Peter Harrington and Joe Gallagher
report on a project that focused on improving asthma care with limited resources in Malawi

Asthma care: finding the right ingredients

IF YOU ASK AN IRISH PERSON to bake a cake, they're likely to Google a recipe and purchase the relevant ingredients. If you ask a Malawian to bake a cake, they're likely to first establish what ingredients are available in the cupboards.

One of our sadder moments in Malawi, where we are part of a primary care health partnership involving our practice in Gorey, Co Wexford, was listening to a clinical presentation on asthma by Rose, a young clinical officer, in advance of the hospital grand rounds. She spent a lot of effort on an excellent PowerPoint presentation, which she had diligently tapped out on her smartphone. All was going well until she presented the therapeutics of asthma. She spoke accurately about the workings of leukotriene antagonists, LAMAs and LABAs among others. Her audience, comprising clinical officers, nurses and doctors, did not interject as she moved on to discuss the previous night's admissions.

So why the sadness? What Rose knew, and what all her audience knew, was that these drugs were not available in her institution and were not likely to be available anytime soon. Rose, unfortunately, had Googled her recipe instead of looking in her cupboards.

St John's Hospital Mzuzu, and Mzuzu Central Hospital had asked for the help of the Gorey Malawi Health Partnership to improve their asthma management, leading to the signing of a formal memorandum of understanding in June 2018. Malawi is one of the world's poorest countries; it is now struggling like other low-income countries, with an emerging epidemic of chronic non-communicable disease which it lacks the expertise to manage. Ironically, the skills being harnessed by the HSE in the new GP deal in Ireland are exactly the skills in demand in Malawi today, and they are general practice skills.

Table 1: Availability of asthma resources at St John's Hospital Mzuzu

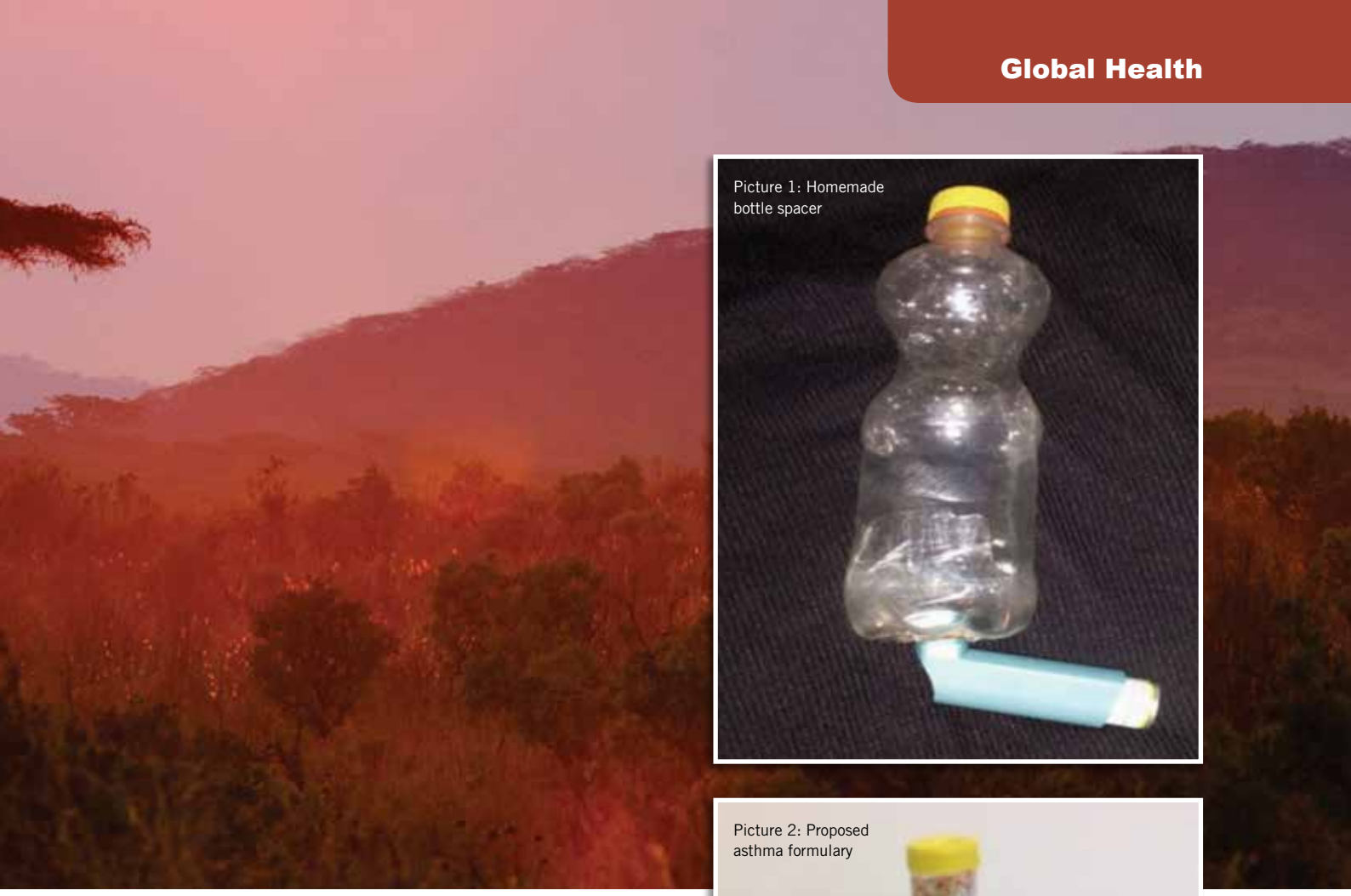
ALWAYS AVAILABLE	SOMETIMES AVAILABLE
Salbutamol tablets	Salbutamol inhaler
Aminophylline IV and tablets	Salbutamol nebules
Prednisolone tablets	Nebuliser
Dexamethasone tablets	Nebuliser masks
Hydrocortisone IV	Beclomethasone inhaler
Adrenaline SC	Spacer devices
Magnesium sulphate amps	
IV and oral antibiotics	

Sodium cromoglycate inhalers were not available

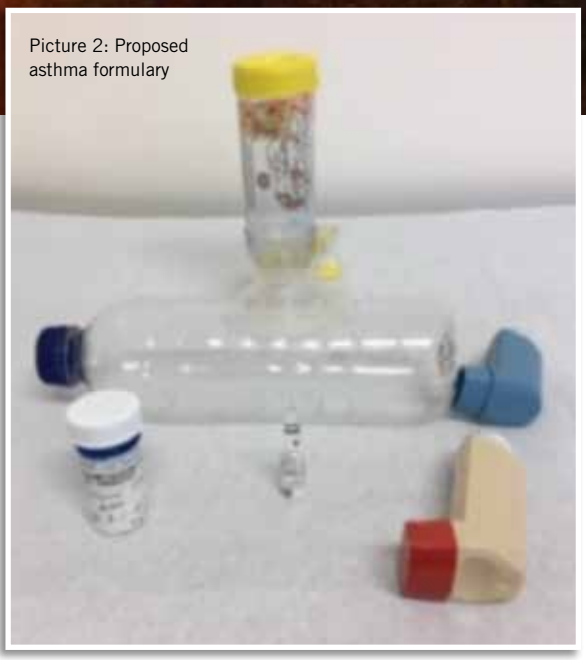
Present asthma management practice

Like any good audit cycle, the most important initial step is to establish exactly what the present practice is in the Malawian institutions in question. We carried out a needs assessment to establish present practice in asthma management and to gather baseline data on current diagnostic and management strategies. We took a look inside the pharmacy to establish what drugs Rose might have to hand for managing asthma patients. *Table 1* shows the drugs recommended in the Malawi Standard Treatment Guidelines listed in columns according to the likelihood of availability in the hospital pharmacy.

It is clear that those managing asthma are unable to rely on a guaranteed supply of inhaled medication. Salbutamol and theophylline tablets are the usual medications taken by outpatients with asthma. A salbutamol inhaler is occasion-



Picture 1: Homemade bottle spacer



Picture 2: Proposed asthma formulary

ally prescribed but there is no tradition of inhaled steroids to prevent relapse. It is not entirely surprising therefore, that a recent national household survey in Malawi found that 10% of patients deeming themselves to be asthmatic required hospitalisation over the previous 12 months.[1]

Among patients needing admission, we found overuse of intravenous steroids and aminophylline, the latter of dubious therapeutic value. Patients were frequently commenced on parenteral antibiotics including cephalosporins – unlikely to be of value in the absence of coexisting pneumonia. Curiously, there is no tradition of using magnesium sulphate despite its easy availability on the labour ward for treating eclampsia. This drug is extremely useful in the management of severe acute asthma that is unresponsive to bronchodilators. It now sits in the acute drug bag at our practice centre in Gorey as a treatment option, either intravenously or by nebuliser – learning is a two-way process.

Most of the time in Malawi some form of bronchodilator was available, usually salbutamol by nebuliser. However, spacer devices were in short supply and paediatric spacer devices were heavily improvised.

The Malawi Standard Treatment Guidelines do not make mention of ipratropium, which is surely a valid option for patients unresponsive to salbutamol or those with coexisting COPD. They also list sodium cromoglycate as a possible preventer drug for asthma, although it is likely to be more expensive and substantially less beneficial than inhaled steroids.

Suggested quality measures

We proposed the following:

- Accurate measurement of asthma activity at the hospital – admission, readmission and death rates
- Supply of reliever inhaler +/- spacer for all symptomatic asthma patients
- Supply of preventer inhaler (beclomethasone) +/- spacer for more severe cases or patients at risk of rapid deterioration
- Prescription of oral prednisolone to keep at home for flares among patients admitted with a severe asthma attack, or those at greater distance from the hospital
- Structured clinical review, incorporating assessment of inhaler technique, for all symptomatic patients.

Intervention

We proposed a multifaceted intervention. With support from a local benefactor, Maria Medical Technology in Gorey, we secured enough funding to sponsor the salaries of three half-time clinical officers in the two institutions. Clinical officers are non-physician healthcare workers and

Table 2: Results of first audit cycle

	Six months before intervention	After six months of intervention
Admissions	42	15
Re-admissions	4	0
No of exacerbations	N/A	67
BASELINE MEDICATIONS		
Salbutamol tablets	N/A	44
Salbutamol inhaler	N/A	5
Oral aminophylline	N/A	10
No regular medication	N/A	8
Beclomethasone inhaler	N/A	0
DISCHARGE MEDICATIONS		
Salbutamol inhaler	N/A	66
Beclomethasone inhaler	N/A	66
Aminophylline	N/A	0
Salbutamol tablets	N/A	0

are the backbone of the acute hospital system throughout most of the developing world. They are trained in four years and spend the first three years learning didactically and the last year in clinical training. This clinical training has an extensive surgical component; it prepares them for their future work in district hospitals and health centres where there are often no doctors, and so they are the senior medical decision makers.

Each clinical officer was charged with driving the proposed initiative at their own institution, educating other clinicians involved in asthma care and ensuring as close as possible adherence to protocol. We supplied laptops for them to compile a register of all patients with asthma and COPD attending the hospital.

We proposed a simpler and more effective drug formulary focusing particularly on the use of inhaled medication based on current best evidence. This emphasised the use of spacer devices rather than nebulisers and bottle spacers where possible to keep costs down. There is strong clinical evidence that correctly manufactured homemade bottle spacers are as effective as commercially available spacers in the delivery of inhaled medication for asthma *(see Picture 1).*

We suggested omitting the use of oral theophyllines, oral salbutamol and intravenous theophyllines from the formulary and highlighted the overuse of antibiotics in the absence of coexisting pneumonia. We facilitated an in-person workshop focusing on the motor skills involved in an inhaler-centred asthma service. Clearly, in a country with only 15% electricity penetration, it is unwise to rely on the delivery of bronchodilator by nebuliser. In a nutshell, we proposed that the asthma formulary would consist of salbutamol and beclomethasone inhalers, oral prednisolone and intravenous magnesium sulphate, and two types of spacer *(see Picture 2)*. This form of watertight formulary will be particularly important in more rural locations, where availability of electricity is low and healthcare workers are likely to have had lower levels of training.

We supplied a spirometer to each institution to more accurately identify those suffering from COPD. We introduced a structured review clinic for symptomatic patients following discharge to assess compliance and inhaler technique. We produced an ink stamp for the patient's hand-held record, emphasising the areas to be covered at a review visit. Finally, we continued to mentor our clinical officers remotely from Gorey using web-conferencing technology.

Audit cycle one

The results of our first audit cycle from St John's Hospital Mzuzu, incorporating six months of admission data ending January 2019 are outlined in *Table 2*. Sixty-seven patients attended during the study period. At baseline 44 patients were taking salbutamol tablets, five were on a salbutamol inhaler, 10 were on oral aminophylline and eight were on no regular medication. None were using a beclomethasone inhaler. There was no regular follow-up of patients. Following the intervention, 66 patients were on a salbutamol inhaler and beclomethasone inhaler – one patient refused this intervention. We should acknowledge that the numbers involved are small and that the six months under study may not be directly comparable with the previous six months in terms of circulating respiratory pathogens. However, the results demonstrate a substantial fall in admissions from 42 to 15 and readmissions from four to zero following the move to an inhaler-based service.

Forty patients (60%) came for review on the appointed date, 10 patients (15%) came but not on the appointed date as they had no funds for transport. Seven patients (25%) did not come for review. Follow up was made via phone call for 17 patients. Nine patients reported that they did not have the means to attend and eight stated that they were feeling well and would only come return when feeling unwell.

Next steps

The choice of asthma as the first non-communicable disease for focus has demonstrated both to us and to our Mzuzu colleagues the viability of this type of intervention. There is a significant amount of work to be done in the management of hypertension, heart failure and diabetes among other conditions. Irish GPs and practice nurses can make major contributions to healthcare in Africa by partnering with colleagues using modern technology such as Whatsapp and Zoom and using their practical expertise to develop sustainable solutions.

We wish to acknowledge the hard work by clinical officer Hastings Gondwe at St John's Hospital, Mzuzu, whose work drove this intervention, and the support we received from our collaborators and supporters in academic institutions and elsewhere.

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Reference
1. Malawi – Fourth Integrated Household Survey 2016-2017. Available at www.microdata.worldbank.org

This article is based on a presentation to the AUDGPI/RCSI Scientific Meeting 2019 by Peter Harrington, Joe Gallagher, Hastings Gondwe, Chris Watson and Mark Ledwidge