BRITISH JOURNAL OF HOSPITAL MEDICINE

Fibroadenoma: a guide for junior clinicians

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Abstract

Fibroadenoma is the most common cause of benign breast lumps and is typically seen in women under the age of 40 years. Fibroadenomas are classified as simple, complex, giant, myxoid or juvenile. They present as smooth, rubbery, mobile masses on palpation. Ultrasonographic and mammographic features typical of fibroadenomas include solid, round, well-circumscribed masses, with or without lobulated features. They are predominantly treated conservatively although clinical pathways recommend referral for triple assessment. Surgical intervention is indicated by the presence of one or more of the following features: the presence of symptoms, a diameter greater than 2 cm, rapid growth rate, complex features, disease recurrence or patient anxiety.

Key words: Benign breast disease; Benign breast lump; Breast; Breast lump; Fibroadenoma

Submitted: 31 January 2022; accepted following double-blind peer review: 11 May 2022

Definition and pathogenesis

Fibroadenomas originate from the glandular parenchyma of the breast lobules, and are biphasic tumours consisting of epithelial and stromal cells (Amin et al, 2013). They can also occur in axillary accessory breast tissue (Lee, 2021). While their aetiology is not fully understood, fibroadenomas are classified as aberrations in the normal development and involution of the breast (Greenberg et al, 1998). Hormonal factors may influence fibroadenoma development as the rise in oestrogen and progesterone levels during puberty and pregnancy can result in rapid growth (Johansson et al, 2021). Despite being benign tumours, fibroadenomas are associated with a minimally increased risk of breast cancer (Dyrstad et al, 2015). Nassar et al (2015) found that, while women with complex fibroadenoma were more likely to have concomitant high-risk histological features, complex fibroadenoma itself is not independently associated with increased breast cancer risk.

Epidemiology

Fibroadenoma is the most common type of benign breast tumour, accounting for 50% of all breast biopsies and occurring in 25% of women without overt symptoms of breast disease (El-Wakeel and Umpleby, 2003). They can occur at any age but are most common in women under the age of 40 years, and very rarely occur in men (Agarwal and Kohli, 2016).

Classification

Simple fibroadenomas are the most common type, making up 86% of cases (Nassar et al, 2015). They are considered non-proliferative lesions and are usually 1–3 cm in diameter (National Institute for Health and Care Excellence, 2017).

Complex (or giant) fibroadenomas are a form of proliferative disease and their diameter can exceed 5 cm (Neal et al, 2014). They may contain sclerosing adenosis, calcifications or papillary hyperplasia, and represent 14% of fibroadenomas (Neal et al, 2014; Nassar et al, 2015).

Juvenile fibroadenomas make up 8% of all fibroadenomas and typically occur between the ages of 10 and 18 years (Kopkash and Yao, 2020). They tend to grow rapidly and are radiologically indistinguishable from phyllodes tumours which may be malignant and require excision (Chung et al, 2009). Of note, 10–25% of patients with juvenile fibroadenomas will have multiple or bilateral fibroadenomas at the time of diagnosis (Roveda Júnior et al, 2018).

How to cite this article:
Hudson-Phillips S, Graham G, Cox K, Al Sarakbi W. Fibroadenoma: a guide for junior clinicians, Br J Hosp Med. 2022. https://doi.org/10.12968/hmed.2022.0070

Multiple fibroadenomas are reported in 10–25% of cases, which are bilateral in 4% of cases (Gokhale, 2009; Masciadri and Ferranti, 2011).

Myxoid fibroadenoma is a histological subtype characterised by a hypocellular stromal component with an abundant myxoid matrix (Lozada et al, 2017).

Symptoms and presentation

Breast cancer is the most common newly diagnosed cancer in women worldwide, with 31% of new cancer diagnoses in women in the United States of America in 2022 being breast cancer (Siegel et al, 2022). Breast symptoms cause anxiety for patients despite the fact that a large proportion of patients who present with a breast lump will have benign disease. Eberl et al (2008) found that 3% of all visits to primary care were regarding breast symptoms, with breast pain and breast lumps being the most common complaints. Fibroadenomas are usually asymptomatic and are often painless and slow-growing, but in some cases they can become painful and cause deformity.

History taking is a key part of the diagnostic process and should be thorough and precise in all patients presenting with a breast lump. Table 1 lists important questions to ask during a breast consultation.

Guidelines for the investigation of breast disease

Guidelines for the investigation and management of breast disease can be easily accessed via the National Institute for Health and Care Excellence website. Patients are referred to the breast unit either via the 2-week wait suspected cancer pathway for breast cancer or via non-urgent referral (Table 2).

Investigation

First-line investigation of a breast lump follows the triple assessment protocol which includes clinical examination, imaging and tissue biopsy. The suspicion of malignancy is graded at each stage of the assessment to create an overall risk index (Table 3). This will influence which imaging modalities are used, whether biopsy is required and if the case warrants discussion in the breast multidisciplinary team meeting. This standardised scale also highlights discordance in the triple assessment, allowing for further review and discussion.

Clinical examination

Clinical examination of a fibroadenoma typically reveals a smooth, rubbery, mobile mass palpated in the breast tissue (Houssami et al, 2001). Other concerning or suspicious features

Table 1. A guide to history taking for patients with a breast lump

Questions to ask:
How long has the lump been there?
Has it changed in size over time? (including changes with the menstrual cycle)
Does the lump feel soft or hard? Does it have irregular borders?
Is the lump painful?
Are there any associated sinister features to suggest malignancy, such as bloody discharge from the nipple, nipple retraction, skin changes or ulceration?
Are there any other features suggestive of malignancy such as weight loss, lumps in the axilla or back pain?
Are there features to suggest an infective aetiology such as pyrexia, erythema, warmth of overlying skin or pain?
Is there a family history of breast and/or ovarian cancer?

Table 2. Criteria for referral to the breast unit on the suspected cancer pathway

Refer people using a suspected cancer pathway referral (for an appointment within 2 weeks) for breast cancer if they are:	■ Aged 30 years and over and have an unexplained breast lump with or without pain or
	■ Aged 50 years and over with any of the following symptoms in one nipple only:
	  ■ discharge
	  ■ retraction
	  ■ other changes of concern

Consider a suspected cancer pathway referral (for an appointment within 2 weeks) for breast cancer in people:	■ With skin changes that suggest breast cancer or ■ Aged 30 years and over with an unexplained lump in the axilla
Consider non-urgent referral in people aged under 30 years of age with an unexplained breast lump, with or without pain	

From National Institute for Health and Care Excellence (2021)

Table 3. The triple assessment scoring system

		Imaging		
	Clinical examination (P)	Ultrasound (U)	Mammography (M)	Histology (B)
1. Normal	P1	U1	M1	B1
2. Benign	P2	U2	M2	B2
3. Uncertain or likely benign	P3	U3	M3	B3
4. Suspicious of malignancy	P4	U4	M4	B4
5. Malignant	P5	U5	M5	B5

which may indicate infection or malignancy are usually absent. These include overlying skin changes, nipple retraction, abnormal nipple discharge or palpable axillary lymph nodes.

Imaging

Imaging should be performed by trained breast radiologists, who are key members of the multidisciplinary team. Ultrasound is the first-line imaging modality for women under the age of 40 years and during pregnancy and lactation (Royal College of Radiologists, 2019). For women over the age of 40 years, mammography is the first-line imaging modality with the addition of ultrasound as indicated (Royal College of Radiologists, 2019). The density of breast tissue in women under the age of 40 years can limit the sensitivity of mammography, so it is only performed on women in this age group if malignancy is clinically (P4/P5) or ultrasonically (U4/U5) suspicious or malignancy has been confirmed (Kolb et al, 2002).

An ultrasound scan of the affected breast is performed on all patients presenting with a breast lump. Ultrasound features of a fibroadenoma are typically a solid, oval or round, well-circumscribed, lobulated mass with the width greater than the height (Figures 1a and 2) (Gokhale, 2009). Compared to breast cysts which are typically anechoic and thin walled (Figure 1b), fibroadenomas are typically hypoechoic, compared with the surrounding breast parenchyma, with identifiable capsules and may have low-level internal echoes (Gokhale, 2009).

Fibroadenomas appear on mammography as an oval or round, circumscribed mass that is homogenous and sharply demarcated from the normal breast tissue. There may also be associated coarse calcifications with benign appearances (Figure 3).

Biopsy

The gold standard for tissue biopsy of a breast lesion is core biopsy under image guidance (ultrasound or X-ray guided). Core biopsy is preferred over fine-needle aspiration cytology as it provides higher sensitivity and specificity. It also gives important information that can

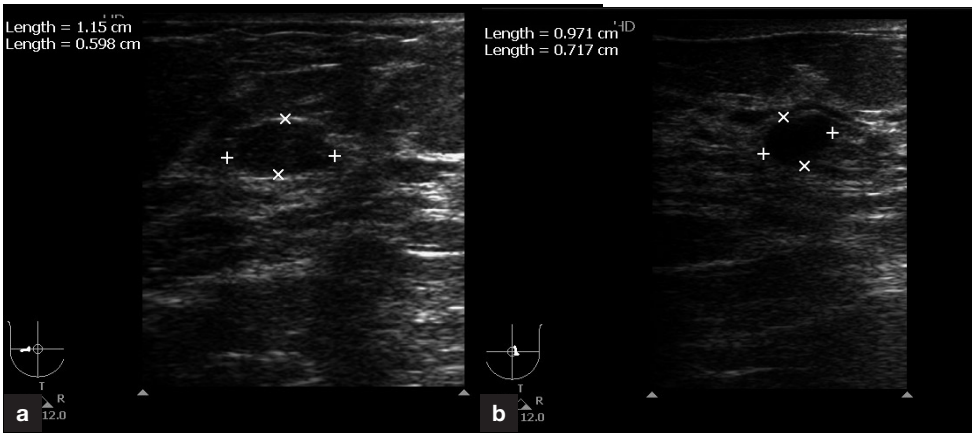

Figure 1. a. Ultrasound appearance of a well-circumscribed oval-shaped lesion with the width greater than the height containing internal echoes, in keeping with a fibroadenoma.
b. Simple cyst.

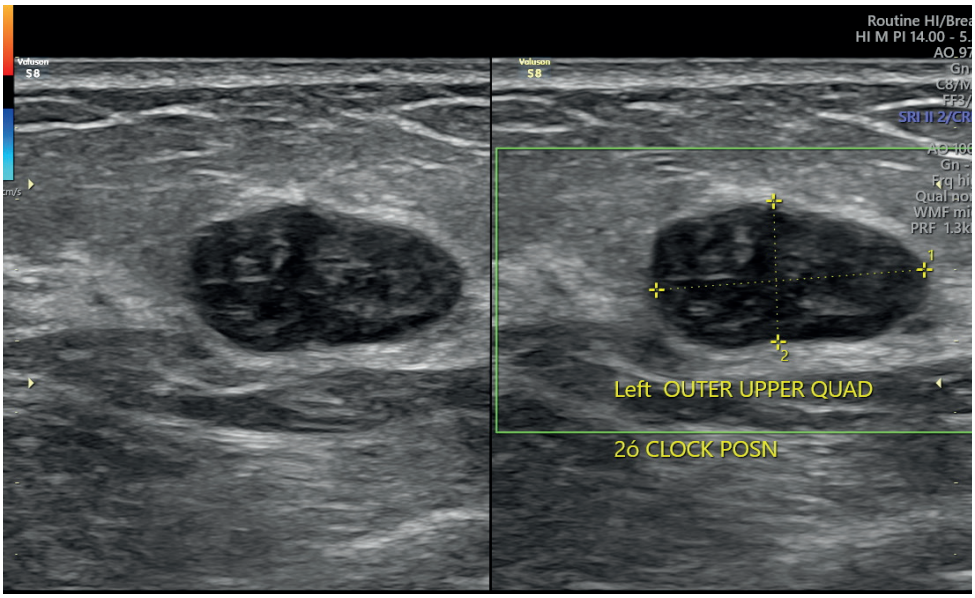

Figure 2. Ultrasound appearance of fibroadenoma with lobulated features; located in the left upper outer quadrant.

influence ongoing treatment, such as prognostic oncological features, specifically tumour type, grade and receptor status (Royal College of Radiologists, 2019).

Histopathology of fibroadenoma reveals epithelial and stromal elements with intracanalicular (Figure 4) or pericanalicular (Figure 5) growth patterns. These lesions are usually sharply demarcated from adjacent normal breast tissue. Despite this, they can vary considerably in their histological characteristics and growth patterns (Kuijper et al, 2001).

Biopsy is not indicated in all cases. For patients under the age of 25 years, the Royal College of Radiologists (2019) recommend that biopsy of a presumed fibroadenoma is not required if ultrasound imaging satisfies the following criteria: ellipsoid shape, wider than tall, well-defined outline with fewer than four gentle lobulations, no calcification or shadowing and a thin echogenic pseudocapsule. In such cases, with benign features on the triple assessment index for clinical examination (P1/P2) and imaging (U1/U2), together with a history suggestive of benign aetiology, it is reasonable to arrange a short interval follow up for clinical review or repeat imaging as opposed to performing a biopsy.

One study of 251 patients with palpable breast abnormalities but negative imaging found that if biopsy was reserved for patients with only suspicious (P4) or malignant (P5) clinical findings at initial assessment, then 81.7% of all biopsies could have been avoided without missing any malignancies (Gumus et al, 2012). However, other studies have found that negative imaging can fail to identify a minority of patients with breast cancer (Moy

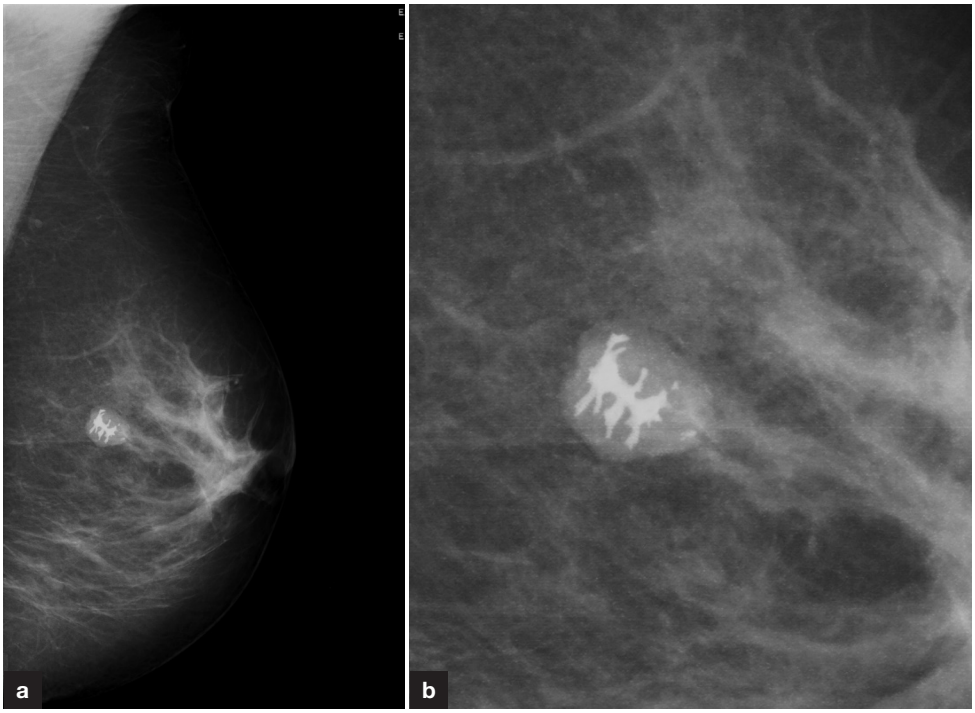

Figure 3. a. Mammographic appearance of a fibroadenoma with associated benign coarse calcifications. b. Magnified image to better appreciate the calcifications within the fibroadenoma.

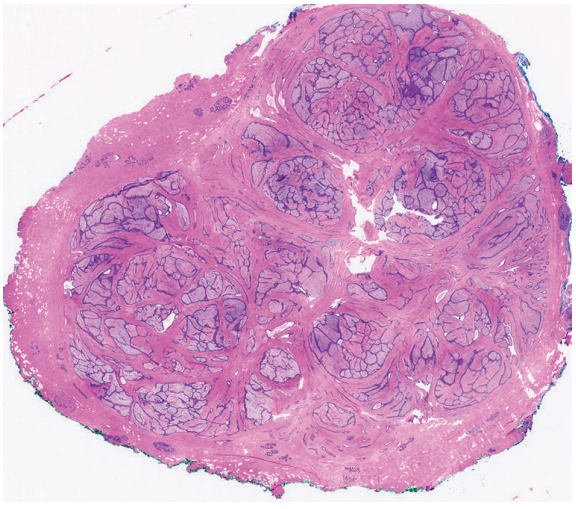

Figure 4. Histological appearance of a well-circumscribed fibroadenoma with a uniform distribution of glandular and stromal elements and an intracanalicular growth pattern.

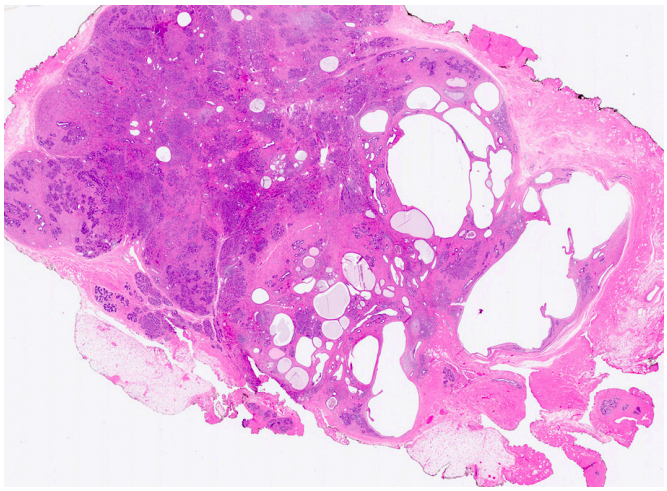

Figure 5. Histological appearance of a complex fibroadenoma showing associated cyst formation (>3 mm) and a pericanalicular growth pattern.

et al, 2002). Therefore, if there is any doubt about the nature of the lesion or if there is discordance in the triple assessment scores, needle biopsy should be performed (Royal College of Radiologists, 2019).

Multiple lesions presumed to be fibroadenomas should be carefully assessed and biopsy of the largest or least radiologically typical mass performed to confirm diagnosis. Occasionally, biopsy of more than one lesion is required to establish the extent of the disease, guide ongoing management and use as a reference point for ongoing surveillance (Royal College of Radiologists, 2019).

Management

The majority of patients with fibroadenomas are managed conservatively with clinical review, reassurance and observation. If diagnosis is confirmed by core biopsy then fibroadenomas do

not need additional evaluation (Grady et al, 2008). Fibroadenomas do not usually increase in size, may disappear over time without intervention and are unlikely to recur if excised (National Institute for Health and Care Excellence, 2005). Recurrence is primarily seen in lesions with a diameter greater than 2 cm (Grady et al, 2008). If asymptomatic, no further treatment or follow up is necessary. Reassurance plays a key role and safety-netting advice must be given to the patient to report any growth or textural changes (National Institute for Health and Care Excellence, 2017). Further management and ongoing surveillance will depend on the rate of growth in relation to the size of the breast and the presence of new symptoms such as pain or discomfort. Women with multiple masses presumed to be fibroadenomas should undergo clinical and radiological surveillance to reduce the risk of missing a malignancy in one or more of the masses.

Indications for surgical management of fibroadenoma include the presence of any of the following features: symptoms, a diameter greater than 2 cm, rapid growth rate, complex features, recurrence or patient anxiety (National Institute for Health and Care Excellence, 2017).

While there are various options for surgical management, complete surgical excision is most common. After excision, fibroadenomas in young women are unlikely to recur (Grady et al, 2008; Javed et al, 2019). For fibroadenomas under the size of 2 cm, ultrasound-guided vacuum-assisted excision is a safe and effective alternative to surgical excision with better cosmetic outcomes (Rupa and Kushvaha, 2021). Less commonly used options for removal include cryoablation, image-guided radiofrequency excision biopsy or interstitial laser therapy.

While management options are conservative or surgical at present, options for medical management have been proposed with one randomised clinical trial showing metformin to be effective at reducing fibroadenoma size and growth compared to placebo (Alipour et al, 2021). For women at high risk of breast cancer, tamoxifen has also been shown to reduce the incidence of fibroadenoma (Tan-Chiu et al, 2003). Evening primrose oil has been suggested as a treatment option for fibroadenoma but a clinical study showed it to have no significant effect (Kollias et al, 2000). Ultimately, the benign nature of fibroadenoma and the availability of effective and minimally invasive surgical options with good cosmetic results means that medical treatment of fibroadenoma is unlikely to supersede conservative and surgical management options in the near future.

No routine surveillance is required for fibroadenoma post-excision but it is good practice to discuss the postoperative histology at the breast multidisciplinary team meeting. Postoperative histological appearance typically shows a well-circumscribed mass which is white-grey in colour with lobulated contours (**Figure 6**).

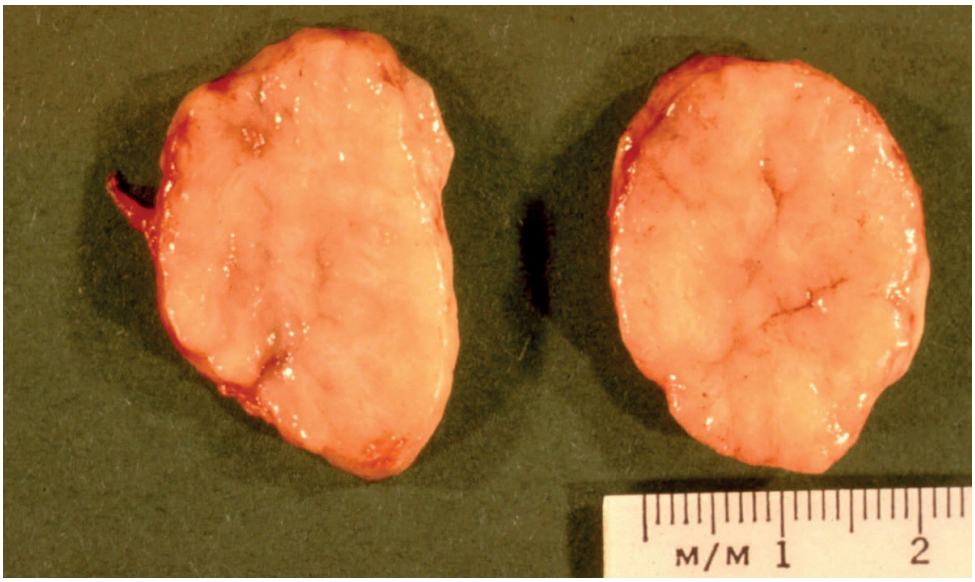

Figure 6. Excision biopsy specimen of a fibroadenoma showing a white-grey mass with lobulations bulging above the cut surface.

Key points

- Most fibroadenomas can be managed without surgery and reassurance is a key part of fibroadenoma management.
- Simple fibroadenomas are not commonly associated with malignancy.
- Surveillance of multiple fibroadenomas is important to avoid missing the presence of malignancy in one or more of the masses.
- Conservative and surgical management of fibroadenomas still supersedes the more recent suggestions of medical therapies.
- Indications for operative management of fibroadenoma include rapid growth, size greater than 2 cm, symptoms, complex features, recurrence, and patient anxiety.
- Following surgical excision, fibroadenomas are unlikely to recur.

Conclusions

Fibroadenomas are common benign breast lumps mostly affecting women under the age of 40 years. They are typically smooth, round, mobile masses on palpation and solid, round, well-circumscribed lobulated masses on ultrasound. Fibroadenomas do not carry a risk of breast cancer, but patients with complex fibroadenomas are more likely to have concomitant high-risk histological changes to the breast tissue which are themselves associated with increased risk of malignancy. The breast triple assessment, consisting of clinical examination, ultrasound or mammographic imaging and core biopsy, forms the core component of the diagnostic work up. Management is primarily conservative but surgical excision may be appropriate if there are concerns about malignancy, presence of symptoms or patient anxiety. Owing to their non-malignant nature, minimally invasive techniques such as ultrasound-guided vacuum-assisted excision can be safe, effective alternatives to surgical excision in certain situations. While fibroadenomas are benign tumours, all breast lumps have the potential to cause significant patient anxiety. Thorough diagnostic work up using the triple assessment protocol helps to address this anxiety and enables sinister pathology to be robustly excluded.

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Conflicts of interest

The authors declare that there are no conflicts of interest.

Acknowledgements

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Curriculum checklist

This article addresses the following requirements from the general internal medicine curriculum:

- Managing patients in an outpatient clinic, ambulatory or community setting, including management of long term conditions
- Managing medical problems in patients in other specialties and special cases
- Managing a multidisciplinary team including effective discharge planning.

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