatment of ovarian cancer is summarized in Figure 4. The process begins, as all approaches to disease do, with a history and physical exam. This initial diagnostic step can be initiated in various ways as dictated by the NCCN protocol. After receiving the diagnostic results, if surgery is indicated, it should be initiated as the primary treatment[25] and followed by postoperative OMT. Following treatment, psychosocial support should be addressed and appropriate referrals made in order to ensure optimal recovery and maintenance.

LIMITATIONS OF OSTOCA

While OstOCA was designed using evidence-based concepts established by researchers in osteopathic medicine in addition to the allopathic physicians who worked to develop the NCCN protocol for ovarian cancer treatment,[25] it has yet to be subject to direct evaluation to determine its efficacy in its target population. So while this initial presentation does not claim to do anything more but propose the structure and possible utility of this model, it must be reiterated that future studies investigating its efficacy beyond theory are required.

HOW ABOUT NON-SURGICAL CANDIDATES?

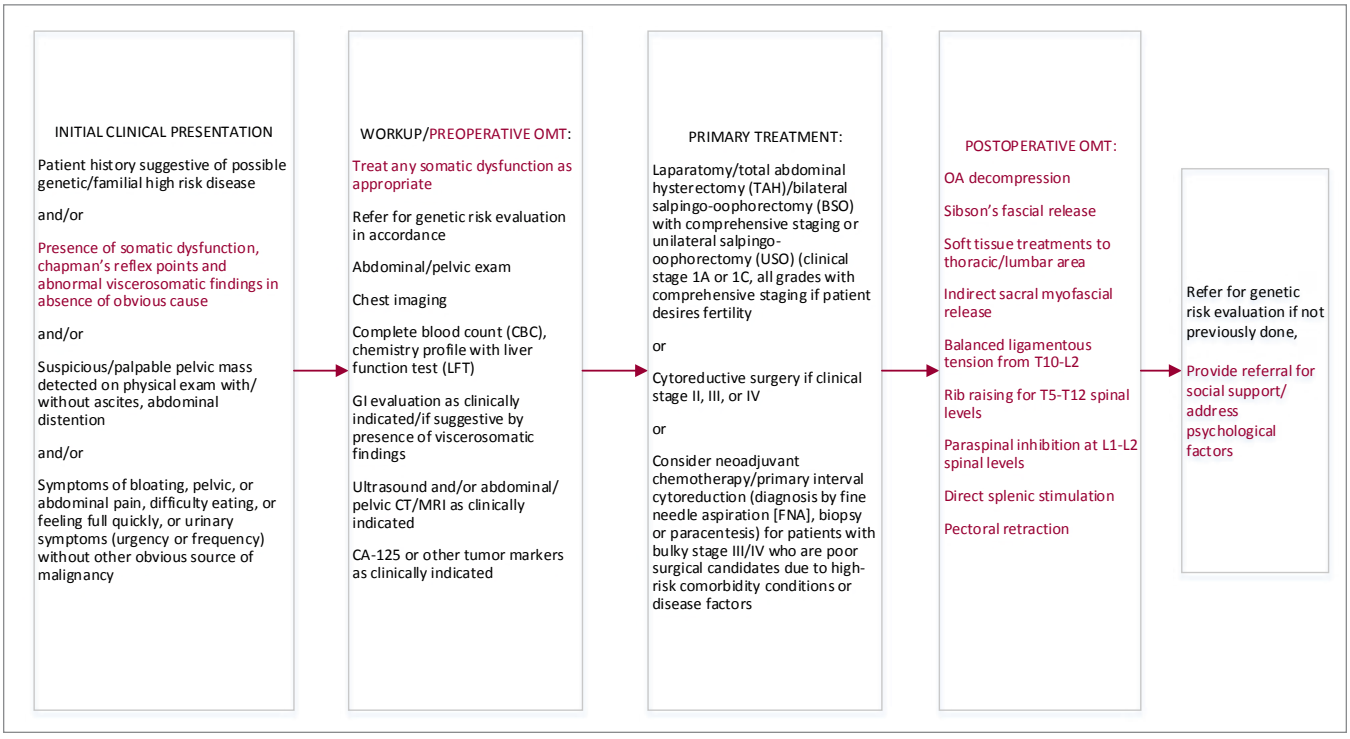
Inherent in OstOCA is the need for surgical intervention in the treatment of ovarian cancer. The decision to focus of surgical candidates was twofold: The efficacy of these techniques have been primarily studied in surgical candidates and late-stage disease commonly requires surgical intervention. Thus, claims to the efficacy of incorporating OMT into post-treatment protocols for patients managed with non-surgical treatments have less support and less confidence. However, there is indirect evidence to suggest osteopathic manipulative treatments involved in OstOCA can provide benefit to nonsurgical treatments of ovarian cancer, namely chemotherapy. Manipulation techniques, specifically rib raising, paraspinal inhibition, direct splenic stimulation, and pectoral retraction, have been shown to shorten hospital stays and hasten recovery in acute disease states.[25, 28, 49, 54-56, 58, 65-66] While infection and chemotherapeutic agents both cause damage to the body and require healing, the association between the two is not strong enough to propose OstOCA be used in the same manner as in surgical candidates.

CONCLUSION

Ovarian cancer still remains a lethal disease in the United States and research conducted in many facets of medicine, including genetics, pharmacology, surgery, oncology, and gynecology, is trying to improve this situation. OstOCA provides a novel approach to the treatment and management of ovarian cancer and holds promise to potentially improve outcomes for patients with ovarian cancer. Future studies designed to properly test this model in its intended population are the next step into defining a role for osteopathic concepts in the treatment and management of ovarian cancer. Should OstOCA prove empirically sound and

FIGURE 4:

Algorithm for the osteopathic approach to the treatment and management of ovarian cancer



clinically useful, it could potentially open the door for new proposed protocols for osteopathic management of other neoplastic processes and provide a new frontier for osteopathic medicine and research.

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CLINICAL IMAGES

Pediatric Nasal Rash

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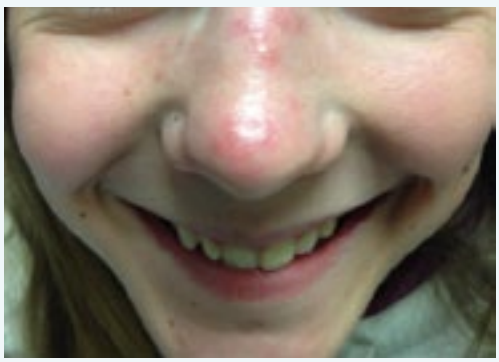
A 13-year-old white female presented with a two-day history of a rash on the dorsum of her nose. The patient stated she was outside all weekend playing soccer in the sun without sun protection prior to appearance of the rash. The patient described an itchy sensation to the dorsum of her nose prior to lesions appearing. The rash has been recurrent on her nose at least one or two times per year for six years and it usually follows history of sun exposure. It presents in a similar manner with each episode: an itchy prodromal period followed by groups of small, fluid filled lesions lasting approximately three days before crusting over. The inflammation and crusting persists for about a month with each episode before resolving completely. Prior occurrences of the rash have been treated with topical antifungals without relief. She denies blurry vision, diplopia, orbital pain, burning sensation on nose, similar lesions elsewhere on her body, or any close contacts with similar rash. The patient denies other medical problems or skin conditions. She does have family history of rosacea.

QUESTIONS:

1. What is the most likely diagnosis?
   a. Acne Vulgaris
   b. Herpes Simplex Virus
   c. Impetigo
   d. Phytophotodermatitis
   e. Solar urticaria

2. How would you diagnose this rash?
   a. History and physical examination
   b. Skin Biopsy
   c. Tzank smear
   d. Viral Culture
   e. All of the above aid in diagnosis

3. What is the appropriate treatment?
   a. Acyclovir
   b. Mupirocin
   c. Benzoyl peroxide wash
   d. Metronidazole cream
   e. Topical clindamycin



ANSWERS

1. What is the most likely diagnosis?

The correct Answer is: B) Herpes Simplex Virus

Fluid filled vesicles in a grouped manner as seen in the patient photograph is consistent with herpes simplex virus. Acne vulgaris would not necessarily have the sensation of pruritus or outbreak after sun exposure, and lesions often appear more pustular in nature. Acne typically begins at puberty due to hormonal influence, yet this patient had onset of this recurrent rash since the age of seven. Solar urticaria may present with pruritus and erythema but is associated with wheal formations that typically resolve 24 hours after cessation of sun exposure.[1] Phytophotodermatitis is an inflammatory skin reaction that develops following cutaneous contact with photoactive compounds and exposure to ultraviolet light. There was no known contact with such compounds on her nose.[2] Impetigo is a very contagious bacterial infection caused by Streptococcus or Staphylococcus. It often is associated with history of trauma to the skin and appears as vesicles or pustules that rupture and leave behind a characteristic honey colored crust.[3]

2. How would you diagnose this rash?

The correct Answer is: E) All of the above aid in diagnosis

All of the above may aid in the diagnosis of the pictured rash. History and physical exam will be the best clue to diagnosis as grouped fluid-filled vesicles with prodromal period is classic for HSV. The most commonly used diagnostic test is the Tzanck smear, a non-specific test which will reveal to the provider if the skin infection is associated with a member of the herpes virus family.[4] Skin biopsy and viral culture are also effective means of diagnosing the rash.

3. What is the appropriate treatment?

The correct Answer is: A) Acyclovir

Episodic treatment options for recurrent herpes labialis includes acyclovir 500mg five times a day for five days, valacyclovir 2g twice daily for one day, or famciclovir 125mg twice daily for five days (or 1500mg once daily for one day). In order for this episodic therapy to be effective, the patient must start therapy within one to two days of lesion onset or during the prodromal period.[5] Topical antibiotics, such as Mupirocin and topical clindamycin are not indicated for treatment of viral skin infections unless the lesions become secondarily infected with bacteria. Benzoyl peroxide wash is a treatment option for acne vulgaris. Metroniadazole cream is a commonly used topical agent for treatment of rosacea.

DISCUSSION

Herpes Simplex virus is a ubiquitous double-stranded enveloped DNA virus that infects both children and adults.6 Herpes simplex virus type-1 (HSV-1) and type-2 (HSV-2) belong to the Alphaherpesvirinae subfamily of the large Herpesvirus family.[6,7] Worldwide, greater than one-third of people have recurrent HSV infections.[7] The virus infects by destroying the host cell and becoming latent in the sensory ganglia of nerves, most commonly the trigeminal ganglion in HSV-1 and the sacral ganglion in HSV-2.[6] HSV-1 generally infects above the waist as orolabial lesions at the vermillion border called herpes labialis. HSV-2 is most frequently associated with genital herpes and neonatal infections passed along from a mother with genital herpes during the birthing process. HSV-2 has been linked to oral mucosal infections, however the incidence is much less than HSV-1.[6,7] This discussion will be focused on non-genital HSV infections.

Herpes simplex virus infection is one of the most prevalent infections in the world, with humans being the sole reservoir.[4,6] Between 30% and 95% of adults are seropositive for HSV-1 worldwide, with HSV antibodies in nearly 90% of adults by the fifth decade.[8,9] HSV-1 infection is generally transmitted during childhood or adolescence via non-sexual contact with infected saliva, though it may be transmitted in young adulthood through sexual contact.[10] Viral shedding can occur in an asymptomatic state; therefore, it is important to note that all individuals infected with HSV are potentially infectious even with no apparent signs or symptoms of disease.[4]

HSV infections occur in a susceptible host when the virus enters through a break in the skin or mucous membrane. The virus may be transmitted by sharing utensils, sharing towels, or kissing. HSV minimally replicates at the inoculation site before entering the cutaneous neurons. The virus then travels in a retrograde fashion along the axons to the sensory ganglia where it will establish lifelong latency.[11] The classic oral HSV-1 infection reactivates from the trigeminal ganglia which may lead to facial, labial, buccal, or ocular mucosal lesions. A visible skin lesion appears when the virus travels to the original entry site via the sensory nerve fibers. When it reaches the skin, it replicates and destroys the surrounding epithelial cells leading to the appearance of vesicular lesions. These lesions are filled with virus, cell debris, and inflammatory cells.[11] The above patient was likely infected with HSV-1 of the ophthalmic branch of the trigeminal ganglion.[12] Of note, this is not to be confused with Hutchinson's sign caused by Herpes Zoster, which also involves the ophthalmic branch of the trigeminal ganglion. This rash is generally located on the tip of the nose, but typically does not cross the midline.[12]

The establishment of lifelong latency with brief periods of mucocutaneous outbreak is a key feature of the HSV viral infections. The time in latency likely depends on factors including the amount of neurons infected during the primary episode, the amount of neurons involved with the reactivation periods, and recruitment of additional neurons with each recurrent episode.[11] The average number of HSV-1 outbreaks is one to six per year.[13] Reactivation of the virus is stimulated by direct trauma to the skin or mucosa innervated by peripheral nerve, ultraviolet –B exposure, physical or emotional stress, hormonal changes, menstruation, fever, immunosuppressive agents, or other infections.[7,11] The most likely cause of our patient's outbreak was extensive UV-B exposure while playing soccer.

The clinical appearance of herpes simplex lesions characteristically involves a group of small vesicles on an erythematous base about 1 to 2 mm in diameter. The grouping of vesicles is a clue to the diagnosis. These vesicles may contain a clear to cloudy fluid. The vesicles rupture and painfully ulcerate forming a hemorrhagic crust. This crust will resolve and leave an area of erythema that typically clears in 2 to 6 weeks.[13,15]

The primary mucocutaneous lesions appear approximately 3 to 7 days after initial exposure to the virus. This first episode is often accompanied by a generalized flu-like prodrome of tender cervical lymphadenopathy, fever, inability to eat, myalgias and malaise.[8,14] Pain, burning, tingling, or pruritus at the initial site of inoculation are characteristic symptoms of the reactivation prodrome.[14] The primary infection tends to be more severe than the recurrent infections.[16] Subsequent episodes of cutaneous presentation are often associated with fewer vesicles and shorter duration.[14] The differential diagnosis of HSV-1 infection includes aphthous ulcers, Behcet syndrome, herpangina, varicella-herpes zoster infection, impetigo, and pemphigus vulgaris.

HSV-1 or 2 can be diagnosed via specific or nonspecific laboratory tests. The most common diagnostic method is the Tzanck smear, a nonspecific test that will reveal to the provider if the skin infection is associated with a member of the herpes virus family. A more specific means of diagnosis is the direct fluorescent antibody test that identifies the virus subtype. Viral culture is a specific test, and an alternative to serological testing, which will provide results in as little as 2-3 days.[4] This patient was diagnosed with herpes simplex viral infection via viral culture. Polymerase chain reaction (PCR) testing is as specific as, and four times more sensitive than viral culture. A skin biopsy will reveal HSV-induced viropathic changes and special staining techniques may be performed on the tissue sample to confirm the diagnosis. The lesion morphology at the time of presentation and sampling ultimately determines the accuracy of these tests. Vesicular lesions will likely be positive with Tzanck smears, while crusted, ulcerative lesions are best diagnosed by culture, PCR, skin biopsy, or fluorescent antibody testing.[4]

The treatment of herpes infections is personalized to the individual based on a number of factors including frequency of recurrence, the cost of treatment, and impact on quality of life. Since UV-B sunlight is a common trigger for orolabial lesions, applying sunblock daily to the face and lips may reduce the rate of recurrence.[4] Topical antiviral therapy, such as topical acyclovir ointment, has proven to be minimally effective with no impact on symptom relief or healing time.[4,13] The recommended treatment for a primary orolabial herpes infection is acyclovir 15mg/kg orally five times a day for 5-10 days.[5,13] Treatment options for episodic therapy of recurrent herpes labialis infection includes acyclovir 400mg five times a day for five days, valacyclovir 2g twice daily for one day, famciclovir 125mg twice daily for five days, or famciclovir 1500mg once daily for one day.[5,13] In order for this episodic therapy to be affective, the patient must start the medication within one to two days of lesion onset or during the prodromal period.[5,13]

Suppressive therapy is the gold standard treatment option if transmission is a concern or if the patient experiences greater than five episodes per year. Episodic therapy will not reduce the risk of transmission. Acyclovir 400mg twice daily is recommended for suppressive therapy.[5] The patient can also prophylactically treat with antivirals prior to known triggers such as skiing, tropical vacations, or dental/surgical procedures to reduce the risk of a subsequent outbreak.[4] The patient in this case was placed on acyclovir 400 mg by mouth three times day for seven days and reported that her lesions cleared in two days. Application of sunblock to her face was also recommended prior to sporting events to reduce the risk of subsequent outbreak with the UV-B exposure.

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ENVIRONMENTAL ASTHMA TRIGGERS

Peter Zajac, DO, FACOFP, Author

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Asthma is a long-term lung condition in which the airways become inflamed and narrow leading to difficulty breathing and wheezing. It often affects people with a family history of allergies. A variety of triggers have been identified such as pollens, molds, animal dander and saliva, cockroaches, dust mites, breathing cold, dry air, cigarette smoke, strong odors, paint fumes, and wood smoke. Signs and symptoms of asthma, which can be mild to severe, may include wheezing, shortness of breath, a persistent cough, chest tightness, a rapid pulse, sweating, flared nostrils, pursed lips, a need to sit upright, and a bluish discoloration of the lips and fingernails. With treatment, you can control symptoms successfully. You can prevent some asthma episodes by avoiding or minimizing exposure to known triggers.

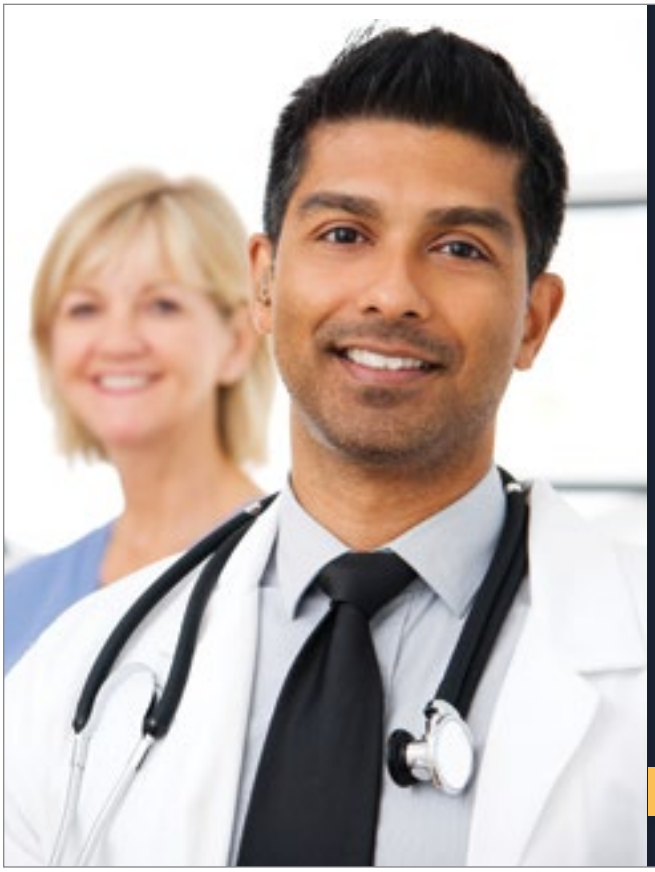
ENVIRONMENTAL TRIGGERS & PREVENTIVE MEASURES INCLUDE:

- **Pollen and Outdoor Mold:** Stay indoors and keep windows closed when pollen and mold-spore counts are highest. Use air conditioning.
- **Indoor Mold:** Moisture causes mold. Fix leaky faucets and pipes. Clean mold off surfaces with a cleaner that has bleach. Open a window or turn on the exhaust fan when you shower. Replace or wash moldy shower curtains. Reduce room humidity by using a dehumidifier.
- **Pets:** Some people are allergic to animal dander (flakes of skin) and saliva. Don't allow pets in your bedroom. If possible, keep pets outside. Vacuum often, using a vacuum cleaner with a high-efficiency particulate air (HEPA) filter. Add HEPA filters to central air conditioning and heating to help remove dander from the air. Bathe your cat or dog weekly. Wash your hands and clean your clothes after contact with pets.
- **Cockroaches:** Many people with asthma are allergic to the dried droppings of roaches. Keep food and garbage in closed containers. Wash the kitchen floor and counters at least once a week. Use traps to eliminate roaches. If a spray is used to kill roaches, stay out of the room until the odor goes away.
- **Dust mites:** Dust and vacuum your home frequently using a vacuum cleaner with a HEPA filter. Wash sheets, blankets, and stuffed toys each week in hot water. Keep stuffed toys off the bed. Encase your mattress and pillows in dustproof covers. Reduce room humidity by using a dehumidifier or air conditioner.
- **Weather:** If you are sensitive to cold weather, cover your nose and mouth with a scarf when outdoors to trap moisture and minimize the effect of the cold, dry air.
- **Tobacco Smoke:** Do not smoke! Ask people not to smoke around you or inside your home, car, or any enclosed spaces.
- **Strong Odors, Sprays, and Smoke:** If you have asthma, you may be very sensitive to strong odors, chemicals, or smoke in the air. Avoid strong odors and sprays such as perfume, hair spray, and paints. Avoid use of a woodstove, kerosene heater, or fireplace.

MEDICAL CARE & TREATMENT OPTIONS:

If you have any questions about asthma, please contact your osteopathic family physician. Asthma can be diagnosed with a thorough history and physical exam along with lung and blood tests. Management includes the right treatment plan and regular visits with your doctor. Your family doctor will help you choose which medications will work best for you. In case of any emergency, you should call your doctor or 911 right away.

SOURCE(S): Asthma and Allergy Foundation of America, Environmental Asthma Triggers. Gov, Medscape, & Up-To-Date.



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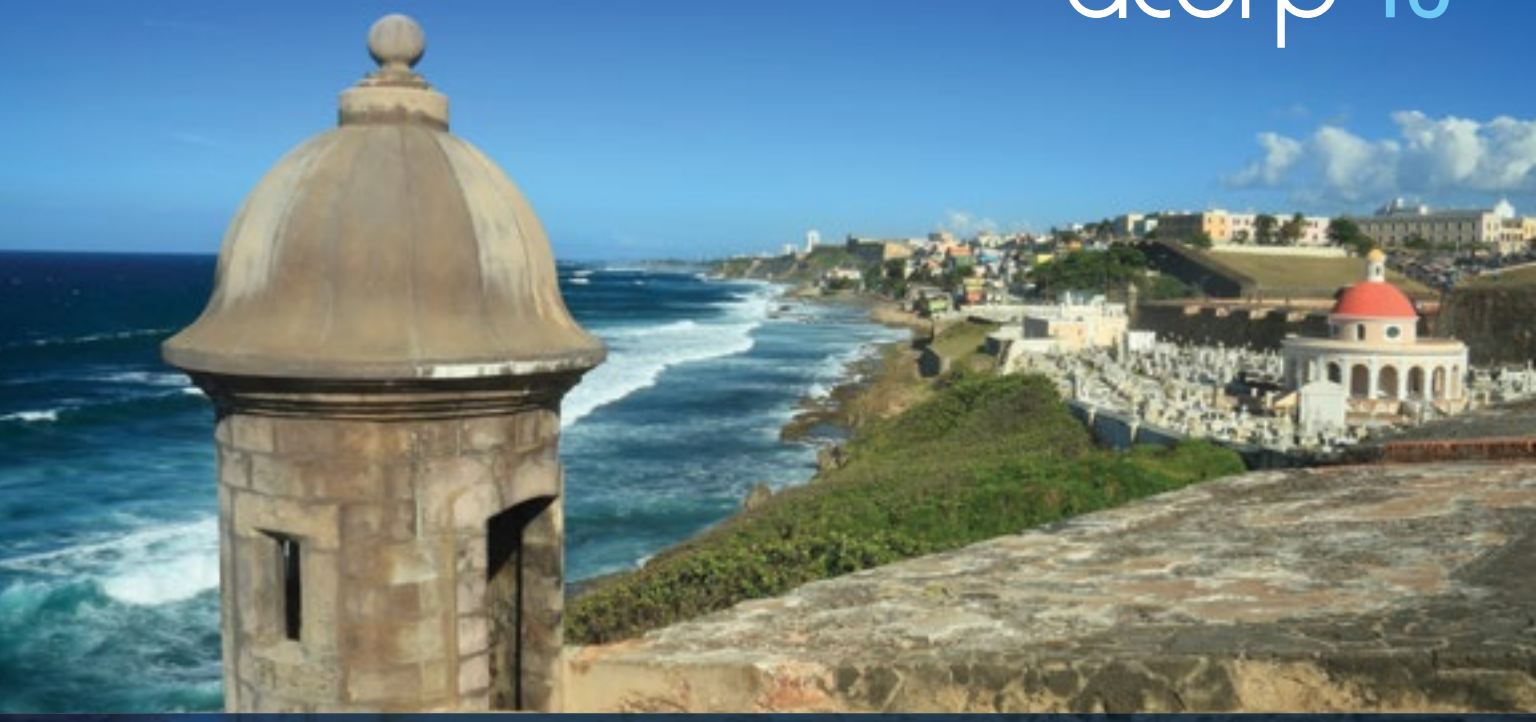

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