TO THE EDITOR: Odden and colleagues (1) did not include stroke in their estimate of the cost-effectiveness of statins for primary prevention in adults aged 75 years or older. This results in an underestimate of the benefits of statins in this age group and an overestimate of their costs. Stroke increases dramatically with advancing age and accounts for a large proportion of cardiovascular events in this population (2).

The amount by which statins reduce the risk for ischemic stroke is similar to that for coronary heart disease (CHD) (3). The costs of nonfatal strokes are high, including those for prolonged hospitalization and long-term care that are not present for CHD. In addition, the authors misrepresent the inclusiveness of their analysis by referring repeatedly to cardiovascular disease reduction and failing to mention the lack of the inclusion of stroke as a serious limitation. The term “cardiovascular disease” includes stroke as well as CHD (4).

Although it is encouraging that statins for the primary prevention of CHD after age 75 years are cost-effective at $25,200 per disability-adjusted life-year, the full potential for cost-effectiveness—or, potentially, cost savings—cannot be evaluated without considering the full benefits of statins for preventing stroke and CHD.

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Disclosures: Disclosures can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=L15-0321.

References

TO THE EDITOR: The 2013 American College of Cardiology/American Heart Association guideline recommends that everyone with a 10-year risk score for an atherosclerotic cardiovascular disease (ASCVD) event greater than 7.5% should receive statins. This would include nearly everyone older than 70 years.Odden and colleagues (1) state that this threshold does not separate high- from low-risk patients and add low-density lipoprotein cholesterol levels for this purpose. The guideline includes diet, smoking, exercise, and weight as important risk factors. Modest alcohol consumption also decreases risk (2). A Mediterranean diet alone reduced the ASCVD rate by 27% compared with an ordinary (control) diet (3). Akesson and associates found that persons with the best modifiable lifestyle factors had only 14% of the number of myocardial infarctions as persons with the worst (2).

If Odden and colleagues stratified their participants by alcohol intake, diet, and physical activity as well as family history (4, 5), those with better lifestyles and family histories would have less absolute benefit from statins than the average person and those with worse lifestyles and family histories would have more absolute benefit. A discussion individualized for a patient about ASCVD risk reduction requires knowledge of a specific patient’s likely risk reduction based on all the lifestyle factors that Akesson and associates cite (2) and family history in addition to the factors in the current risk calculator (http://tools.cardiosource.org/ASCVD-Risk-Evaluator). One should not focus on statins and neglect change in modifiable lifestyle factors, because they can make such a large difference in prognosis.

If these additional lifestyle factors and family history were added to the ASCVD risk calculator, we could make a more personalized risk assessment and hold a more relevant comprehensive discussion about primary prevention.

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Disclosures: Authors have disclosed no conflicts of interest. Forms can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=L15-0322.

References
IN RESPONSE: Dr. Robinson’s assertion that the amount by which statins reduce the risk for ischemic stroke is similar to that for CHD is unfortunately not borne out of what we believe are the best available data. PROSPER (Prospective Study of Pravastatin in the Elderly at Risk) (n = 5804; age, 70 to 82 years), the largest trial with a study population in the age range of that in our article, found no benefit of statins on stroke risk (hazard ratio, 1.03 [95% CI, 0.81 to 1.31]; P = 0.81) (1). Therefore, we did not include a beneficial effect of statins on stroke in our projections.

Dr. Reidenberg comments on the recent American College of Cardiology/American Heart Association cholesterol guideline, which we did not participate in drafting. However, we must emphasize that the starting point of our analyses already included any benefits of preexisting diet, physical activity, or alcohol use on cholesterol levels and other risk factors. We agree with Dr. Reidenberg on the virtues of diet and exercise. Nevertheless, to require inclusion of these factors in the risk calculator would necessitate a rigorous assessment of the predictive value of these factors, as well as universally agreed-upon standards for measurement. Our analyses focused on a different question: the population-level benefit and risks of statin therapy in older adults using current, guideline-based recommendations.

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Disclosures: Disclosures can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M14-1430.

Reference

Metformin Prescription for Insured Adults With Prediabetes From 2010 to 2012

TO THE EDITOR: Moin and colleagues (1) show that the use of metformin in patients with prediabetes is infrequent (3.7%). They suggest that this rate should be higher and call for more research on how to achieve this goal. Although their methods are rigorous, we believe that their article promotes a notion that is highly problematic: that patients with prediabetes benefit from metformin.

The case for metformin use for diabetes prevention is based on the results of the DPP (Diabetes Prevention Program) study that found metformin to be effective in delaying the diagnosis of diabetes (2) and on metformin’s track record of safety. Moin and colleagues, along with some endocrine guidelines, assume that delaying the diagnosis of diabetes with an antihyperglycemic agent offers a net benefit to at-risk patients. Yet, several studies have neglected to show that metformin prevents diabetes—that is, that its use interrupts the pathophysiologic path to type 2 diabetes (3). The main mechanism responsible for delaying the diagnosis of diabetes, therefore, results from metformin’s glucose level-lowering effect. This amounts to treating prediabetes as diabetes. Thus, the diagnosis of diabetes is delayed, but not its treatment.

And, to our knowledge, no evidence is available showing that premature treatment leads to better patient outcomes. Indeed, one could imagine patients in whom the diagnosis of diabetes was delayed being worse off: Consider the emphasis on lifestyle changes now that a pill takes care of the problem or how the implementation of protocols linked to a diabetes diagnosis—for example, consideration of statin use and foot and eye examinations—may be delayed along with the diagnosis of this condition.

We believe in the importance of turning the tide of the worldwide diabetes tsunami. Ecological and social interventions that make being active at home, at work, and in the community easier; facilitate access to healthy food; and reduce the allostatic load (the stress of living in poverty, in violence, and in isolation [4]) may reflect a level of response commensurate with the huge magnitude of the problem (5). These interventions reflect a different assumption: that a problem of this scale cannot result from an epidemic of bad individual lifestyle choices. Emphasis on clinical interventions in physicians’ offices—labeling healthy persons as having prediabetes and treating them as if they had diabetes with individual counseling and diabetes drugs—does not match the nature or magnitude of the problem and removes pressure from societies to adequately address the root causes—social and ecological—of this epidemic.

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Disclosures: Authors have disclosed no conflicts of interest. Forms can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=L15-0352.

References
4. Steptoe A, Hackett RA, Lazzarino AI, Bostock S, La Marca R, Carvalho LA, et al. Disruption of multisystem responses to stress in type 2 diabetes: investi-
IN RESPONSE: We respectfully disagree with Drs. Rodriguez-Gutierrez and Montori’s statements that patients with prediabetes do not benefit from metformin and that a focus on “in-office” clinical approaches distracts from needed societal interventions to address the problem at a larger scale. The process by which diabetes develops is more complicated than a simple “on/off” switch at a particular glycemic threshold. There is a clear continuum of risk from normal glycemia to prediabetes to diabetes (1). Across this continuum, it is critical that providers and patients are aware of all available evidence-based approaches shown to lower the risk for progression.

In the DPP study, most of the effects of metformin persisted after a 2-week washout period, resulting in a 25% reduction in diabetes risk even among patients no longer receiving the medication (2). Metformin was also associated with a small but durable amount of weight loss. We have yet to fully understand all of the molecular actions of this agent, but studies have also shown us that it is safe, tolerable, and marginally cost-saving for diabetes prevention (3, 4). In fact, if the outcome of incident diabetes from the DPP study and DPP marginally cost-saving for diabetes prevention (3, 4). In fact, if the outcome of incident diabetes from the DPP study and DPP Outcomes Study had included a hemoglobin A1c level of 6.5% to fully understand all of the molecular actions of this agent, but studies have also shown us that it is safe, tolerable, and marginally cost-saving for diabetes prevention (3, 4). In fact, if the outcome of incident diabetes from the DPP study and DPP Outcomes Study had included a hemoglobin A1c level of 6.5% or greater, metformin and lifestyle interventions would have been similarly effective (5). We believe that the published evidence strongly supports that metformin is effective in preventing or delaying diabetes.

Although we agree that worldwide action to create healthier societies is an ideal goal, we also believe that withholding information from patients about an evidence-based option to prevent diabetes is not only counterproductive but also unethical and could lead to loss of trust. When presented with clear information about their level of risk and options for prevention, patients are more than capable of working with their providers to make the best decision. This decision could include lifestyle interventions and metformin, because these therapies are not necessarily competing. Diagnostic challenges for prediabetes remain, but the sheer number of persons affected makes this an important public health issue necessitating multifaceted interventions.

This is our call to action and our time to act if we are going to make any progress in curbing the ever-expanding prediabetes and diabetes epidemics worldwide. While we wait for societies to address the root causes of these epidemics, we should not be paralyzed. We believe that the key to progress is doing what we can, 1 patient at a time.

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Disclosures: Disclosures can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M14-1773.

References

Low-Molecular-Weight Heparin for Women With Unexplained Recurrent Pregnancy Loss

TO THE EDITOR: We read Schleussner and colleagues’ article (1) about the effect of low-molecular-weight-heparin (LMWH) on pregnancy outcomes in women with unexplained pregnancy loss with interest. On the basis of the absence of a significant difference in the live-birth rates between women who are and those who are not receiving anticoagulant therapy, the authors do not recommended anticoagulation in such women. A similar observation has been reported in a double-blind, placebo-controlled trial using enoxaparin (2). However, while applying the exclusion criteria for different acquired and inherited types of thrombophilia, one should consider the recently emerged prothrombotic marker—that is, cell-derived microparticles (MPs), which are basically markers of activation and cell death. Because most MPs express phosphatidylserine on their surface, they become thrombogenic. Elevated MP levels in any clinical condition thus suggest some type of chronic activation or damage. The procoagulant nature of MPs is proved by the decrease in clotting time when MP-rich plasma is added to a test system and confirmed by their strong association with different thrombotic disorders.

We have previously shown a strong association between elevated MP levels and recurrent pregnancy loss in a large series of patients (3). When patients with highly elevated MP
levels received LMWH during pregnancy, those whose MP levels gradually normalized had a successful outcome (4). We completely agree with the authors that LMWH should not be administered in women without thrombophilia or with weak, inherited thrombophilia. However, we thus also propose that the role of MPs in these well-designed trials must not be ignored. The randomized, phase 2 clinical trials in patients with cancer who are receiving thromboprophylaxis have proved the efficacy of enoxaparin in decreasing thrombotic events in patients with increased levels of tissue factor MP (5), and a multicenter trial to further confirm the role of primary thromboprophylaxis in patients with cancer with elevated tissue factor-bearing MP levels is ongoing.

Although several trials undoubtedly have confirmed the role of MPs in recurrent pregnancy loss, studies are also emerging on the beneficial role of thromboprophylaxis in patients with pathologic levels of MPs of different cell types. Microparticles are certainly worth considering in larger clinical trials involving thromboprophylaxis in women with unexplained pregnancy loss. Once the cause and consequence of MPs is fully established, the number of women with idiopathic pregnancy loss will reduce substantially and evidence-based thromboprophylaxis will become the standard of care in most of these patients.

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Disclosures: Authors have disclosed no conflicts of interest. Forms can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=L15-0355.

References

TO THE EDITOR: The results of Schleussner and colleagues’ open-label trial (1) agree with those of our double-blind, placebo-controlled study published in April 2015 (2). Accord-

ing to both studies, LMWH did not increase the chance of a live birth in women with unexplained recurrent miscarriage. Cocooning remains the only validated therapeutic option.

Of note, the live-birth rate in Schleussner and colleagues’ study (approximately 86%) was higher than that reported in our study (70%) (2) and in the ALIFE (Anticoagulants for Living Foetuses) and HABENOX (Thromboprophylaxis for Recurrent Miscarriage in Women With or Without Thrombophilia) trials (3, 4). Most women with recurrent miscarriage have recurrent early pregnancy loss with a failure of development before 10 weeks. The anticipated 75% live-birth rate used by Schleussner and colleagues for the sample size estimation was based on longitudinal follow-up studies among women with common recurrent miscarriage. This factor was probably not relevant to the design of their study. Indeed, in their trial, women were randomly assigned late during pregnancy. The mean gestational age at randomization was approximately 7 weeks (after ultrasonography confirmed a viable pregnancy) versus approximately 5.5 weeks (after positive results on a pregnancy test) in other trials (2, 4). In addition, only 32% of women versus approximately 70% in other trials (2–4) had more than 2 previous early losses. Thus, the women randomly assigned in Schleussner and colleagues’ open-label trial were at low risk for subsequent pregnancy loss.

Most of the trials that have investigated the benefit of antithrombotic medications in preventing miscarriage were not designed to assess the effect of treatment in the early stages of pregnancy. The subcutaneous administration of LMWH hampers its use before conception and sufficiently early during pregnancy in fertile women. It is well-known that most of the pathologic events are likely to occur very early in pregnancy and may require intervention as early as the initial blastocyst implantation. We emphasize that, in a recent study on aspirin therapy before conception, the assessed subgroup of women were at low risk for recurrent loss (that is, they had 1 or 2 previous miscarriages) (5).

Therefore, the nagging question remains: How can we optimally manage recurrent miscarriage? In the future, medical caregivers should prefer to investigate more relevant oral or intravaginal therapies administered before conception and, consequently, at the time of the initial implantation to prevent this condition.

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Disclosures: Authors have disclosed no conflicts of interest. Forms can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=L15-0353.

References
Ms. Patil and colleagues propose looking at 


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5. Schisterman EF, Silver RM, Lesher LL, Faraggi D, Wactawski-Wende J,


05-0334

4. Visser J, Ulander VM, Helmerhorst FM, Lampinen K, Morin-Papunen L, Blo-

emenkamp KW, et al. Thromboprophylaxis for recurrent miscarriage in women

with or without thrombophilia. HABENOX: a randomised multicentre trial.

05-0334

3. Kaandorp SP, Goddijn M, van der Post JA, Hutten BA, Verhoeve HR, Hamu-

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.1056/NEJMoa1000641

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emenkamp KW, et al. Thromboprophylaxis for recurrent miscarriage in women

with or without thrombophilia. HABENOX: a randomised multicentre trial.

5. Schisterman EF, Silver RM, Lesher LL, Faraggi D, Wactawski-Wende J,

Townsend JM, et al. Preconception low-dose aspirin and pregnancy out-


IN RESPONSE: Ms. Patil and colleagues propose looking at MP’s to assess risk. This interesting approach was not well-established when our trial was designed, but we certainly agree that research in that direction should be followed.

Drs. Pasquier and de Saint Martin note that LMWH does not increase live-birth rates in the populations being considered and propose exploring specific new avenues. They remark that the women in our trial were “at low risk for subsequent pregnancy loss” because the mean week of gestation at inclusion was thought to be high and the proportion of women with more than 2 previous early pregnancy losses was ostensibly low. Indeed, the overall miscarriage rate in our trial was low, but we included subgroup analyses of higher-risk groups.

As for the time of inclusion, we designed our trial based on the hypothesis that the effect of LMWH on placental vascularization is at the root of its putative benefit and thus randomly assigned patients during this stage (5 to 8 weeks’ gestation) after ultrasonographic confirmation of a fetal heartbeat. The SPIN (Scottish Pregnancy Intervention) trial included women after confirmation of pregnancy before 7 weeks’ gestation (1), resulting in mean inclusion approximately 1 week earlier than in our trial. The ALIFE trial randomly assigned most of the women before pregnancy, but they began receiving LMWH therapy only after “pregnancy was confirmed on ultrasonography, starting at 6 weeks of gestation” (2) and thus provided evidence for the effects of LMWH beginning much later than randomization, which was similar to the design of our trial. We commend Drs. Pasquier and de Saint Martin for providing important data with their PREFIX (Prevention of Unexplained Recurrent Abortion by Enoxaparin) trial on the effects of LMWH at earlier stages of pregnancy (3).

As for miscarriage history, approximately 60% of the women in the ALIFE trial had more than 2 previous miscarriages (not 70%). In the SPIN trial, approximately 43% of the women fit this criterion, which is almost identical to the 44% in our article (8% with 1 late miscarriage and more than 1 early miscarriage, 3% with more than 1 late miscarriage and at least 1 early miscarriage, and 33% with 0 late miscarriages and more than 2 early miscarriages). The HABENOX trial mentioned by Drs. Pasquier and de Saint Martin did not include any women with 2 early pregnancy losses; thus, miscarriage history in this trial is not comparable (4). Given the distribution of pregnancy loss in the population and at the obstetrician, it is surprising that so few women had 2 early pregnancy losses in the PREFIX trial given that this factor was an inclusion criterion.

Drs. Pasquier and de Saint Martin’s comment shows how important it is to discuss and compare the trials on this topic openly, because subtle differences in design and local patient characteristics can have a large effect on clinically relevant variables.

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Disclosures: Disclosures can be viewed at www.acponline.org /authors/icmje/ConflictOfInterestForms.do?msNum=M14-2062.

References

05-0334

OBSERVATIONS

Firearms Among Cognitively Impaired Persons: A Cross-sectional Study

Background: Firearms in the homes of persons with dementia may pose a risk for serious harm to themselves or others. Prior research suggests that patients with dementia and their caregivers infrequently remove firearms from the home (1). How often firearms remain in the homes of these patients—and whether they have additional symptoms that may increase their risk for harm—is not well-known.

Objective: To determine the frequency of firearms present in the homes of patients evaluated for dementia and the frequency of delusions, hallucinations, and aggressive behavior among this population.

Methods and Findings: In this institutional review board-approved retrospective study, we reviewed the records of all consecutive patients presenting to a single outpatient memory clinic at a tertiary academic center for the initial evaluation of cognitive impairment between October 2011 and October 2013. All patients were evaluated clinically and by standardized measures (such as the Montre´ al Cognitive Assessment,
LETTERS

Table 1. Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All patients (n = 495)</strong></td>
<td></td>
</tr>
<tr>
<td>Mean age (SD) [range], y</td>
<td>79.9 (8.3) [52–98]</td>
</tr>
<tr>
<td>Sex, n (%)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>310 (63)</td>
</tr>
<tr>
<td>Male</td>
<td>185 (37)</td>
</tr>
<tr>
<td>Dementia, n (%)</td>
<td>380 (77)</td>
</tr>
<tr>
<td>Mean MOCA score (SD)*</td>
<td>16.1 (6.1)</td>
</tr>
<tr>
<td>Mean PHQ-9 score (SD)†</td>
<td>5.8 (6.1)</td>
</tr>
<tr>
<td>Reported depression, n (%)</td>
<td>316 (64)</td>
</tr>
<tr>
<td>Firearm in home, n (%)</td>
<td>89 (18)</td>
</tr>
<tr>
<td><strong>Patients with dementia (n = 380)</strong></td>
<td></td>
</tr>
<tr>
<td>Firearm in home, n (%)</td>
<td>63 (17)</td>
</tr>
<tr>
<td>Firearm in home and living in own home/total living in own home, n/N (%)‡</td>
<td>39/172 (23)</td>
</tr>
<tr>
<td><strong>Patients with a firearm (n = 89), n (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Dementia</td>
<td>63 (71)</td>
</tr>
<tr>
<td>Delusions</td>
<td>33 (37)</td>
</tr>
<tr>
<td>Paranoid delusions</td>
<td>24 (27)§</td>
</tr>
<tr>
<td>Hallucinations</td>
<td>15 (17)</td>
</tr>
<tr>
<td>Paranoid or hostile hallucinations</td>
<td>7 (8)¶</td>
</tr>
<tr>
<td>Behavioral symptoms¶</td>
<td>32 (37)</td>
</tr>
</tbody>
</table>

MOCA = Montréal Cognitive Assessment; PHQ-9 = Patient Health Questionnaire-9.

* Used to assess cognitive impairment, which in combination with clinical features may help diagnose dementia. Scored out of 30, with lower scores representing worse cognition. Generally, scores of 18–26, 10–17, and <10 correspond with mild, moderate, and severe cognitive impairment, respectively.

† Screening tool for depression. Scored from 0 to 27, with higher scores corresponding to increasingly severe depression. Scores >5, 10, 15, and 20 generally reflect mild, moderate, moderate–severe, and severe depression, respectively, and scores >10 are sensitive and specific for major depression.

‡ 172 patients were confirmed to be living in their own home by questionnaire response; 38 were confirmed to be living in a supervised setting (e.g., skilled nursing facility). The remainder did not have a confirmed living situation by questionnaire.

§ A description of the quality of the delusion was unavailable in the medical records of 5 patients; 24 of the 28 delusions for which descriptions were available (86%) were of the paranoid type.

¶ A description of the quality of the hallucination was unavailable in the medical record of 3 patients; 7 of the 12 hallucinations for which descriptions were available (58%) were paranoid or hostile.

Patient Health Questionnaire-9 depression scale, and verbal fluency. We recorded whether patients had any documented “behavioral symptoms” defined as physical or verbal aggression toward themselves or others. Firearm presence in the home was uniformly assessed as part of a safety questionnaire administered according to the standard of care. All patients (and caregivers, when available) were interviewed by a nurse and social worker in addition to the treating physician.

Our search identified 506 patients. After exclusion of patients without documentation of a firearm in the home, 495 remained and were included in this study. The average age was 79.9 years; 63% were female. The mean Montréal Cognitive Assessment score was 16.1. Seventy-seven percent of patients were diagnosed with dementia, most commonly suspected to be due to Alzheimer disease (46%) or vascular pathology (21%). Three hundred sixteen patients (64%) had a history of depression or were diagnosed with depression at the index visit.

Eight-nine patients (18%) reported having a firearm in their place of residence. Among these, 63 (71%) were diagnosed with dementia; 33 (37%) had delusions, and 15 (17%) reported having hallucinations (Table 1).

Among 380 patients with dementia, 63 (17%) reported having a firearm in their residence. A total of 172 of the patients with dementia was confirmed to be living in their own home (as opposed to a supervised setting), and 39 (23%) reported having a firearm. Of the patients with dementia who had a firearm in the home, 31 (49%) had delusions, 14 (22%) endorsed hallucinations, and 27 (44%) had a history of behavioral symptoms. Most delusions (85%) and more than one half of hallucinations (54%) were of paranoid or hostile quality.

Discussion: A considerable proportion of patients diagnosed with dementia reported having a firearm in their home; furthermore, many persons with firearms also had delusions, hallucinations, and behavioral manifestations of their disease. Of note, the frequency of firearms in the home in our study was 18%—lower than the overall rate of firearm ownership in the United States. Whether this difference reflects the specific geographic and social sampling in this single-center trial is not known, and whether the presence of firearms was underreported by those with dementia deserves further study.

Our questionnaire did not assess whether firearms were kept locked or loaded, and whether these patients were able to access or use their firearms is also unknown. Furthermore, firearm use is a complex task that may challenge patients in later stages of dementia. However, in addition to the assumed risk of firearm access among patients with severe disease, high-functioning patients early in the course of dementia have been reported to commit suicide and homicide, presumably in part because of their diagnoses (2, 3).

Our study is limited by its retrospective nature and inability to assess variables absent from the medical record. Nonetheless, research related to outcomes of firearm injury lacks large, high-quality studies, partly because of legislative and funding barriers (4). Several entities, including 8 major health professional organizations together with the American Bar Association, have called for action—including research—to reduce the burden of firearm-related injury in the United States (5).

Our findings highlight the importance of asking specifically about firearms during the evaluation of dementia. In our study, this task was accomplished using a standardized questionnaire. Whether patients with dementia who have a firearm in the home are able to access and use their firearm and whether they or their caregivers are at increased risk for harm is unknown and warrants investigation.

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Background: Clostridium difficile infection is increasing in incidence, severity, and mortality (1). Surgery is sometimes used to manage complicated infections because it improves short-term survival (2); however, it is associated with high rates of morbidity and poor long-term survival (3). Surgery is most often used when disease recurs and cannot be con-
trolled with antibiotics, because the risk for severe complications and mortality increases greatly during these recurrences (4). An alternative effective treatment for recurrent disease in-
volves delivery of stool from a healthy donor directly into a patient’s colon. This procedure is known as fecal microbiota transplantation (FMT), and it can be done via enema or colonoscopy or indirectly into the colon through the upper gastrointestinal tract using various methods (5).

Objective: To determine whether the availability of FMT in our hospital was associated with a decrease in the frequency of surgery for patients with C. difficile infection.

Methods: To identify patients with C. difficile infection, we used the database in the hospital’s microbiology laboratory to identify all patients with a positive result for this toxin between January 2010 and April 2015, which was 30 months before and 10 months after FMT was introduced in June 2013. We then reviewed patients’ medical charts to identify those who were treated with surgery or FMT.

Results: We identified 901 patients with C. difficile infection. Although the total number of hospital admissions per year did not change substantially, the number of patients with this infection increased gradually over time: 54 patients were diagnosed in 2010, 116 in 2011, 200 in 2012, 212 in 2013, 268 in 2014, and 71 between January and April 2015. We identified 35 patients who had FMT: 7 (3.3%) in 2013, 16 (6.0%) in 2014, and 12 (17.0%) between January and April 2015. We also identified 18 patients who had surgery: 1 (1.9%) in 2010, 3 (2.6%) in 2011, 10 (5.0%) in 2012, 4 (1.9%) in 2013, and 0 (0%) in 2014 and between January and April 2015 (Table 2).

Discussion: The frequency of surgery in patients with C. difficile infection decreased rapidly after our hospital began using FMT to treat those with severe disease. The frequency of surgery decreased despite increased hospital admissions of patients with this infection and the continued availability of

<table>
<thead>
<tr>
<th>Table 2. Baseline Demographic and Clinical Characteristics of Patients With CDI Treated With FMT or Surgery Between 2010 and 2015</th>
</tr>
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<tbody>
<tr>
<td><strong>Characteristic</strong></td>
</tr>
<tr>
<td>Patients treated, n</td>
</tr>
<tr>
<td>Enrollment period</td>
</tr>
<tr>
<td>Mean age (range), y</td>
</tr>
<tr>
<td>Women, n (%)</td>
</tr>
<tr>
<td>Median Charlson comorbidity index score (range)*</td>
</tr>
<tr>
<td>Median recurrences of CDI (range), n</td>
</tr>
<tr>
<td>Stool delivered by colonoscopy</td>
</tr>
<tr>
<td>Treated with multiple fecal infusions</td>
</tr>
<tr>
<td>Had pseudomembranous colitis/severe clinical status</td>
</tr>
<tr>
<td>Received feces from unrelated donors</td>
</tr>
<tr>
<td>Successfully treated</td>
</tr>
<tr>
<td>Successfully treated for severe CDI</td>
</tr>
<tr>
<td>Surgery</td>
</tr>
<tr>
<td>Ileostomy and lavage, n</td>
</tr>
<tr>
<td>Colectomy, n</td>
</tr>
<tr>
<td>Successfully treated, n (%)</td>
</tr>
<tr>
<td>Deaths after procedure, n (%)</td>
</tr>
<tr>
<td>&lt;1 mo</td>
</tr>
<tr>
<td>1-6 mo</td>
</tr>
<tr>
<td>7-22 mo</td>
</tr>
</tbody>
</table>

CDI = Clostridium difficile infection; FMT = fecal microbiota transplantation.
* Ranges from 0 to 100, with higher scores indicating improved functional status.
† 2 patients preliminarily treated with ileostomy were successively treated with colectomy.

**References**

surgery from our emergency surgery team, whose membership remained unchanged during this period. Although such observational studies as this cannot establish causality, we believe that the availability of FMT probably led to the decrease in surgery, which, if true, may predict similar experiences in other hospitals.

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Disclosures: Disclosures can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=L15-0294.

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