

Kelly Casler, DNP, APRN, FNP-BC, EBP-C Karen Trees, DNP, RNC, CNM, WHCNP, FNP-BC Kelly Bosak, PhD, APRN, ANP-BC



# Providing Care for Fatty Liver Disease Patients

Primary Care Nurse Practitioners' Knowledge, Actions, and Preparedness

### ABSTRACT

The increasing prevalence of nonalcoholic fatty liver disease requires primary care providers to serve on the front lines of care for patients with nonalcoholic fatty liver disease. Knowledge gaps regarding nonalcoholic fatty liver disease exist among primary care physicians, but it is unknown whether primary care nurse practitioners demonstrate similar gaps because they are under-represented in the literature. The purpose of this study was to evaluate primary care nurse practitioners' clinical approaches regarding nonalcoholic fatty liver disease, their knowledge regarding diagnosis and management, and their preparedness level regarding care for patients with nonalcoholic fatty liver disease. Adequate knowledge was demonstrated in some, but not all, areas. The knowledge did not necessarily translate into clinical practice behaviors, however. In addition, only 35% of the participants agreed that they felt prepared to care for patients with nonalcoholic fatty liver disease. Implications are limited by the small sample size but provide some insight into primary care nurse practitioners' preparedness to care for this important epidemic.

onalcoholic fatty liver disease (NAFLD) was identified nearly 40 years ago (Ludwig, Viggiano, McGill, & Oh, 1980) and since that time, the incidence has increased exponentially (Estes, Razavi, Loomba, Younossi, & Sanyal, 2018). The impact of NAFLD continues to grow as it surpasses viral hepatitis and alcoholic liver disease as the leading reasons for hepatocellular carcinoma, cirrhosis, and liver failure (Estes et al., 2018). Because the number of patients with NAFLD continues to expand past a point where a specialist can see each and every one, primary care (PC) nurse practitioners (NPs) play a

Received March 23, 2019; accepted July 14, 2019.

Dr Bosak is the senior author.

**About the authors:** Kelly Casler, DNP, APRN, FNP-BC, EBP-C, is Assistant Professor of Clinical Nursing, The Ohio State University College of Nursing, Columbus.

Karen Trees, DNP, RNC, CNM, WHCNP, FNP-BC, is Clinical Assistant Professor, University of Kansas School of Nursing, Kansas City.

Kelly Bosak, PhD, APRN, ANP-BC, is Associate Professor, University of Kansas School of Nursing, Kansas City.

The authors declare no conflicts of interest.

Correspondence to: Kelly Casler, DNP, APRN, FNP-BC, EBP-C, Clinical Nursing, The Ohio State University College of Nursing, 1585 Neil Ave, Columbus, OH 43210 (Casler.11@osu.edu).

DOI: 10.1097/SGA.000000000000487

crucial role in delivering care to these patients (de Silva & Dassanayake, 2009; Dietrich & Hellerbrand, 2014). However, studies have found that PC providers may be underprepared to fill this role and knowledge gaps lead to deviations from evidenced-based practice (Angulo et al., 2007; Stål, 2015). Little is known regarding PCNP's knowledge gaps and practice approach because they are under-represented in the literature. As part of a larger study, we surveyed PCNPs and discovered they have similar knowledge gaps as their physician colleagues. This supports the importance of education and support for PCNPs as the prevalence of NAFLD grows to affect a large proportion of their patients.

## NAFLD Diagnosis and Management

Nonalcoholic fatty liver disease is the general term used to describe a state of surplus fat, called steatosis, in the liver. The two subcategories of NAFLD include nonalcoholic fatty liver (NAFL) and nonalcoholic steatohepatitis (NASH). Nonalcoholic fatty liver is a generally benign condition where steatosis is present without inflammation. In contrast, NASH refers to steatosis with inflammation and, often, co-occurring fibrosis (Dharel & Fuchs, 2014). Nonalcoholic steatohepatitis affects an estimated 20% of patients with NAFLD and is the more concerning form due to its tendency for more complications (Spengler & Loomba,

**E184** Copyright © 2020 Society of Gastroenterology Nurses and Associates

2015). Nonalcoholic steatohepatitis fibrosis is graded into mild, moderate, or severe fibrosis and can progress to cirrhosis and liver failure (Kleiner et al., 2005).

Identification of NAFLD is somewhat challenging. Although clinicians usually suspect NAFLD based on the presence of metabolic syndrome along with persistently elevated liver transaminases and/or steatosis detected on liver ultrasonography, the disease does not always result in these abnormalities (Ahmed et al., 2018; Rinella, 2015). Clinical symptoms are also frequently absent (Chalasani et al., 2018). Another challenge is differentiating benign NAFL from the more concerning NASH. Traditionally, differentiation was accomplished with liver biopsy, but more recently, noninvasive assessment options have been developed to accomplish the task. These noninvasive assessments can be conducted in PC (Angulo et al., 2007; Armstrong et al., 2014; Blais et al., 2015).

Noninvasive assessments use biometric measurements such as weight and liver transaminases, to stratify patients at risk for fibrosis in NASH. They perform similarly or better than liver biopsy (Xiao et al., 2017). One concern is that the noninvasive methods cannot distinguish between NAFL and NASH; they can only distinguish between advanced NAFLD (NASH with severe fibrosis) and milder forms of NAFLD (NAFL or NASH with mild to moderate fibrosis). However, so far, this has not presented concern because only patients with severe fibrosis need to be referred to hepatology (Chalasani et al., 2018; McPherson, Anstee, Henderson, Day, & Burt, 2013; Tapper, Hunink, Afdhal, Lai, & Sengupta, 2016). The most commonly recommended noninvasive assessments for NAFLD are the NAFLD fibrosis score (NFS) and the Fibrosis-4 score (Chalasani et al., 2018).

Management of NAFLD continues to evolve. Currently, lifestyle modifications are the predominate treatment modality for NAFLD. Weight loss through reduced caloric intake of 500-750 kcal/day and 150 minutes of exercise per week are the current foci for NAFLD lifestyle recommendations (Chalasani et al., 2018; Kenneally, Sier, & Moore, 2017; Younossi et al., 2018). Stabilization of NASH fibrosis can be accomplished with weight loss of just 5% of a patient's body weight whereas 7%-10% weight loss can improve NASH fibrosis (Chalasani et al., 2018). Although, currently, there are no Federal Drug Administration (FDA)-approved liver-directed therapies to specifically manage NAFLD, FDA-approved medications for weight loss and bariatric surgery are also recommended by guidelines (Chalasani et al., 2018).

# NAFLD Awareness in Primary Care Providers

Three national studies have demonstrated that PC providers experience knowledge gaps regarding NAFLD concepts such as those described earlier. Only one study included NPs in the sample, though the sample was still primarily physicians. Eighty-three percent of participants in the study reported a need for more education (Wieland, Quallick, Truesdale, Mettler, & Bambha, 2013). A second study showed half of a PC physician sample was unfamiliar with the differences between NAFL and NASH, yet participants were managing patients with both diseases (Polanco-Briceno, Glass, Stuntz, & Caze, 2016). In another study, 84% of PC physicians underestimated the prevalence of NAFLD, even in obese and diabetic individuals, and 58% reported a lack of confidence with disease treatment, reporting this was a barrier to providing care (Said, Gagovic, Malecki, Givens, & Nieto, 2013). All three studies concluded a strong need for education among PC physicians. Although these studies provide generalizable information for PC physicians, there is a low to absent representation of PCNPs.

Two other studies looked at knowledge of nonhepatology providers in Australia (Bergqvist et al., 2013; Patel et al., 2018). However, these studies, too, included physician-only samples. Both studies found gaps regarding the prevalence of NAFLD. Among Australian hospitalists, 75% underestimated NAFLD prevalence (Bergqvist et al., 2013) whereas 58% of PC physicians underestimated the prevalence (Patel et al., 2018). Nearly half of PC physicians erroneously thought that liver transaminases are sensitive enough to rule out NAFLD or were unsure of the role of liver enzymes in diagnosis (Patel et al., 2018). Primary care physicians also failed to use recommended tools in guidelines such as the NFS. Thirty-one percent of PC physicians volunteered that the survey made them realize they had an unrecognized knowledge gap (Patel et al., 2018). Both studies concluded a need for training of healthcare providers regarding NAFLD.

Remaining studies have explored provider knowledge gaps in Europe. In the United Kingdom, NAFLD knowledge and attitudes of both patients and PC physicians were explored in a qualitative manner (Avery et al., 2017). Findings included a need for PC physician education and better patient education materials. Several PC physicians felt underequipped to provide lifestyle change counseling and also felt a lack of comfort with diagnosis and management. Patients shared a lack of education and support given to them by PC physicians. Surprisingly, one patient was told to "Google" NAFLD rather than the physician supplying information. In the Netherlands, van Asten, Verhaegh, Koek, and Verbeek. (2017) highlighted a striking underuse and awareness of NAFLD clinical practice guidelines by PC physicians (only one of 64 reported using guidelines). In France, Ratziu et al. (2012) noted that even gastroenterologists were prone to diagnostic

knowledge gaps, with 78% of their sample showing an over-reliance on liver transaminases even in patients with metabolic risk factors or obesity. As previously mentioned, liver transaminases have low sensitivity for ruling out NAFLD and, specifically, NASH (Ahmed et al., 2018; Rinella et al., 2016).

# **Purpose**

The literature illustrated a knowledge gap among an almost exclusive physician sample. It is unclear whether this knowledge gap extends to PCNPs because NPs were only represented in one sample and were less than 7% of the sample (Wieland et al., 2013). Therefore, the purpose of this study was to evaluate PCNPs' knowledge, clinical approaches, and preparedness regarding care of the patient with NAFLD in an effort to explore whether PCNPs experience similar knowledge gaps as their physician colleagues. The data were collected as part of a pre/post-test survey evaluation design for a larger project evaluation that developed and evaluated an NAFLD tool kit (Casler, Trees, & Bosak, 2020). Nine (45%) of the project evaluation participants did not complete the post-test survey, but their responses on the pretest survey, grouped with the other participants' pretest survey responses, provided a picture of the state of PCNPs' knowledge and preparedness regarding NAFLD.

## **Methods**

A convenience sample of 20 PCNPs from two Midwestern NP professional groups completed the Nonalcoholic Fatty Liver Disease survey (Patel et al., 2018). The survey tool was a 19-question survey with three sections. The first section assessed general knowledge regarding NAFLD, the second section assessed approaches to clinical care by PCNPs, and the final section assessed perceived preparedness and comfort regarding caring for patients with NAFLD. The first two sections included not only questions with true/ false answer options, but also an option to mark "unsure." The final section included a single 5-point Likert-scale question that asked participants whether they felt they had adequate knowledge to care for patients with NAFLD. The answer choices ranged from strongly disagree (0) to strongly agree (5). Research Electronic Data Capture was used to deliver the survey. Survey data were anonymous, and no identifying information, including e-mail address, was collected. The study was approved by the institutional review board as an exempt study.

# **Results**

Descriptive statistics were used to summarize the survey findings. The range of years of experience of the participants was 1-43 years (mean = 8.75; median =

5). Analysis of knowledge showed knowledge gaps in some but not all areas. Examples of knowledge gaps included only 30% of the sample being able to correctly estimate the prevalence of NAFLD. Reassuringly, however, all PCNPs did correctly identify the role of weight loss (100%) and nearly all recognized the important role of physical exercise (90%) and optimization of treatment of metabolic comorbidities, such as diabetes, on NAFLD (95%). Participants did, however, underappreciate the role of bariatric surgery (50%) and pharmacology-directed at weight loss (50%).

The survey also assessed clinical practice behaviors of the PCNPs. For NAFLD management, 95% of participants in the sample reported they would provide information on diet and exercise and 90% would refer to exercise and physical activity programs, 70% would refer to a dietician, and 40% would refer to a weight loss clinic. Sixty-five percent of participants in the sample reported they would not refer a patient to a specialist unless liver transaminases were abnormal, and 100% of the sample reported using liver transaminases to monitor NAFLD progression. Both misconceptions regarding liver transaminases illustrate the need for education because many patients with NAFLD, even those with cirrhosis, have liver transaminase values in the normal range (Ahmed et al., 2018; Ratziu et al., 2012; Rinella et al., 2016).

Over-reliance on ultrasonography was also identified. Eighty percent of our sample reported using ultrasonography for monitoring of NAFLD. This is problematic, given that ultrasonography may not show evidence of NAFLD unless 30% or more of the liver is affected by steatosis (Saadeh et al., 2002). In addition, liver ultrasonography can be normal in early cirrhosis (Lurie, 2015; Saadeh et al., 2002).

Further analysis of clinical practice behaviors showed that although PCNPs knew about some guideline-suggested interventions, few used them. For example, most participants knew that the NFS was recommended for diagnosis and monitoring of NAFLD (65% and 70%, respectively), yet only 15% reported using it in clinical practice. This may illustrate a gap between "knowing" and "doing," a phenomenon previously described in the literature (Cochrane et al., 2007).

Another area of concern in our sample was the lack of comfort and perceived preparedness to care for patients with NAFLD. Only 35% of participants in this sample agreed (and none strongly agreed) that they had adequate knowledge to take care of patients with NAFLD (Figure 1; Table 1). This demonstrates an educational need for PCNPs. Combined with the selfreported knowledge gaps, this finding provides insight into the state of knowledge for PCNPs, a population under-represented in studies describing PC provider knowledge and behaviors regarding NAFLD.

Copyright © 2020 Society of Gastroenterology Nurses and Associates. Unauthorized reproduction of this article is prohibited.

I HAVE THE NEEDED KNOWLEDGE REGARDING NAFLD TO DIAGNOSE, MANAGE, AND REFER THESE PATIENTS (N=20)



FIGURE 1. Nurse practitioner perceived preparedness for care of patients with nonalcoholic fatty liver disease.

# Discussion

Primary care nurse practitioners in our sample had adequate knowledge regarding NAFLD in some, but not all, areas. Knowledge gaps in the sample are similar to those identified in physician colleagues. This included a likelihood to over-rely on liver transaminases to rule out NAFLD and its progression (Patel et al., 2018; Ratziu et al., 2012). Also, 65% of our sample underestimated the prevalence of NAFLD in the obese population and 45% underestimated the prevalence in the general population, mirroring findings in studies of physicians (Patel et al., 2018; Said et al., 2013).

The results from the Likert scale question assessing preparedness for NAFLD patient care suggest that PCNPs need and want more support and education regarding NAFLD. This, in combination with our and other authors' findings of knowledge gaps and "knowing" versus "doing" discrepancies, highlights the need for continued NAFLD education efforts focused on PCNPs. Some examples of potential solutions include awareness campaigns such as "Think NAFLD" (Marjot et al., 2018), educational conferences (Grattagliano

### TABLE 1. Response to "I Have the Needed Knowledge Regarding NAFLD to Diagnose, Manage, and Refer These Patients" (N = 20)

	n	%
Strongly agree	0	0
Agree	7	35
Neutral	4	20
Disagree	5	25
Strongly disagree	4	20
<i>Note</i> . NAFLD = nonalcoholic fatty liver disease.		

et al., 2008), or online tool kits (Casler et al., 2020). Future research also needs to be done to confirm our findings with a larger PCNP sample and to explore the impact of NAFLD education efforts for PC providers.

## Limitations

There are limitations to our findings. First, the small sample size, convenience sample, and regional-only location of the study limit the generalizability of the results. In addition, the utilized survey was developed and tested for validity in Australia. However, we were able to modify the tool for use within the United States after consultation with NASH clinical experts. After this, we performed a pilot review of the survey for appropriateness with five PCNPs who were not part of the study sample. Finally, the small sample size may not be representative of the entire PCNP population, as respondents may have participated because of their interest in NAFLD.

Strengths include that the survey explored the baseline knowledge and clinical approach to NAFLD by PCNPs, a population scantly represented in current literature describing NAFLD knowledge gaps. Our survey also included a previously used survey tool with content and face validity.

# Conclusion

Primary care nurse practitioners experience similar knowledge gaps as their physician colleagues and share a desire for more support in caring for patients with NAFLD. Moreover, although knowledge about some aspects of NAFLD is adequate, it may not translate into clinical practice behaviors. Therefore, PCNPs need continued education and support to fulfill their role to provide patient care during the NAFLD epidemic.

## REFERENCES

- Ahmed, Z., Ahmed, U., Walayat, S., Ren, J., Martin, D. K., Moole, H., ... Dhillon, S. (2018). Liver function tests in identifying patients with liver disease. Clinical and Experimental Gastroenterology, 11, 301-307. doi:10.2147/CEG.S160537
- Angulo, P., Hui, J. M., Marchesini, G., Bugianesi, E., George, J., Farrell, G. C., ... Day, C. P. (2007). The NAFLD fibrosis score: A noninvasive system that identifies liver fibrosis in patients with NAFLD. Hepatology, 45(4), 846-854. doi:10.1002/hep.21496
- Armstrong, M. J., Hazlehurst, J. M., Parker, R., Koushiappi, E., Mann, J., Khan, S., ... Tomlinson, J. W. (2014). Severe asymptomatic non-alcoholic fatty liver disease in routine diabetes care; A multi-disciplinary team approach to diagnosis and management. QJM: An International Journal of Medicine, 107(1), 33-41. doi:10.1093/gjmed/hct198
- Avery, L., Exley, C., McPherson, S., Trenell, M. I., Anstee, Q. M., & Hallsworth, K. (2017). Lifestyle behavior change in patients with nonalcoholic fatty liver disease: A qualitative study of clinical practice. Clinical Gastroenterology and Hepatology, 15(12), 1968-1971. doi:10.1016/j.cgh.2017.06.011

- Bergqvist, C.-J., Skoien, R., Horsfall, L., Clouston, A. D., Jonsson, J. R., & Powell, E. E. (2013). Awareness and opinions of nonalcoholic fatty liver disease by hospital specialists: Opinions of fatty liver disease. *Internal Medicine Journal*, 43(3), 247–253. doi:10.1111/j.1445-5994.2012.02848.x
- Blais, P., Husain, N., Kramer, J. R., Kowalkowski, M., El-Serag, H., & Kanwal, F. (2015). Nonalcoholic fatty liver disease is underrecognized in the primary care setting. *American Journal of Gastroenterology*, 110(1), 10–14. doi:10.1038/ajg.2014.134
- Casler, K., Trees, K., Bosak, K. (2020). Readiness for the epidemic: The adult nonalcoholic fatty liver disease toolkit for primary care nurse practitioners. *Journal of the American Association of Nurse Practitioners*, 32(4), 323–331.
- Chalasani, N., Younossi, Z., Lavine, J. E., Charlton, M., Cusi, K., Rinella, M., ... Sanyal, A. J. (2018). The diagnosis and management of nonalcoholic fatty liver disease: Practice guidance from the American Association for the Study of Liver Diseases. *Hepatology*, 67(1), 328–357. doi:10.1002/hep.29367
- Cochrane, L. J., Olson, C. A., Murray, S., Dupuis, M., Tooman, T., & Hayes, S. (2007). Gaps between knowing and doing: Understanding and assessing the barriers to optimal health care. *Journal of Continuing Education in the Health Professions*, 27(2), 94–102. doi:10.1002/chp.106
- de Silva, H. J., & Dassanayake, A. S. (2009). Non-alcoholic fatty liver disease: Confronting the global epidemic requires better awareness. *Journal of Gastroenterology and Hepatology*, 24(11), 1705–1707. doi:j.1440-1746.2009.06026.x
- Dharel, N., & Fuchs, M. (2014). Non-alcoholic fatty liver disease— A major public health challenge for the 21st century. *JSM Gastroenterology & Hepatology*, 2(2), 1018.
- Dietrich, P., & Hellerbrand, C. (2014). Non-alcoholic fatty liver disease, obesity and the metabolic syndrome. *Best Practice & Research. Clinical Gastroenterology*, 28(4), 637–653. doi:j. bpg.2014.07.008
- Estes, C., Razavi, H., Loomba, R., Younossi, Z., & Sanyal, A. J. (2018). Modeling the epidemic of nonalcoholic fatty liver disease demonstrates an exponential increase in burden of disease. *Hepatology*, 67(1), 123–133. doi:10.1002/hep.29466
- Grattagliano, I., D'Ambrosio, G., D'Ambrozio, G., Palmieri, V. O., Moschetta, A., Palasciano, G., ... "Steatostop Project" Group. (2008). Improving nonalcoholic fatty liver disease management by general practitioners: A critical evaluation and impact of an educational training program. *Journal of Gastrointestinal and Liver Diseases*, 17(4), 389–394.
- Kenneally, S., Sier, J. H., & Moore, J. B. (2017). Efficacy of dietary and physical activity intervention in non-alcoholic fatty liver disease: A systematic review. *BMJ Open Gastroenterology*, 4(1), e000139. doi:10.1136/bmjgast-2017-000139
- Kleiner, D. E., Brunt, E. M., Van Natta, M., Behling, C., Contos, M. J., Cummings, O. W., ... Nonalcoholic Steatohepatitis Clinical Research Network. (2005). Design and validation of a histological scoring system for nonalcoholic fatty liver disease. *Hepatol*ogy, 41(6), 1313–1321. doi:10.1002/hep.20701
- Ludwig, J., Viggiano, T. R., McGill, D. B., & Oh, B. J. (1980). Nonalcoholic steatohepatitis: Mayo Clinic experiences with a hitherto unnamed disease. *Mayo Clinic Proceedings*, 55(7), 434–438.
- Lurie, Y. (2015). Non-invasive diagnosis of liver fibrosis and cirrhosis. World Journal of Gastroenterology, 21(41), 11567. doi:10.3748/wjg.v21.i41.11567

- Marjot, T., Sbardella, E., Moolla, A., Hazlehurst, J. M., Tan, G. D., Ainsworth, M., ... Tomlinson, J. W. (2018). Prevalence and severity of non-alcoholic fatty liver disease are underestimated in clinical practice: Impact of a dedicated screening approach at a large university teaching hospital. *Diabetic Medicine*, 35(1), 89–98. doi:10.1111/dme.13540
- McPherson, S., Anstee, Q. M., Henderson, E., Day, C. P., & Burt, A. D. (2013). Are simple noninvasive scoring systems for fibrosis reliable in patients with NAFLD and normal ALT levels? *European Journal of Gastroenterology & Hepatology*, 25(6), 652–658. doi:10.1097/MEG.0b013e32835d72cf
- Patel, P. J., Banh, X., Horsfall, L. U., Hayward, K. L., Hossain, F., Johnson, T., ... Powell, E. E. (2018). Underappreciation of nonalcoholic fatty liver disease by primary care clinicians: Limited awareness of surrogate markers of fibrosis. *Internal Medicine Journal*, 48(2), 144–151. doi:10.1111/imj.13667
- Polanco-Briceno, S., Glass, D., Stuntz, M., & Caze, A. (2016). Awareness of nonalcoholic steatohepatitis and associated practice patterns of primary care physicians and specialists. *BMC Research Notes*, 9, 157. doi: 10.1186/s13104-016-1946-1
- Ratziu, V., Cadranel, J.-F., Serfaty, L., Denis, J., Renou, C., Delassalle, P., ... Perlemuter, G. (2012). A survey of patterns of practice and perception of NAFLD in a large sample of practicing gastroenterologists in France. *Journal of Hepatology*, 57(2), 376–383. doi:10.1016/j.jhep.2012.03.019
- Rinella, M. E. (2015). Nonalcoholic fatty liver disease: A systematic review. JAMA, 313(22), 2263. doi:10.1001/jama.2015.5370
- Rinella, M. E., Lominadze, Z., Loomba, R., Charlton, M., Neuschwander-Tetri, B. A., Caldwell, S. H., ... Harrison, S. A. (2016). Practice patterns in NAFLD and NASH: Real life differs from published guidelines. *Therapeutic Advances in Gastroenterology*, 9(1), 4–12. doi:10.1177/1756283X15611581
- Saadeh, S., Younossi, Z. M., Remer, E. M., Gramlich, T., Ong, J. P., Hurley, M., ... Sheridan, M. J. (2002). The utility of radiological imaging in nonalcoholic fatty liver disease. *Gastroenterology*, 123(3), 745–750.
- Said, A., Gagovic, V., Malecki, K., Givens, M. L., & Nieto, F. J. (2013). Primary care practitioners survey of non-alcoholic fatty liver disease. *Annals of Hepatology*, 12(5), 758–765.
- Spengler, E. K., & Loomba, R. (2015). Recommendations for diagnosis, referral for liver biopsy, and treatment of nonalcoholic fatty liver disease and nonalcoholic steatohepatitis. *Mayo Clinic Proceedings*, 90(9), 1233–1246. doi:10.1016/j.mayocp.2015.06.013
- Stål, P. (2015). Liver fibrosis in non-alcoholic fatty liver disease: Diagnostic challenge with prognostic significance. World Journal of Gastroenterology, 21(39), 11077. doi:10.3748/wjg.v21. i39.11077
- Tapper, E. B., Hunink, M. G. M., Afdhal, N. H., Lai, M., & Sengupta, N. (2016). Cost-effectiveness analysis: Risk stratification of nonalcoholic fatty liver disease (NAFLD) by the primary care physician using the NAFLD fibrosis score. *PLoS One*, 11(2), e0147237. doi:10.1371/journal.pone.0147237
- van Asten, M., Verhaegh, P., Koek, G., & Verbeek, J. (2017). The increasing burden of NAFLD fibrosis in the general population: Time to bridge the gap between hepatologists and primary care. *Hepatology*, 65(3), 1078. doi:10.1002/hep.28940
- Wieland, A. C., Quallick, M., Truesdale, A., Mettler, P., & Bambha, K. M. (2013). Identifying practice gaps to optimize medical care

for patients with nonalcoholic fatty liver disease. *Digestive Diseases and Sciences*, 58(10), 2809–2816. doi:10.1007/s10620-013-2740-8

Xiao, G., Zhu, S., Xiao, X., Yan, L., Yang, J., & Wu, G. (2017). Comparison of laboratory tests, ultrasound, or magnetic resonance elastography to detect fibrosis in patients with nonalcoholic fatty liver disease: A meta-analysis. *Hepatology*, 66(5), 1486–1501. doi:10.1002/hep.29302

Younossi, Z. M., Loomba, R., Rinella, M. E., Bugianesi, E., Marchesini, G., Neuschwander-Tetri, B. A., ... Lindor, K. (2018). Current and future therapeutic regimens for non-alcoholic fatty liver disease (NAFLD) and non-alcoholic steatohepatitis (NASH). *Hepatology*, 68(1), 361–371. doi:10.1002/hep.29724

For more than 70 additional continuing education articles related to gastrointestinal topics, go to www.NursingCenter.com.

#### Instructions for Taking the CE Test Online:

- Read the article. The test for this CE activity can be taken online at www.nursingcenter.com. Tests can no longer be mailed or faxed.
- You will need to create a free login to your personal CE Planner account before taking online tests. Your planner will keep track of all your Lippincott Professional Development online CE activities for you.
- There is only one correct answer for each question. A passing score for this test is 10 correct answers. If you pass, you can print your certificate of earned contact hours and the answer key. If you fail, you have the option of taking the test again at no additional cost.
- For questions, contact Lippincott Professional Development: 1-800-787-8985.

#### Registration Deadline: September 2, 2022

#### Disclosure Statement:

The authors and planners have disclosed that they have no financial relationships related to this article.

#### **Provider Accreditation:**

Lippincott Professional Development will award 1.5 contact hours for this continuing nursing education activity.

Lippincott Professional Development is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation. This activity is also provider approved by the California Board of Registered Nursing, Provider Number CEP 11749 for 1.5 contact

hours. Lippincott Professional Development is also an approved provider of continuing nursing education by the District of Columbia, Georgia, and Florida, CE Broker #50-1223. Your certificate is valid in all states.

#### Payment:

• The registration fee for this test is \$10.50 for members; \$15.00 for nonmembers.

DOI: 10.1097/SGA.000000000000563