Critical thinking and diagnostic reasoning when advanced practitioners assess and treat skin conditions.

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Title

Clinical Review: Critical Thinking and Diagnostic Reasoning of the skin

Introduction

In the last two decades the role of Advanced Clinical Practitioner (ACP) has emerged to relieve pressures within the healthcare workforce (Reynolds, & Mortimore, 2021). Unless the ACP works within a specific speciality, ACPs require a broad knowledge of many specialism, both medical and surgical, and an ability to work both within primary and secondary care (Reynolds, & Mortimore, 2021). Therefore this clinical review, the second in a series of two articles, is designed to support ACP's across acute hospital settings and primary care in differential diagnosis, mimickers, common investigations and treatment options out with a dermatology setting. Many ACPs feel uncomfortable with skin conditions as it is a complexed speciality which may be in part due to the large number of potential diagnosis (over 2000) (Levell, Jones and Bunker 2013). However, those with less familiarity of dermatological conditions, can develop their knowledge and experience and provide care for those with dermatological complaints.

In our previous clinical review, we considered a systematic approach to consultation and physical assessment in a patient with a skin complaint. In this clinical review we explore the next steps for a novice ACP, considering some differential diagnoses and mimickers, common investigations and treatment options for a patient presenting with a skin complaint. The decision making behind these for ACPs is crucial when caring and supporting a patient with a skin condition/complaint within this role. This article assumes the ACP will have knowledge and understanding of normal skin health, which is required prior to being

able to consult a patient with a skin complaint, and is beyond the scope of this article to address.

Differentials

The possible list of differential diagnoses within the integumentary system is vast (Lynch, 1994). Whilst it is unlikely that those working outside the dermatology speciality will have a depth of knowledge around these differentials it is optimal that all ACPs have some developed knowledge of common conditions, treatments, and investigations, which we will cover in this clinical review. The high numbers of patients presenting with skin conditions, and skin conditions being the most common presentation to primary care in England and Wales (Schofield, Fleming, Grindlay, & Williams. 2011), making it likely that all ACPs, working in general settings, will be presented with a patient demonstrating a skin complaint as some point in their career and given the often distressing nature of this and the potential for ill health associated with skin conditions having a firm baseline knowledge of this area and any red flags (Table 1) essential.

Mimickers

It is useful to be aware of mimickers in skin presentations and to consider and investigate any potential differentials or causes. A common condition with several mimickers is cellulitis, conditions such as herpes zoster, vasculitis, venous disease (such as venous thrombosis and venous eczema), lymphoedema, dermatitis (including contact), panniculitis, and necrotising fasciitis along with other conditions may present in a similar manner to cellulitis (Hirschmann & Raugi, 2012). As each of these conditions have their own required treatment and secondary concerns it is important to distinguish them from cellulitis. This is

where a thorough history and exam is vital in aiding this diagnostic process. Table 2 explores common mimickers including cellulitis and other common mimickers with skin presentations.

Investigations to Choose

Often obtaining a thorough history and physical examination can allow for efficient diagnosis and treatment of the most common skin conditions. The identification or elimination of red flags can reduce diagnostic uncertainty and increase patient safety whilst improving the initiation of appropriate treatment.

There will be some presentations however that require further investigations to determine the nature of the condition before treatment can be commenced. Whilst many of these investigations require referral to a specialist service some of these explorations can be undertaken by those outside of the dermatology speciality. It is important that ACPs are aware of treatments available and their mode of action as this will enable them to provide clear information to the patient prior to referral, gather informed consent for this process, and to provide holistic care responsive to the patient's needs (All Party Parliamentary Groups, 2020). These treatments will be discussed further in this clinical review.

Key Investigations for a Skin Complaint

For an ACP, some basic/straightforward investigations which can help in confirming diagnosis and identification of a treatment plan can be requested. These investigations include; swabs, allergy testing and skin, hair and nail sampling as key alongside blood tests

(discussed below). These investigations can also be carried out prior to referral to a specialist to speed up waiting for results etc.

Swabs

A common and non-invasive investigation is the swab for microbiology. This is useful in conditions where bacterial infection is suspected and can aid in the identification of appropriate antibiotic choice if indicated. It is recommended that swabs be taken prior to the commencement of antimicrobial therapy (Cross, 2014). Wounds or skin conditions such as ulcers that have debris in situ require cleansing prior to swabbing, and those swabs obtained from lower limbs often have a positive growth from colonisation rather than infection (Public Health England (PHE), 2018). If swabbing a wound with exudate expressing the area with the swab tip can ensure adequate sampling occurs. If swabbing an area that has previously been covered with a dressing or cream care should be taken to remove and clean these away prior to obtaining the swab. Swabs should be taken using aseptic non-touch technique to prevent cross contamination and therefore inaccurate results. Swabs are taken for culture and sensitivity but may be limited due to the efficiency and technique of collection (Ogai et al., 2018). In addition to microbiology swabs, viral swabs may be obtained where there is suspicion of herpes simplex or herpes zoster. To obtain a viral swab the swab is rubbed over and against the lesion or vesicle, rubbing the top/crust off with a sterile swab prior to collection.

Hair samples/skin scrapings/nail clippings

Other minimally invasive investigations include skin scrapings, hair samples, and nail clippings, these are primarily used in investigation of suspected fungal presentations (PHE, 2018). These results however may take several weeks and if these are being requested it is

good practice to advise the patient of the wait for results to reduce anxiety and ensure that their expectations are met. Also if the patient is discharged from secondary care to primary care, or admitted to secondary care from primary care, these investigations should be handed over as part of the admission/discharge letter and ongoing treatment plan.

Hair samples may be collected by means of plucking or cutting and can be assessed by microscopy (Adya, Inamadar, Palit, Shivanna, & Deshmukh, 2011). Hair microscopy can aid diagnosis of cause of hair loss such as alopecia or trauma (De Berker, 2002).

Skin scrapings are used in the investigation of suspected fungal infections and once collected are examined by microscope (Kyrade, Amlade, and Miskeen, 2006). The skin should be cleaned with 70% alcohol prior to collection and free of any topical preparations or debris and these would be collected using a Dermapak specimen envelope.

Nail samples are not required for simple infections such as athletes foot or mild ringworm. They may however be useful where infections have been resistant to topical treatment and oral is being considered or in severe infection. As with skin scrapings the nail should be clean and free of any creams or treatments (PHE 2017). Full thickness clippings obtained as far back as possible are recommended and debris from under the nail will be of benefit in aiding diagnosis.

Allergy testing

In those patients presenting with a suspected allergy a referral can be made for allergy testing. It is worth noting that most referrals to allergy clinics should be for severe allergies or those impacting on nutritional state only and that those patients requiring patch tests should be referred to dermatology.

There are some simple steps that can be taken in patients presenting with suspected allergy that is mild in nature. A food and activity diary can be a useful tool in identifying triggers and potential allergens, it requires the patient to record their diet and activities alongside any worsening or alleviation of symptoms so that patterns or themes can be identified. Once a trend is noticed then steps can be taken with advice and support from dietetics to eliminate the suspect trigger. If there is a suspected food trigger a trial of food elimination may be useful, this process may take time and the patient should be aware of this before undertaking this method. Whilst antihistamines may be useful in alleviating symptoms they may mask some triggers and should ideally be avoided when using a food/activity diary or food elimination methods.

Blood tests

Blood tests can be an appropriate investigation where systemic infection is suspected or where the skin condition is suspected to be secondary to an underlying condition.
Due to the related risk of skin conditions and infection in diabetes blood glucose and Hb1Ac are useful blood tests to obtain. Other potentially appropriate blood tests, dependent on the presenting complaint, may be proteins (when there is a concern regarding connective tissue disease or vasculitis), blood borne virus serology (to investigate any underlying infection such as hepatitis B, hepatitis C, HIV etc.), renal, thyroid, and hepatic function tests to examine any underlying disorder or impact, investigation of inflammatory markers and haematology will help to determine any systemic infection, and a full blood count (which will include white cells) to determine any potential haematological disturbance such as anaemia, neutrophilia, and thrombocytopaenia (see Table 3).

In suspected allergic reactions, including food allergies, a RAST (radioallergosorbent) test or Allergen-Specific IgE screen can be taken. Minor allergies can often be treated with topical treatments and/or antihistamines. Should the patient present with any red flag of anaphylaxis however this should be treated as a medical emergency.

Other investigations

While beyond the scope of a general ACP, more specialist investigations such digital dermatoscope, tomography, microscopy, biopsy, and wood light examination may be required but are undertaken by those experienced in the field of dermatology, if any of these investigations are required the patient should be referred to their local dermatology service.

It would also be worth noting radiological exams are rarely utilised in the diagnosis of skin conditions, they may however be used where an underlying disease or disorder is suspected.

Principles of Therapy

Whilst there is many available therapies we will cover a few basic and common treatments in this clinical review. This will include those which the ACP themselves may be able administer or commence, and a brief look at some that the ACP may be asked to explain to or discuss with their patient. Having some knowledge of treatments outside the scope of practice for the ACP can allow them to have an informed discussion with their patient, potentially allaying fears and supporting good onward referrals.

Topical therapy

Topical therapy are those treatments which are applied to the skin externally and often a simple and non-invasive treatment for skin complaints. Their effect can be either local or systemic and can be suitable for a wide range of skin conditions such as acne, insect stings, pre-cancerous lesions, infections, and inflammatory process. Patients (in particular children) may find topical therapy more acceptable than oral medications. Topical therapies range from creams and ointments to dressings and patches as seen in Figure 1. Some of the benefits and disadvantages of topical therapy are outlined in Table 4 discussing these with the patient prior to commencing treatment may assist in the adherence of treatment. Topical corticosteroids are divided into different levels of potency: mild, moderate, potent, and very potent (BNF 72, 2016). The choice of topical steroid will be informed by the severity of condition: mild eczema for example requiring a mildly potent topical corticosteroid (eg. Hydrocortisone 0.1%, 0.5%, 1.0%, or 2.5%) and conditions like severe eczema a moderately potent topical corticosteroid such as betamethasone dipropionate 0.05% or betamethasone valerate 0.1%. Very potent topical steroids are usually only prescribed by specialists (National Institute for Health and Care Excellence, 2021). Stepping up or down of potency will be secondary to the response to current treatment, for example a patient experiencing worsening flare of eczema despite treatment may require a step up to a higher potency, and Bewley (2008) suggest that this guidance should be provided to the patient within a patient information leaflet.

Finger-tip Units

Finger-tip Units (FTU) are a measurement of topical steroid as squeezed from a standard tube (with a standard 5MM diameter nozzle) onto an adult index fingertip from distal crease

to tip of finger (Long and Finlay, 1991). When body mapping for application of steroid one FTU is roughly the amount required to treat about 2% of the total body surface area (TBSA) of an adult which can be calculated using the palmer method: one flat palmer surface of an adult patient's hand is equivalent to 1% of TBSA (Nagel and Schunk, 1997). 1g of topical steroid would be the same as two FTUs. The ability to assess TBSA and amount of topical steroid required can aid in in prescribing that is cost effective and ensures that the patient receives as adequate amount of medication. Use of a body mapping diagram can assist in raising staff and patient awareness of areas where the application of steroid is required.

Oral/IV Therapies

This is the group of therapies that are taken orally or through the intravenous route including antibiotics and steroids. These are usually prescribed following a thorough review and with the availability of blood results and /or microbiology results.

Antibiotics base the treatment for bacterial infections and unless the infection is not severe then the oral route is normally adequate. Antibiotics can treat a wide range of bacterial skin conditions (Sukumaran & Senanayake, 2016). Consultation with local formularies, where available, and the latest BNF edition can assist in supporting safe and appropriate prescribing decisions.

Steroids can be useful in the treatment of skin conditions that are secondary to conditions such as vasculitis, inflammatory diseases, and autoimmune disorders. Whilst they can be given orally the topical route is preferred whenever possible to reduce the risk of side

effects. Long term steroid use should be avoided if feasible (Coondoo, Phiske, Verma, & Lahiri, 2014).

Conditions such as psoriasis can in severe presentations be treated effectively with either immunosuppressants or biologics (often seen in the treatment of rheumatoid arthritis or Crohn's disease). Eczema and atopic dermatitis may benefit from the initiation of an enzyme inhibitor, these work by fighting inflammation through suppression of an immune system enzyme.

Acne is one of the most common presentations and occurs in over 80% of teenagers in the United Kingdom (Purdy & Deberker, 2008). Treatment options can range from topical steroids in mild presentations (with less than half of face, back, and chest affected), to topical retinoid, antibiotic, or benzoyl peroxide in combination with oral antibiotics in severe disease where all areas are affected, highly inflamed, and display many nodules and cysts (Onselen, 2017). NICE (2020) offer discussion and patient information around topics such as facial cleansing and diet as essential steps within management of a patient presenting with acne in a primary care setting. Whilst the prescribed interventions are important it is worth considering the psychological impact of acne and the risk or depression (Onselen, 2017).

Phototherapy

Another treatment option is Phototherapy. Also commonly known as light therapy, this is a non-invasive therapy where ultraviolet (UV) light is used to help reduce or control (rather than aiming to cure) symptoms of some skin conditions such as eczema, vitiligo, and

psoriasis. However this is a treatment that would normally be beyond the scope of the ACP to instigate and would follow specialist dermatology review.

Treatment is often several times a week for a period of months and is provided typically in a clinic or hospital environment. Initially the skin may be sensitive and care should be taken to reduce any further UV exposure outside of treatment. Whilst considered a low risk therapy some side effects such as erythema, stinging or burning, and localised skin changes can occur (Davies et al, 2017). In patients presenting with erythema and burning secondary to phototherapy (usually within 4-6 hours of treatment) a topical steroid should be applied and contact made with treatment provider (Singh et al, 2016).

Photodynamic Therapy (PDT)

This type of therapy is used in the treatment of abnormal cells. Initially a light-sensitive medication is given before the patient returns at a later date/time and the area to be treated is subjected to either a lamp or laser being shone onto it. Alternatively some patients may use daylight rather than conventional PDT within their treatment of conditions such as actinic keratoses, reducing the risk of pain associated with therapy (Morton & Braathen, 2018). The therapy can be used in some skin cancers as well as acne and warts. It can cause some discomfort post treatment alongside the risk of altered pigmentation and hair loss (over the treated area). As above this is a treatment option that we need to be aware of as ACP but would be commenced following a specialist dermatology review.

Psycho-dermatology

This is a group of psychological treatments such as mindfulness, cognitive behaviour therapy (CBT), and habit reversal designed to complement other therapies for skin conditions. Stress can have a negative impact on skin health and in turn skin conditions can have a negative effect on both behaviour and mood. As with phototherapy and PDT this is a treatment that would normally often be beyond the scope of the ACP to instigate unless further training in CBT undertaken, and would follow specialist dermatology review but it is important to be aware of this treatment option.

Whilst psycho-dermatology, PDT, and phototherapy are undertaken by specialists in these areas topical and antimicrobial therapies may be commenced by ACPs. Use of local and national guidance can assist in informing the most appropriate choice of therapy, however if there is any doubt about the correct course of action a second opinion should be sought. As with any new presentation or complaint, an ACP must provide support and education to the patient and family. In many situations, the ACP may not be able to provide direct follow up and will be required to ensure that a full consideration of factors post ACP interaction are discussed and topics such as waiting times and worsening advice are explored during the consultation.

Anticipatory Guidance

Patients should be provided with strong worsening advice and informed of any red flags to observe for. Worrying signs such as lesions anywhere on the skin that will not heal, prolonged or purpuric rashes, and moles that change in appearance, or bleed/crust should be investigated (Lowth, 2016).

If the patient has a carer or guardian they should be provided with the guidance and education required to ensure patient safety and well-being. Patients at risk of skin conditions from underlying conditions should also be provided with the information required to detect these at the early stages, this includes patients with diabetes, vasculitis, and autoimmune disorders. Patients using intravenous drugs should be advised of the risks of poor skin health and educated in how to spot potential complications, and how to gain treatment and investigations.

Patient Education and Health Promotion

Patient education serves a vital role in the maintenance of skin health (Terence, Ryan Steven, Ersser, & Fuller, 2012). This is true for all patients, not just those presenting with a skin complaint. It is imperative that the patient is adequately educated and informed of any treatments commenced including the side effects, the correct administration/application, and any expected outcomes.

Diet plays an important role in skin health and healing (Katta & Desai, 2014). Patients should be provided with both education and support if required to improve their diet and nutritional state. This may on some occasions require a referral to a dietician.
Obesity is linked to a wide range of associated skin conditions such as cellulitis, infections, psoriasis, and hidradenitis suppurativa (Chacon, France, Ledon, and Nouri, 2013) and weight loss advice and management may be an important step in treating and preventing conditions. Lifestyle choices may also impact on skin health (Addor, 2018) and two of the most common lifestyle factors are smoking and alcohol. It may be appropriate to discuss both smoking cessation options and support for alcohol excess when treating a patient

presenting with a skin condition. Intravenous drug use, as previously mentioned is a risk factor for skin conditions (Lavender & McCarron, 2013) and intervention and support should be provided to those patients who are accepting of this, and the information of the support available to those who are not should they decide to seek it in the future.

It is worth noting that whilst diet, lifestyle, and weight may all impact on skin health some skin conditions themselves can offer a higher risk of other co-morbidities. Psoriasis is one such condition and those patients presenting with psoriasis will have a higher risk of developing conditions such as hyperlipidaemia, diabetes, and hypertension (Aldridge, 2014) and according to Abuabara et al. (2010) these patients have a reduced life expectancy of around five years. Therefore the ACP should take these risks into consideration, ensuring screening is appropriate, and offering health education and promotion.

Other areas of education may involve the patients living arrangements and social interaction. Contagious skin conditions will continue to spread unless all those in close contact have received the appropriate treatment and household environments may also play a role in skin health. Educating the patient on the risk of such environmental factors may prevent recurrence and aid the treatment of their complaint.

Not all ACP will feel comfortable providing education on these topics, knowing their limitations of knowledge is key to ensuring the patient receive appropriate information. Awareness of risk factors and potential areas of further education can inform where the ACP guides the patient

Safety Netting

If there is suspicion that the presenting skin complaint has arisen through self-harm or abuse then appropriate steps should be taken to safeguard the patient. Local policy and guidance should inform the pathway to follow. Poor skin health, as previously mentioned, can have a negative effect on both mood and behaviour. The patient demeanour and any concerns regarding their mental health should be noted during consultation and form part of the treatment plan or interventions should concerns arise.

Referral to Specialists

As indicated in the introduction, dermatology is a complex speciality and often the role of the ACP is not to diagnose or treat but instead to accurately obtain a thorough history and to document finding of their exam to provide strong foundations for the patients care pathway. Referral to a speciality will depend on the findings from history and exam and may include referral to dermatology, tissue viability, and cancer services. As skin ill health may be an indicator to an underlying condition the ACP may find themselves referring to less obvious specialities such as cardiology or infectious diseases.

If the ACP is unsure which pathway in which to send the patient advice may be obtained from specialities prior to referral.

Conclusion

Overall as ACP roles continue to increase and work more autonomously then the level of knowledge required has also increased. However, skin despite being a common presenting compliant, this is an area ACP's feel less confident to diagnose and treat. This clinical review has discussed the decision making, investigations and treatment options for skin conditions that is key for ACP's to considering when caring for patients with these presentations. Basic

investigations and treatment can be initiated and carried out by ACP's in various settings. However these require ACP's to have a good understanding of investigations and treatment options as well as aspects of education and safety netting to provide support to patients and families who are faced with a skin condition. These domains have been covered in the article to provide ACP's with a foundation to develop their practice knowledge and understanding of skin conditions and treatments.

Key points

- Understanding treatments and investigations can alleviate patient anxiety and increase concordance when treating skin conditions.
- Patient education can be key to early intervention and prevention of skin conditions.
- Skin conditions can have a negative impact on mental health and well-being.
- Skin conditions may be secondary to underlying disease and infection.

Reflective Questions:

1) Reflect on your own knowledge of investigations and treatments and how increasing this may improve patient care.
2) Consider common presentations and which conditions you might mimic them.
3) Think about your role in patient education and your wider knowledge of that may assist in providing this.

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