APPSA Journal

Association for Peri-operative Practitioners in South Africa

Vol 7 Issue 1 Feb 2021

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- APPSA is a non-profit organisation which exists for the benefit of its members. This is accomplished by way of congresses, local meetings and travel grants, with the express goal of raising the standard of peri-operative practice in South Africa

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  Tel: 051 436 8145
  Fax: 086 275 2869
  Email: congress@internext.co.za

  Banking details:
  SA Theatre Nurse
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  Tel: 051 436 8145
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Association for Peri-operative Practitioners in South Africa

EDITOR:
Mrs Madeleine Hicklin

PRESIDENT:
Mrs Marilyn de Meyer

VICE-PRESIDENT:
TBC

TREASURER:
Mrs Marianne Oosthuizen

LAYOUT:
Carma Design
Tel: 072 825 3124
email: carma@gonet.co.za

PUBLISHED BY:
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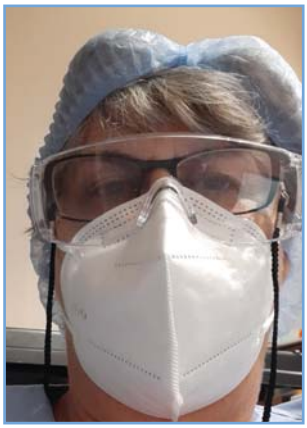


From The PRESIDENT

I would like to take the opportunity to wish every APPSA member a better year in 2021 than the one we experienced in 2020. I cannot actually believe so many of us made it out - albeit in a completely different state to the way in which we went into 2020. I think everyone had so much hope for the beginning of last year ...

Well, we have started 2021 with a 'bang': we are still in the grips of the COVID-19 pandemic and many of us are truly exhausted, despite having had leave over December. But even that was a surreal experience: we moved into the December holidays with all our beaches, rivers and dams largely closed and the country was in Lockdown Level 3. We had all looked so forward to a holiday, a breather, where we could just relax and enjoy the sunshine. Even that did not happen. We had to cancel all our plans and stay home due to the heavy up-swing in the number of people being infected with COVID-19 as the anticipated 'Second Wave' hit us far earlier than we had anticipated. Times were really tough and many were fighting for their lives. Even now, COVID-19 is still very much among us. Our deepest condolences to those who lost loved ones to this pandemic. Many have also lost colleagues and we, ourselves, were fighting the very virus that took those colleagues from us. We fought for survival. To those of you who are still fighting, we wish you a speedy recovery. Hopefully, before the end of the year, we will be in a position to see each other face-to-face and exchange our 'war stories' as of old.

While our country's infection numbers soar past the 1-million mark, we have to ensure we are there for each other. This is where APPSA becomes so important. We are the voice for all peri-operative practitioners in South Africa; we are the most tenacious advocates for our patients - holding their lives in our hands. Despite all gatherings being forbidden under the adjusted Lockdown Level 3 regulations, APPSA stands ready to jump into action the minute we are legally allowed to. In the interim, please reach out to your APPSA Chapter Presidents. Keep us informed of how you are doing - physically and emotionally. APPSA is a family and we care about each and every one of our family members.

That being said, we need to ensure that we protect ourselves and those we care about. Be strong and stay focused on what you have to do - every single day. Observe the rules and stick to the regulations that keep you safe:

- Wear your mask
- Keep a safe social distance
- Engage in vigorous and frequent hand washing/alcohol rubbing and hand hygiene

Let's look forward to new beginnings this year, and make them a reality. Until we can meet again in person, stay safe, stay blessed and be strong.

Marilyn de Meyer

From The EDITOR'S DESK

HAPPY 2021!

I am sure many of you are ready to push this journal to the kerb because I wished us all a Happy 2021 while we are still in the grips of a pandemic. But, I'm asking you to indulge me.

In life, we cannot always control WHAT happens around us, but we can control HOW we respond to what is happening around us. I am CHOOSING to be HAPPY in 2021. That doesn't mean I am mad, or that I am blind to the situation around me. Far from it.

Like many of us, my 2020 was marked by periods of extreme desperation and depression, paralysing terror, and fear of the unknown - and panic. I am not only involved in the healthcare arena because of my involvement with APPSA and my commitment to ensuring that the voices of peri-operative practitioners are heard in South Africa, I am also the mother of a doctor in charge of a COVID ICU in a state hospital. I heard my son cry more times than I heard him laugh last year. And he got COVID - twice. But I am a lucky 'survivor' because my son is still around to tell the tale. Although he was a statistic, he is still here for me to talk to and engage with. For over 49 000 families who have lost one or more family members to COVID, life will never be the same again. The loss of a loved one is so difficult to come to terms with.

This is why I have actively chosen to ensure that, at least once a day, I MAKE a reason to be happy. Even it if is only when I look at my dogs' faces when I get in from a meeting. Their unconditional love always lifts up my spirits. There are so many 'cheesy' comments about being positive and how it changes things, but the one that does spring to mind is this one:

Your mind is a powerful thing. When you fill it with positive thoughts, your life will begin to change.

Think about that for a minute. I am not asking you to forget about COVID, or forget about the stresses you have at work - healthcare workers, peri-operative practitioners such as yourselves, work in one of the most stressful environments any human being can work in. Patients' lives are literally in your hands. Life is terribly stressful. Work is terribly stressful. And add COVID into the mix ....

What I am asking each of us to do is invite positivity into our hearts and into our minds - and watch the difference it makes. It won't end the stress, but it will make the day a little easier to cope with. If we want to find things about which to be negative, it's easy. But my message to you is: choose to find things about which to be positive. See and feel the difference it makes.

Until we chat again, choose to be positive and happy. It will make the world of difference to you.

Madeleine Hicklin

HOW SOUTH AFRICA'S VACCINE EFFORTS
Compare With Other African Countries

By Drs Heinrich C Volmink and Wilmot James

South Africa's efforts in terms of vaccine acquisition and rollout planning have followed a challenging path

CONTINENTAL EVALUATION

Universal access to COVID-19 vaccines must remain a critical goal if we are to win the battle against the disease. However, despite laudable calls for an equitable global rollout, vaccine nationalism appears to have the upper hand for the moment. While it is hoped that an eventual 'course correction' will cause a return to a co-ordinated global effort aimed at a fairer rollout, from a global health perspective it is important to assess where individual countries stand in terms of their COVID-19 vaccination plans, especially those in Africa.

Research led by a Columbia University/Brenthurst Foundation team as part of the Futures Forum on Preparedness (organised by Schmidt Futures) and released recently includes an analysis of five large countries on the continent, namely Egypt, Ethiopia, Kenya, Nigeria and South Africa. Together, these countries represent about 40% of the continent's population and more than half of its GDP. A combination of early efforts to secure vaccine doses and pre-existing manufacturing capacity (in the form of Vacsera, one of only a few vaccine manufacturers on the continent) has placed Egypt in a favourable position. Agreement was reached in 2020 regarding future access to Russia's Sputnik V vaccine, and more recent negotiations may result in the acquisition of doses of both the Pfizer/BioNTech and Oxford/AstraZeneca vaccines.

In September 2020, agreement was reached between Vacsera and Sinopharm to conduct vaccine trials in Egypt. Egypt reportedly received its first batch of 50 000 doses of the Sinopharm vaccine in December, and is in line for an additional 40-million doses. After approval by the Egyptian Drug Authority, the Sinopharm vaccine will start to be rolled out as part of a phased plan later in January, according to Egyptian Health and Population Minister Hala Zayed.

Ethiopia appears to be in more difficult position. Political instability, including the Tigray conflict, has placed the country under substantial strain, which will undoubtedly weaken its health system. A combination of early efforts to secure vaccine doses and pre-existing manufacturing capacity has placed Egypt in a favourable position. Ethiopia's participation in the Covax equitable access initiative is crucial; it was found in an analysis undertaken by the Duke Global Health Innovation Centre that the country may have to rely on Covax for vaccine coverage of 20% of its population.

Ethiopia does appear to have a degree of readiness with regarding distribution. It was recently able to complete a measles campaign that reached 15-million children despite the COVID-19 pandemic, and proactive steps have been taken by a range of stakeholders in the country, including private sector networks, regarding future Covid-19 vaccination logistics.

Kenya's participation in vaccine trials may, like Egypt, prove to be an important factor. It actively participated in trials related to the Oxford/AstraZeneca candidate vaccine, with support provided in-country via the KEMRI/Wellcome Trust Research Programme. The Kenyan government recently announced it had ordered 24-million doses of the Oxford/AstraZeneca vaccine, which could arrive in February. If this transpires and distribution takes place without too many hitches, it would cover a considerable proportion the country's population of about 54-million. Additional doses of vaccines could also be acquired through the country's participation in Covax. The government has indicated that it is developing vaccination guidelines, including a prioritisation strategy, but these are not yet publicly available.

In Nigeria, the federal government responded proactively to the pandemic through the establishment of the presidential task force on COVID-19. Considerable capacity is also available in terms of existing government agencies - the National Agency for Food and Drug Administration and Control is prepared to fast-track regulatory assessment processes related to COVID-19 vaccines; the National Primary Health Care Development has successfully conducted large-scale programmes for other vaccine-preventable diseases in the past; and the Nigeria Centre for Disease Control, under the exceptional leadership of Dr Chikwe Ihekweazu, has substantial institutional memory that can be leveraged for COVID-19 vaccine rollout planning. There are two vaccine manufacturers in the country, Biovaccines Nigeria and Innovative Biotech Nigeria, both of which could boost vaccine production.

CHALLENGING PATH

Despite these advantages, Nigeria has had problems regarding vaccine access. It appears largely reliant on Covax for what, in the first instance, could only be enough doses for 20-million people, enough to cover just fewer than 10% of its population. Early discussions under way between the Nigerian government and vaccine producers in Russia, China and the UK may result in access to much-needed additional doses.

South Africa's efforts in terms of vaccine acquisition and rollout planning have followed a challenging path. The establishment of the ministerial advisory committee on coronavirus vaccines in September was a good first step, creating the potential for co-ordinated planning guided by experts. South Africa also has pre-existing vaccine manufacturing capability in the form of the Biovac Institute, a public-private partnership, and possible future manufacturing capacity through an agreement entered into between Johnson & Johnson and South African-based Aspen that could translate into greater access for the country.

Despite these encouraging developments, there have been significant setbacks. This includes apparent early difficulties providing a down payment to Covax to secure future doses for 6-million people, about 10% of the population (the payment was eventually made) as well as sharp criticisms over the initial lack of a clear COVID-19 vaccination plan.

INEQUALITY OF ACCESS

Recent positive steps have bolstered the country's efforts, including the release of a COVID-19 vaccine rollout strategy on 03 January 2021 and an announcement that the country would obtain 1.5-million doses of the Oxford/AstraZeneca vaccine, due to arrive before the end of

January. Furthermore, during an address on 11 January 2021, President Cyril Ramaphosa announced that South Africa had secured 20-million vaccine doses for distribution mainly in the first half of 2021.

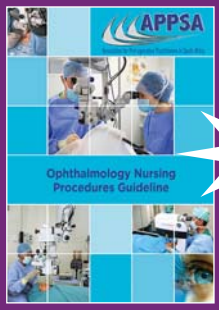
The ability of these five countries to acquire COVID-19 vaccines, and their respective readiness in terms of vaccine rollouts, is varied. The common obstacle faced by all relates to the underlying inequity of access to vaccines. A renewed commitment to a fairer global rollout by, for example, rallying around the People's Vaccine initiative and advocacy of COVID-19 vaccines as a global public good, is perhaps what is most urgently needed, not just for these countries but the continent and global community as a whole.

There is also the further challenge of vaccine resistance to overcome. The Wellcome Trust Monitor established in 2019, before COVID-19 descended on the world, reports that as much as three-quarters of Africans believe vaccines are safe and effective, a much better figure than in the USA, for example.

COVID-19 is certain to have affected attitudes, both positively and negatively, if one carefully examines the social media traffic. Hard work therefore lies ahead in persuading citizens, more in some countries than others, that taking vaccines will accelerate our journey to achieving herd immunity and a return to normal life for all.

Dr Volmink is a Johannesburg-based public health medicine specialist and Dr James a senior research scholar at Columbia University in New York. This article first appeared in Business Day on 17 January 2021 and appears courtesy of the newspaper and the authors.

APPSA GUIDELINES



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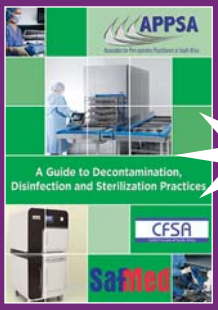

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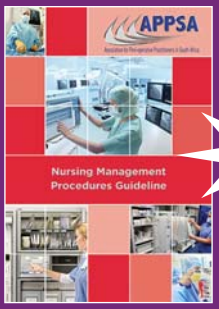

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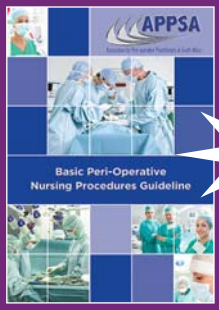

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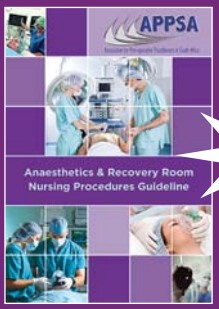

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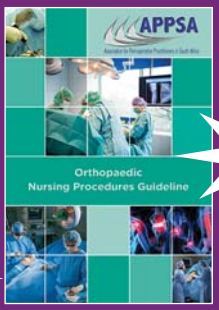

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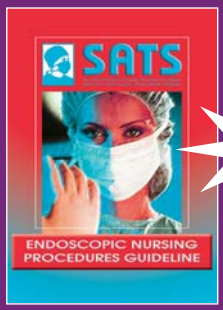

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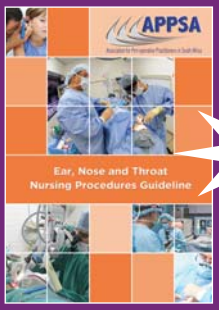

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KN95 FILTERING FACEPIECE RESPIRATORS DISTRIBUTED IN SA

Fail Safety Testing Protocols

By L Mottay,[1*]; J le Roux,[1,4*]; R Perumal,[1]; A Esmail,[1]; L Timm,[4]; S Sivarasu,[4]; K Dheda,[1,2,3]

BACKGROUND

Given the global shortage of N95 filtering facepiece respirators (FFP2 in Europe) during the COVID-19 pandemic, KN95 masks (Chinese equivalent of the N95 and FFP2) were imported and distributed in South Africa. However, there are hardly any published independent safety data on KN95 masks.

OBJECTIVES

To evaluate the seal, fit and filtration efficiency of several brands of KN95 masks marketed for widespread use in South African healthcare facilities, using standardised testing protocols.

METHODS

The verifiability of manufacturer and technical details was first ascertained, followed by evaluation of the number of layers comprising the mask material. The testing protocol involved a directly-observed positive and negative pressure user seal check, which if passed, was followed by qualitative fit testing (sodium saccharin) in healthy laboratory or healthcare workers. Quantitative fit testing (3M) was used to validate the qualitative fit testing method. The filtration efficacy and integrity of the mask filter material were evaluated using a particle counter-based testing rig utilising aerosolised saline (expressed as filtration efficacy of 0.3 µm particles). Halyard FLUIDSHIELD 3 N95 and 3M 1860 N95 masks were used as controls.

RESULTS

Twelve KN95 mask brands (a total of 36 masks) were evaluated in seven participants. The mask type and manufacturing details were printed on only 2/12 brands (17%) as per National Institute of Occupational Safety and Health and European Union regulatory requirements. There was considerable variability in the number of KN95 mask layers (between three and six layers in the 12 brands evaluated). The seal check pass rate was significantly lower in KN95 compared with N95 masks (1/36 (3%) v. 12/12 (100%); $p<0.0001$). Modification of the KN95 ear-loop tension using head straps or staples, or improving the facial seal using Micropore 3M tape, enhanced seal test performance in 15/36 KN95 masks evaluated (42%). However, none of these 15 passed downstream qualitative fit testing compared with the control N95 masks (0/15 v. 12/12; $p<0.0001$). Only 4/8 (50%) of the KN95 brands tested passed the minimum filtration requirements for an N95 mask (sub-optimal KN95 filtration efficacy varied from 12% to 78%, compared with 56% for a surgical mask and >99% for the N95 masks at the 0.3µm particle size).

CONCLUSIONS

The KN95 masks tested failed the stipulated safety thresholds associated with protection of healthcare workers against airborne pathogens such as SARS-CoV-2. These preliminary data have implications for the regulation of masks and their distribution to healthcare workers and facilities in South Africa.

INTRODUCTION

The COVID-19 pandemic caused by SARS CoV-2 has claimed almost - million lives since its emergence approximately a year ago[1]. Healthcare workers face a disproportionate burden of both morbidity and mortality as a result of occupational exposure, which may also result in nosocomial transmission of COVID-19 by healthcare workers and diminished capacity of health-care systems. Indeed, 20% of all cases of Middle East Respiratory Syndrome (MERS) and 20% of all Severe Acute Respiratory Syndrome (SARS) cases globally occurred in healthcare workers, 10% of whom lost their lives[2,3]. Healthcare workers are at least three times more likely than the general public to become infected with SARS-CoV-2, even after accounting for other risk factors and their greater access to testing[4].

Infection in healthcare workers may be mitigated by a variety of strategies including triaging and administrative controls, environmental controls including good ventilation and ultraviolet germicidal irradiation, and use of personal protective measures and equipment, including protective masks. Use of filtering facepiece respirators (FFRs) has been shown to mitigate the SARS-CoV-2 infection risk in healthcare workers by as much as 86%, especially if used during high-risk aerosol-generating procedures[5,6]. However, there has been a worldwide shortage of high-quality, regulatory-approved and authentic FFRs owing to a combination of factors including disruption of the global supply chain, increased demand, inequitable distribution, and unethical practices of hoarding, misuse, price gouging and export blocking[7].

The N95 mask (FFP2 in Europe) has remained the primary mode of respiratory protection in most parts of the world because of the high regulatory standards to which it is manufactured[8]. However, owing to the severe global shortage of N95 masks during the COVID-19 pandemic, there has been a growing demand for N95-like FFRs. The most commonly available substitute for the N95 mask has been the KN95 mask, which is mainly manufactured in China to the GB2626-2006 standard, and which is considered equivalent to the N95 by the US Food And Drug Administration (FDA) following Emergency Use Authorisation based on testing of filtration efficacy of the mask material[8].

The manufacture of N95-like masks remains highly regulated in order to ensure that they filter out at least 95% of penetrating aerosol particles ≥0.3μm in diameter, fit tightly to maximise the passage of inhaled air through the filter fabric of the mask, and have low inhalational resistance to minimise breathing difficulty. There has been a growing concern about the quality of the circulating supplies of N95-like masks in many parts of the world, including the circulation of counterfeit masks.

OBJECTIVES

To evaluate the fit and safety of the KN95 mask against available N95 masks.

METHODS

Participants and setting (Fig. 1). We performed an observational study of user seal check and fit test pass rates for both N95 and KN95 respirators in seven healthcare and laboratory workers employed at the Centre for Lung Infection and Immunity at the University of Cape Town, South Africa. The seven volunteers were screened for symptoms of COVID-19 prior to testing, which was conducted in a room with open windows and with the operator wearing an N95 mask. Standard precautions were followed, including hand sanitisation and cleaning of surfaces after testing. The

seven participants, all with prior experience of N95 respirator use, were of Indian (n = 3), Asian (Chinese, n = 1), European (n = 1), black African (n = 1) and mixed (n = 1) ethnicity. The study was approved by the Human Research Ethics Committee of the University of Cape Town (ref. no. 476/2020).

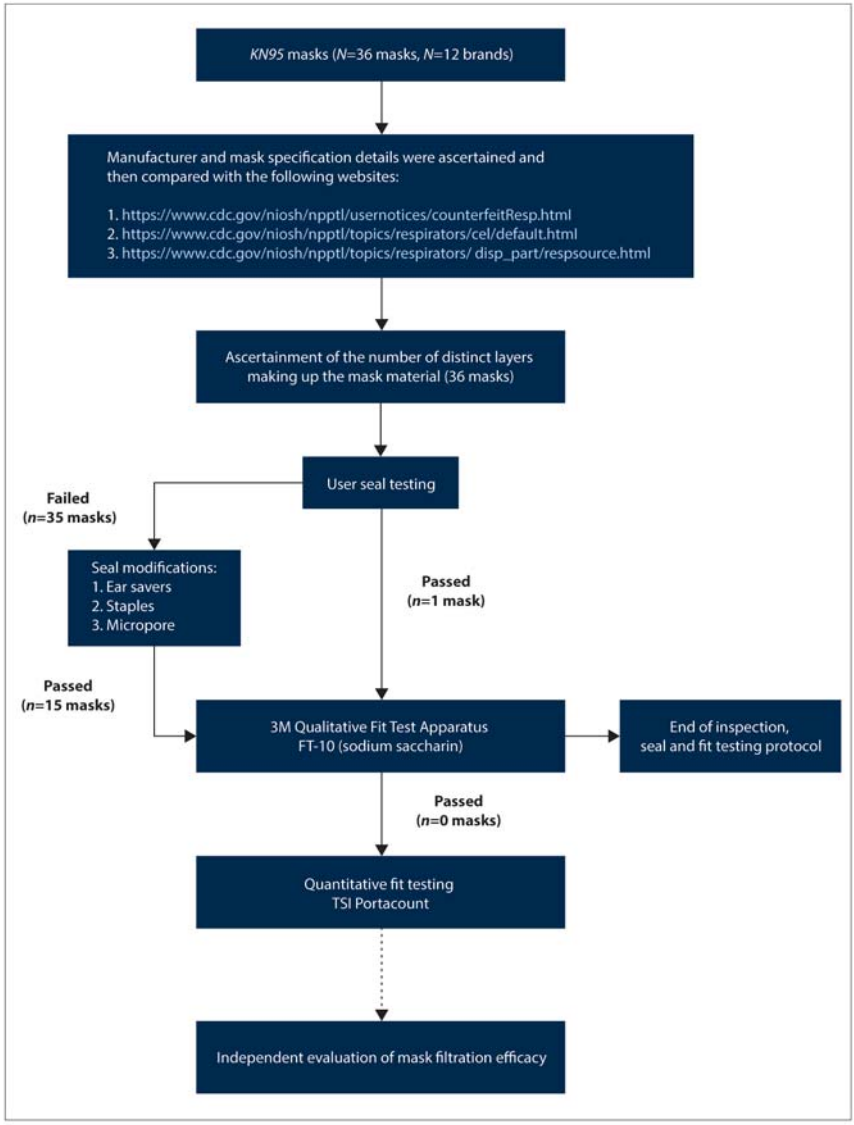

Fig. 1. *Study outline, including the testing protocol used and the number of masks evaluated at each stage.*

MANUFACTURER DETAILS

Twelve brands of KN95 masks were donated for testing by individuals, distributors, or doctors from different hospitals. Each sample was inspected for manufacturer details, which were then compared with the National Institute of Occupational Safety and Health (NIOSH) website (https://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/resources.html), initially on receipt of the mask and thereafter by a second person prior to publication (last checked on 29 September 2020).

EVALUATION OF MASK LAYERS

Each mask was inspected, and the observations were recorded. Thereafter one mask from each brand was cut with a pair of scissors to inspect how many distinct layers the mask comprised.

CONTROL MASKS AND TESTS OF INWARD AND OUTWARD LEAKAGE USING THE SEAL TEST

The N95 respirator brand was selected as the control mask (FLUIDSHIELD 3 N95 Particulate Filter Respirator; Halyard Health, USA). Three masks from each of the 12 brands of KN95 respirators from various manufacturers were evaluated in participants. All participants performed a positive and negative pressure user seal check in accordance with the manufacturer's instructions under direct observation by a pulmonologist.

A user seal check is a self-examination to identify inward or outward leakage through visual and tactile detection of gaps and air leaks between the mask and the wearer's face[9]. Briefly, to check for good fit, the wearer inhaled and exhaled several times to check whether the respirator collapsed slightly upon inhaling and expanded upon exhaling, and whether they could feel any air leaking past the respirator. If the mask failed the user seal test on the first attempt, we allowed two further attempts before making the determination of passing or failure.

MODIFICATION OF KN95 MASKS AND TESTS OF INWARD MASK LEAKAGE USING THE FIT TEST

We also performed modifications to the mask ear loops with head straps (plastic strap with angulated prongs that attempted to improve facial seal by increasing ear-strap tension UCT Hearo Ear Savers, http://www.rci.uct.ac.za/rcips/innovation_achievements/products/hearo), staples or Micropore 3M tape. Masks that passed the user seal check were subjected to qualitative fit testing using the 3M Qualitative Fit Test Apparatus FT-10 (3M, USA), in accordance with the Occupational Safety and Health Administration Standard for Respiratory Protection (29 CFR 1910.134), which was administered by a pulmonologist. Participants with masks that passed a user seal check and a qualitative fit test were invited, according to the protocol, to do a quantitative fit test using a TSI PortaCount Respirator Fit Tester (model 8038; TSI, USA). For all testing stages (seal test, fit test, and the like) the Halyard FLUIDSHIELD N95 respirator was evaluated in parallel as a control. In addition, for the filtration efficacy testing, the Halyard N95, the 3M 1860 N95 Particulate Respirator (3M, USA) and non-sterile surgical masks were used as controls.

EVALUATION OF FILTRATION EFFICACY OF THE MASK FILTER MATERIAL

Eight brands of KN95 masks underwent filtration integrity testing using a closed system (Fig. 2).

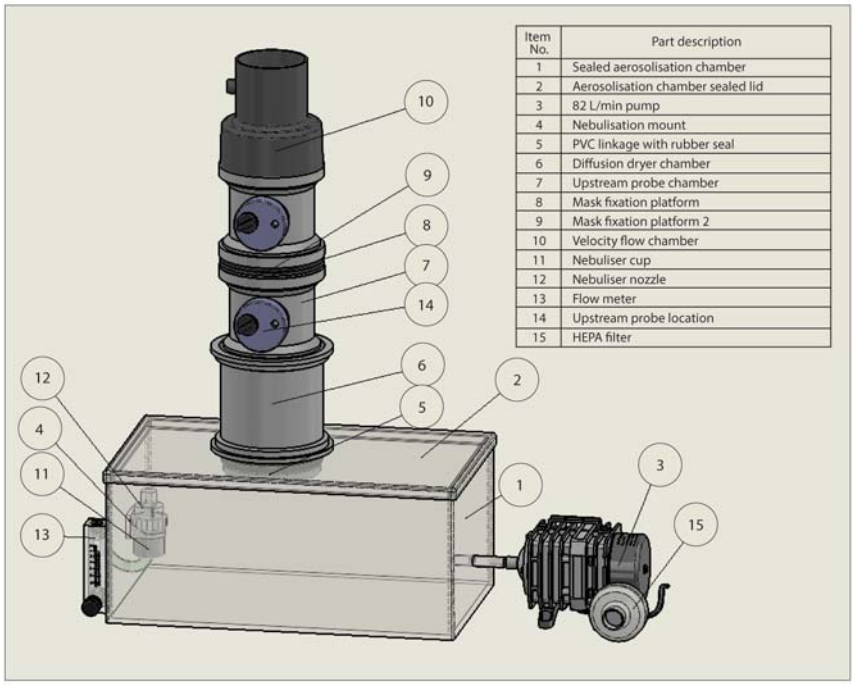

Fig. 2. *Overview of the mask filtration efficiency testing system. The masks were fixed over a cylindrical duct with a inner diameter of 85mm[8, 9]. The nebuliser cup[11] was filled with 0.9% saline solution. Pressurised air from a compressed air source was regulated to 3L/min using a flowmeter[13]. Supplementary air was provided by an 82L/min electromagnetic air pump - the total airflow through the closed system was therefore 85L/min[3] with a HEPA-filtered inlet[15]. Aerosolised particles mixed with supplementary air within the aerosolisation chamber[1] and passed through a diffusion drying chamber[4]. Following a 30-second aerosolisation period, a series of three measurements was taken for one minute each at both the upstream (14) and downstream probing chambers using an optical particle counter (Kanomax Model 3886 GEO α). Velocity flow, temperature and relative humidity were consistently measured using a probe within the exhaust duct. (HEPA = high-efficiency particulate.) The upstream and downstream counts were sampled from one region at one time. Each measurement was repeated three times. Single-pass filtration efficiency was measured as follows*

Both the Halyard FLUIDSHIELD respirator and the 3M 1860 respirator were used as positive controls, and surgical masks were used as additional controls. Different mask samples were clamp-fixed within a cylindrical tube with an inner diameter of 85mm. Normal saline (0.9 % NaCl) was aerosolised using a jet nebuliser (Prime Care Nebulizer Lot 190183; Prime Care, China) at a rate of 3L/min. Airflow (high-efficiency particulate (HEPA) filtered) through the testing apparatus was generated using a HAILEA 328-ACO (HAILEA, China) air compressor, providing a combined flow through the closed system of ~85L/min. After passing through a drying chamber, the aerosolised particles were enumerated using a laser particle counter (Model 3886 GEO α; Kanomax, Japan). One-minute particle counts (of particle sizes 0.3μm, 0.5μm, 1μm, 3μm

and 5µm) were conducted at the upstream and downstream probe locations (Fig. 2). The upstream and downstream counts were sampled from one region at one time. Each measurement was repeated three times. Single-pass filtration efficiency was measured as follows:

$$Filtration\ efficiency\ (\%) = \frac{Upstream\ particle\ count - Downstream\ particle\ count}{Upstream\ particle\ count} \times 100$$

The average filtration efficiency was calculated from the three measurements conducted on each mask. Prior to each measurement, the flow velocity, humidity and temperature were measured by sampling air from the exhaust chamber. The mean (standard deviation (SD)) air temperature prior to each test was 23 (2)°C, with a relative humidity (RH) of 25 (6)%[10, 11].

DATA ANALYSIS

All data were analysed using SPSS software 25.0 (IBM, USA). For all statistical comparisons, a 5% level of significance was used. A $\chi 2$ test was used to assess for differences in the performance of N95 and KN95 masks with regard to the evaluation of mask seal and fit. Descriptive statistics were used to present the mask filtration data.

RESULTS

Participants, mask identifiers and mask layers

Seven healthy volunteers were included in the study; six (85%) were female, and all were healthcare or laboratory workers with prior FFR experience. We selected 12 KN95 brands (a total of 36 masks) from various manufacturers for testing (See Table 1), with each brand tested in three participants. Of the 12 brands evaluated, only eight brands were received in the original packaging, with four brands being received in clear plastic bags. Nevertheless, only two of the 12 brands had the mask type (for example KN95) and manufacturing details printed on each mask as per NIOSH and European Union regulatory requirements[12, 13]. All 12 KN95 brands had malleable metal nose strips and ear loops. One brand had three distinct layers, six brands had four layers, and five brands had five layers.

Table 1. Description of the characteristics and details of the *KN95* respirators evaluated

Identifiable brand	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
NIOSH tested	No	No	No	No	No	No	Yes	No	No	No	No	No
Manufacturer detail provided*	No	No	No	No	Yes	No	No	No	No	No	No	Yes
Number of layers	5	5	5	4	3	5	4	4	4	4	4	5
Ear loops	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Heat sealed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

NIOSH = National Institute of Occupational Safety and Health.
*Refers to the type of mask and manufacturing details appearing on the mask material, in keeping with NIOSH and European Union regulatory requirements.

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Table 2. Summary of results for tests of inward mask leakage

	N95 masks (*N*=12), *n* (%)	*KN95* masks (*N*=36), *n* (%)	*p*-value
User seal check passed on first attempt	12/12 (100)	1/12 (3)	<0.0001
User seal check passed within 3 attempts after modification	12/12 (100)	15/36 (42)	<0.05
Qualitative fit test passed after modification of masks*	12/12 (100)	0/15 (0)	<0.0001

*Head straps, knotting ear loops, and staples that were designed to improve mask seal by tightening the loops. Micropore 3M tape was used to try to improve mask seal.

Table 3. Face mask FE assessments using aerosolised sodium chloride particles

	Single-pass filtration efficiency (%), mean (SD)						
Mask name	0.3 µm	0.5 µm	1 µm	3 µm	5 µm	T (°C)	RH (%)
3M 1860	99.61 (0.12)	99.93 (0.01)	99.97 (0)	99.99 (0.01)	100 (0)	23.8	22.1
Halyard FLUIDSHIELD	99.82 (0.02)	99.94 (0.01)	99.97 (0.01)	99.99 (0.01)	100 (0)	22.6	26.7
Surgical mask	55.64 (5.04)	81.09 (1.72)	91.96 (0.35)	89.07 (14.54)	99.52 (0.02)	24.9	23.6
KN95 #1	97.52 (0.34)	99.64 (0.06)	99.91 (0.01)	99.99 (0.01)	100 (0)	24.6	23.5
KN95 #3	53.40 (5.89)	93.32 (1.18)	98.94 (0.2)	99.93 (0.01)	99.94 (0.10)	25.0	25.9
KN95 #4	41.79 (3.6)	80.66 (1.73)	94.41 (0.53)	99.20 (0.02)	99.94 (0.11)	24.6	17.6
KN95 #5	99.12 (0.17)	99.85 (0.03)	99.95 (0.01)	100 (0)	100 (0)	22.9	20.3
KN95 #7	96.63 (0.51)	99.44 (0.10)	99.87 (0.03)	99.99 (0)	100 (0)	23.7	19.6
KN95 #8	78.49 (1.95)	93.23 (0.32)	97.94 (0.15)	99.61 (0.08)	99.97 (0.05)	22.8	23.8
KN95 #9	12.13 (3.55)	54.47 (2.21)	78.00 (4.47)	93.94 (3.31)	99.15 (0.61)	24.2	28.3
KN95 #12	96.78 (0.36)	99.37 (0.08)	99.82 (0.03)	99.96 (0.02)	100 (0)	23.3	21.4

FE = filtration efficiency; SD = standard deviation; T = temperature; RH = relative humidity.
Explanation of the colour heatmap: green = FE ≥95%; yellow = FE 80 - 95%; red = FE <80%. A minimum of three 1-minute readings was completed both upstream and downstream of the filtration material for each brand tested. All particle sizes were counted simultaneously. Both temperature and RH were monitored but not controlled.

Inward and outward leakage using the seal test

Each participant tested a suitably-sized N95 respirator and three KN95 respirators. In total, 12 N95 respirators and 36 KN95 respirators were evaluated with a user seal check. Performance of the tested KN95 respirators was significantly poorer than the tested N95 respirators when evaluated using a user seal check (1/36 v. 12/12; p<0.0001).

Effect of mask modification and qualitative fit testing

Modification of the KN95 ear-loop tension using head straps or staples, or improving the facial seal using Micropore tape, enhanced seal test performance in 15/36 KN95 masks evaluated (42%). However, none of these 15 passed downstream qualitative fit testing compared with the control N95 masks (0/15 v. 12/12; p<0.0001). The other 21/36 KN95 respirators did not pass a user seal check and could not be evaluated further by a qualitative fit test (See Table 2).

Filtration efficacy of the mask filter material

Only the two positive control masks, as well as four of the eight tested KN95 masks, performed as expected, filtering >95% of all particles ranging from 0.3µm to 5µm. Fifty percent of the KN95 masks evaluated failed to meet the minimum requirements of an N95 equivalent. Two of the KN95 masks tested demonstrated a filtration efficiency significantly less than that of the surgical masks tested (See Table 3 and Fig. 3).

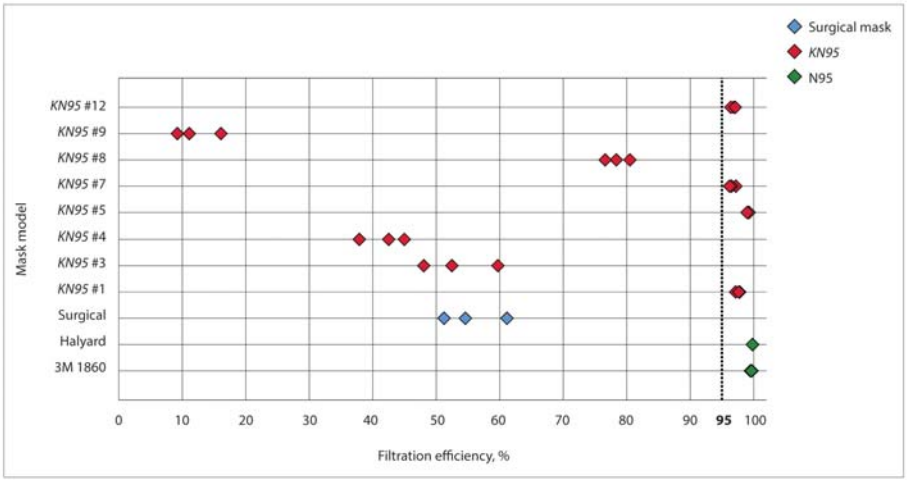

Fig. 3. *Reproducibility of the filtration testing protocol, showing individual data points of the triplicate testing protocol. The filtration efficiency of each mask was tested in triplicate (Halyard and 3M appear as single data points because of high reproducibility and overlapping data observations). The Halyard FLUIDSHIELD and 3M 1860 masks were used as positive controls, and a surgical mask was used as an additional control. Four brands of KN95 masks had filtration efficiency <80%, which was consistent over three filtration efficiency readings.*

DISCUSSION

Given the lack of available safety data, we conducted a preliminary study to evaluate 12 brands of KN95 masks (total of 36 masks) in seven participants.

Our major findings were that:

(i) Of the eight brands with identifiable manufacturer details, only one was on the NIOSH-approved list
(ii) The mask type and manufacturing details were printed on only 2/12 (17%) brands, as per NIOSH and European Union regulatory requirements
(iii) The number of individual mask layers in 12 different brands varied between three and six
(iv) Only one of the 36 KN95 masks passed the seal test
(v) Even after modification of the earloop tension using different methods, all 15 of the masks passing the seal test failed the qualitative fit testing
(vi) Of the eight masks tested, only four passed filtration efficacy testing, in other words, they had a filtration efficacy of >95% for 0.3µm particles

In contrast, the N95 masks tested passed the seal test, qualitative fit testing, and mask filter integrity at the 0.3µm particle count size. In summary, none of the KN95 masks evaluated met the required safety criteria, as stipulated by the NIOSH and/or recently published by the South African Health Products Regulatory Authority (SAHPRA)[13 - 16] to protect healthcare workers from dangerous aerosol-containing pathogens such as SARS-CoV-2 and/or *Mycobacterium tuberculosis.*

Almost all KN95 masks (35/36) failed the seal testing, and all the KN95 masks that were tested failed qualitative fit testing. Therefore, even before evaluating the integrity of the mask filter material, lack of an adequate facial seal was the major shortcoming. Previous studies have shown that inward facial leakage is the main mechanism by which FFRs fail testing[9, 17]. Interestingly, attempting to improve the facial seal by modifying the ear-loop tension failed to improve results (we evaluated several different methods, including increasing ear-loop tension by knotting, staples or head straps, or improving the facial seal using Micropore tape).

To our knowledge, this is the first study that has attempted to objectively test modifications to improve facial seal and hence fit testing of KN95 masks. We conclude, based on our results, that mask design and the nature of the material used are major determinants of mask failure rather than the amount of tension that is required to hold the mask in place. Another determinant of inward mask leakage is facial structure. Indeed, Yu *et al*[17] showed that when a Chinese population was tested, only two out of 50 KN95 masks (4%) passed leakage tests. Interestingly, in that study several N95 masks also had high inward leakage. The authors speculate that the mongoloid facial structure, especially at the bridge of the nose and chin level, facilitates inward facial leakage. The participants in our study were Asian, European, Indian, black African or of mixed race. In all the groups, the N95 control masks failed to show inward leakage.

Only four out of the eight KN95 masks tested passed the mask filter integrity testing, that is they were able to filter >95% of particles 0.3µm in size. This filtration efficacy requirement is to ensure that organisms such as *M. tuberculosis* and viral particles complexed to respiratory secretions fail to penetrate the mask filter material. Some KN95 masks, although filtration integrity was of adequate standard, therefore still failed on facial seal and inward leakage of particles. Plana *et al*[8] (non-peer reviewed data in pre-print format) also found that several KN95 masks failed to meet mask filter integrity thresholds. Their article highlighted that a high proportion of KN95 masks may be counterfeit. They suggest that the presence of ear loops, lack of proper labelling, lack of manufacturer source information, to mention a few, all point to probable counterfeit origin[15].

What are the implications of these findings? Our results are concerning because none of the KN95 masks tested met stipulated safety requirements, including passing the seal test and the qualitative fit test, and mask material filtration efficacy. We recommend stronger oversight by regulatory agencies such as SAHPRA to enforce recently published amended regulations and extend this to manufacturers and distributors[18]. A discussion about access to regulatory testing such as is performed by the NIOSH (a US-based regulatory agency)[15] is warranted. However, it is noteworthy that testing is limited to manufacturer consistency and mask filtration efficacy, and not fit testing[19]. We also recommend that fit testing be enforced, and that institutional capacity throughout the country be improved for qualitative fit and mask filter material efficacy testing. The former is an easy-to-perform, low-cost testing procedure, which can easily verify gross adequacy of mask safety. Specific institutions could therefore test KN95 masks at district or regional level before they are purchased from distributors.

Regular in-house testing can also be performed to ensure consistency in batch quality and supply. We are currently exploring optimisation of a low-cost, standardised mask filter integrity testing system. We would further recommend that the national pre-distribution evaluation protocols and regulations should include fit testing in a range of participants in additional to

mask material filter integrity testing. Indeed, in the single NIOSH-approved KN95 mask that we evaluated, the filtration testing requirements but not the fit testing ones were met.

It is important to note that ~10% - 20% of masks passing qualitative fit testing may still fail quantitative fit testing, which is a more sensitive test[20, 21]. It would be useful to have a local website (perhaps under the auspices of a regulatory agency) that can vet masks that have already been tested and are deemed to be safe for use. Existing organisations and websites that publish tested and approved KN95 masks include the NIOSH Certified Equipment List or the NIOSH Trusted Source, and the FDA Appendix A or Exhibit 1[21]. The Chinese regulatory agency for medical devices also provides details about National Medical Products Administration certification[22]. Such sites also highlight clues to counterfeit masks that do not meet safety requirements, including a lack of manufacturer and distributor information, the presence of ear loops, perforation in the mask material, lack of labelling on the mask certifying that it is approved, and embossing on KN95s that exposes the underlying filter layer[8].

STUDY STRENGTHS AND LIMITATIONS

The key strengths of our study include a testing protocol incorporating seal and fit testing and measuring the filtration integrity of the masks. To our knowledge, this is the only published study that has evaluated all these parameters and dimensions across a range of different KN95 brands and involving 36 different KN95 masks. However, the study has several limitations.

We sampled only a limited number of masks, and only those accessible to us. However, some masks that were sent to us came from outside the Western Cape area, although most were already being used in hospitals in the Western Cape or in other regions of South Africa. Secondly, we only performed testing in a limited number of participants. Nevertheless, we conducted several different types of testing and included modifications to try to improve the facial seal, and further increasing participant sample size is unlikely to have changed our results. Thirdly, we did not measure and categorise facial dimensions. It would have been useful to test more participants of different racial backgrounds and with different facial structures. Finally, although we tested filter integrity of the masks, this may not equate to the type of testing using commercially standardised equipment that may be performed by certified bodies such as the NIOSH (and is offered by at least one commercial company in SA).

Nevertheless, we did use similar flow rates (validated with a flow meter), a commercially available particle counter, a surgical mask as a negative control, and certified N95 masks as positive controls to validate our findings. We are in the process of validating our low-cost testing rig against a standardised commercially available system such as the TSI 8130A Automated Filter Tester (TSI, USA).

CONCLUSIONS

None of the 12 brands of KN95 masks tested (comprising 36 masks) met stipulated safety requirements known to prevent infection by dangerous respiratory pathogens including *M. tuberculosis* and SARS-CoV-2. The findings presented here have implications for KN95 mask evaluation at both regulatory and institutional levels. Our findings will have relevance even after the COVID-19 epidemic has passed, because existing KN95 stockpiles may be given to

healthcare workers to prevent infection by *M. tuberculosis*. We would recommend against this practice, given the failure of these masks to meet stipulated safety requirements.

Declaration. The research for this study was done in partial fulfilment of the requirements for JIR's PhD in Biomedical Engineering degree at the University of Cape Town.

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Author contributions. KD conceived the idea and designed the study. LM and JIR collected the data. All the authors contributed to planning, logistics, data analysis and drafting of the manuscript.

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L Mottay, *MB ChB, FCP (SA), Cert Pulmonology (SA). Centre for Lung Infection and Immunity, Division of Pulmonology and UCT Lung Institute, Department of Medicine, Faculty of Health Sciences, University of Cape Town, South Africa*[1]

J le Roux, *BSc Hons. Centre for Lung Infection and Immunity, Division of Pulmonology and UCT Lung Institute, Department of Medicine, Faculty of Health Sciences, University of Cape Town, South Africa*[1]*; Division of Biomedical Engineering, Department of Human Biology, Faculty of Health Sciences, University of Cape Town, South Africa*[4]

R Perumal, *MB ChB, FCP (SA) Cert Pulmonology (SA), MPH, MMed. Centre for Lung Infection and Immunity, Division of Pulmonology and UCT Lung Institute, Department of Medicine, Faculty of Health Sciences, University of Cape Town, South Africa*[1]

A Esmail, *MD, FCP (SA), Cert Pulmonology (SA). Centre for Lung Infection and Immunity, Division of Pulmonology and UCT Lung Institute, Department of Medicine, Faculty of Health Sciences, University of Cape Town, South Africa*[1]

L Timm, *BEngSc (BME), BScEng (Elec). Division of Biomedical Engineering, Department of Human Biology, Faculty of Health Sciences, University of Cape Town, South Africa*[4]

S Sivarasu*, PhD. Division of Biomedical Engineering, Department of Human Biology, Faculty of Health Sciences, University of Cape Town, South Africa*[4]

K Dheda, *MB BCh, FCP (SA), FCCP, PhD (Lond), FRCP (Lond). Centre for Lung Infection and Immunity, Division of Pulmonology and UCT Lung Institute, Department of Medicine, Faculty of Health Sciences, University of Cape Town, South Africa*[1]*; Institute of Infectious Diseases and Molecular Medicine, Faculty of Health Sciences, University of Cape Town, South Africa*[2]*; Faculty of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, London, UK*[3]*.*

UNIVERSITY OF THE FREE STATE, BLOEMFONTEIN CAMPUS
NTNV 1726 Department Of Nursing

PLEASE WRITE LEGIBLY AND USE A NEW LINE FOR EACH FACT

QUESTION 1

An 80-year-old man is brought into the operating theatre after falling at home. He broke his left hip.

Assess the above-mentioned scenario and answer the following questions:

1.1 Define hip arthroplasty (1)

1.2 Plan the preparation of the operating theatre for this patient specific to this orthopeadic procedure's requirements (10)

1.3 Outline the key steps in hip arthroplasty (10)

TOTAL FOR QUESTION 1: 21

QUESTION 2

Mr X was in a motorcycle accident and broke his nose. He has an obvious displacement of his nasal septum.

Assess the above-mentioned statement:

2.1 Identify and define the surgical operation that the surgeon is going to perform (½ x 2 = 1)

2.2 Plan the operating theatre specific to this patient's surgery (3)

2.3 Outline the surgical procedure with the instrumentation the surgeon is going to need for each step (10)

TOTAL FOR QUESTION 2: 14

QUESTION 3

A male patient is booked for surgery in the urology operating theatre. The surgeon suspects that he has an enlarged prostate.

3.1 Identify and define the endoscopic examination the surgeon will perform in the operating theatre to confirm his diagnosis (½ x 2 = 1)

The surgeon confirmed his diagnosis and will now continue with the operation to remove the enlarged prostate.

3.2 There are five (5) types of prostatectomy procedures. The surgeon chose the one mostly performed in the urology operating theatre. Identify and define the procedure he chose to perform (2)

3.3 Describe the operative procedure with the equipment needed (½ x 14 = 7)

3.4 Define the Brickers operation (3)

3.5 Differentiate between Vasovasostomy and Varicocelectomy (2)

3.6 Debate how you would prevent infection in the care of the genito-urinary patient peri-operatively (5)

TOTAL FOR QUESTION 3: 20

QUESTION 4

Mrs V bleeds profusely every month during her menstrual cycle. Her doctor advises surgery immediately and decides on a vaginal hysterectomy.

4.1 Define and give two (2) contra-indications for the operation (3)

4.2 Discuss the surgical procedure (17)

TOTAL FOR QUESTION 4: 20

QUESTION 5

Mrs S is diagnosed with a disfunctional choledochus. No stones were found in her common bile duct after the applicable tests were done. She is booked for a laparoscopic cholecystectomy on your operating theatre list.

Compile a checklist for the necessary instrumentation, supplies and equipment needed for the abovementioned procedure (½ x 10 = 5)

TOTAL FOR QUESTION 5: 5

QUESTION 6

A female patient is booked for an excision biopsy of a breast tumour. The pathology examination was negative for cancer and confirmed a benign tumour.

Describe the steps of the operative procedure needed and include the instruments needed for each step (½ x 10 = 5)

TOTAL FOR QUESTION 6: 5

ANALYSIS OF VERBS THAT MAY BE USED IN QUESTIONS:

Analyse/analise: Divide into groups or elements and describe fully
Discuss: Examine/consider the case for various viewpoints and give a critical exposition of the advantages and disadvantages
Describe: Give an exposition of the features/basic facts in a logical and well-structured manner
Prove: Support the facts by giving logical, acceptable reasons
Define: Give a clear, concise and authoritative explanation (definition) so that the precise meaning is clear
Evaluate: Make a value judgment on the grounds of a specific point of departure or criteria and give your own opinion. Do not describe
Give an outline: Give a summary of the main points and comment on each
Illustrate: Use a sketch or diagram to explain or elucidate
Interpret: Comment on available facts with reference to appropriate examples. Then give your own interpretation/views
Justify/Judge: Can you justify or judge a decision or course of action
Contrast: Show differences, contrasts and inconsistencies
Criticize/criticise: Expose positive and negative elements, discuss them and judge the credibility of the given factors or points of view
Name: Write down the requested information in short sentences or words without discussing them
Sketch: Briefly give the requested information, under headings and with subheadings, or explain by means of graphic representations (graph, flow diagram, etc)
Write an essay: Give complete information in a logical and well-structured manner
Summarize/summarise: Give a summary of the most important facts without detail, illustrations, criticism or discussion
Comment: Give your own opinion of the given matter
Indicate the relationship: Indicate how different matters relate to one another, are connected or correspond
Give an exposition: Give a clear, logical sequence in order to indicate clearly the differences, similarities and points of contact
Write notes on: Give a brief explanation (elucidation)
Compare: Give the facts, events, etc. and indicate the similarities and/or differences. (Note the difference between contrast and compare)

COMMUNICATING

The Antibiotic Resistance Message Effectively

By Kate Woodhead, RGN, DMS

INTRODUCTION

An interesting report from the Wellcome Trust recently identifies crucial elements of the messages about antimicrobial resistance communications with the public. The Trust reports that the work to date has had insufficient impact and they have therefore set out to test some of the messages and how they affect the public and particularly decision makers in politics, business and civil society.

As global action needs to happen, the research was undertaken by interviewing experts and the public in seven countries. It is a fascinating report, one which should be understood by a wide range of healthcare professionals because we are all responsible for educating and informing the public and our patients, so we need to be as clear as possible in our communications. The report, 'Reframing Resistance'[1] helps us to do that effectively. The public message testing was undertaken in seven countries: the UK, USA, Germany, Japan, India, Thailand and Kenya to ensure a broad range of perspectives which cover both the global north and south. They were also chosen as key hubs of international influence on antimicrobial resistance, major contributors to global antibiotic consumption and countries with notably improving and worsening levels of antibiotic consumption.

FRAMING THE COMMUNICATIONS

How a message is presented or explained through specific angles or themes can affect how it is received and understood. The antibiotic resistance message is not a simple one, so, if it is understood by the communicators how their message can be more effective, or more easily understood, then it is immediately more likely to be acted upon. The report looks at the effectiveness of current communications because global action on drug resistant infections is not happening at the scale and urgency required. Public understanding has an impact on decision makers and politicians, so effective evidence-based communications are essential to galvanise support for the antimicrobial resistance cause.

The importance of language and framing is really crucial, especially when communicating about a topic such as antimicrobial resistance - which is a complex, invisible problem with multiple drivers and is full of complicated terminology that is difficult to understand. To date, other issues such as climate change and plastic usage are issues which are receiving far more media and social media attention. Political will is demonstrated by agenda items in recent years by the G7 and G20, but that is not translating into the truly global action that is needed to address the problem. The Wellcome Trust research seeks to identify the most effective ways of talking about antimicrobial resistance that will increase public comprehension of the problem and to persuade them that the issue needs to be the focus of political action.

SO WHERE ARE WE NOW?

The research notes that experts and practitioners working on antimicrobial resistance feel that the current communications are problematic. There is also an extensive base of research with the public that identifies the same issue. For example, multiple terms are used such as antimicrobial resistance, drug resistant infections, superbugs and antibiotic resistance. This is reported to somewhat confuse the public as they do not recognise this as a single problem.

The frames used also vary tremendously from wars and battles, to deaths, economic effects and the impact on healthcare. A frame, in this context, is a pattern of thought or behaviour that people use to comprehend information. Framing is a way in which an issue or idea is presented to an audience that can shape the way that the recipient perceives that information[2]. Those who talk the most frequently about antimicrobial resistance are often technical experts and institutions, which indicate that the issue is not in general conversations and the public do not see the true scale and severity of the problem.

The research reports that as the public see or read a different range of framings on antimicrobial resistance and it's impact from different sources such as the media, public health authorities and healthcare professionals using different terms, it is not surprising that there is low understanding and widespread misconceptions.

KEY FINDINGS

Interestingly, there are consistent themes across all the countries included in the research. This means that there can be similar overarching principles that can be used globally for communicating messages and principles. The report cites five principles which are recommended to be used by experts and practitioners to inform public communications. These are:

- Frame antimicrobial resistance as undermining modern medicine
- Explain the fundamentals succinctly
- Emphasise that this is a universal issue; it affects everyone, including you
- Focus on the here and now
- Encourage immediate action

The most compelling frame in the research is the undermining of modern medicine by antimicrobial resistance. This helped the public to understand the breadth of impact both now and into the future. Effective communications therefore needed to reflect that antimicrobial resistance is a cross-cutting threat across all spheres and sectors of medicine (beyond specific disease areas) which sets back and undermines treatments that we have come to rely on.

The message also needs to be specific and relevant to the locality and to the audience. The research demonstrates that antimicrobial resistance is more motivating when the impact across a range of diseases and medical procedures is understood. Other health issues such as cancer, obesity, mental health and air pollution may feel more urgent and personally relevant to most members of the public than, for example, talking about multi-drug resistant tuberculosis.

If the message is to resonate widely, as we wish it to, it needs to focus on the common threat to which we can all relate. For example 'the undermining of modern medicine that can take us back

to a time where common infections and routine surgery could prove fatal' is a concept that cuts through. This was the case across all countries.

The messages tested to show the above results were:-

- Tuberculosis (TB) was a disease that had been brought under control by antibiotics; however, the spread of antibiotic-resistant TB means many people are once again dying from this disease
- Growing resistance to medicines means that we are facing an antibiotic apocalypse where currently treatable infections and injuries will kill once again
- If we do not take action against antibiotic resistance, we will return to the dark ages of medicine where currently treatable infections and injuries will kill once again
- Having routine surgery such as caesarean sections or hip replacements will become life threatening, and complications from common diseases such as diabetes and injuries or cuts will become harder to manage

The concept of 'going back in time' and of antimicrobial resistance undermining modern medicine resonated across countries. While the sensationalist tone of the more apocalyptic messaging was a cause for some scepticism and can reduce credibility, the core idea of treatable infections and injuries killing once again was compelling. This concept helped people understand the need for action on this issue[3]. In addition, the setting back in time, has a broader impact if combined with a clear indication that it is bigger than one disease. However, the message also needs to be relevant to the local audience and setting to ensure the maximum potential impact.

Explanation of the fundamentals needs to be undertaken succinctly. The simple and straightforward messages are the most effective. In particular describing that microbes develop the resistance and not individuals was a common misconception. Those who believe that resistance occurs in individuals think that antimicrobial resistance can be avoided, which in turn means they do not feel any personal threat. It is important that people understand that their personal behaviour does not have any particular impact and that this affects everyone globally. This has an effect on driving the appreciation that collective political action is needed to address the problem, rather than individual healthy personal behaviours.

The research also showed that it is important for our explanations to include the part that human activity is playing in increasing the problem. While there is a demand for clear, simple messages, this does not extend to the demand for scientific descriptions. For example, one of the questions asked in the research was the terminology which is best understood. Bacteria (95%) had the greatest meaning, followed shortly by germs (94%) and considerably less by microbes (83%).

Clarity of explanation, avoidance of scientific jargon and badly understood terms means that as healthcare professionals the Wellcome Trust is recommending that the following terms are not used unless in professional dialogue. Antimicrobial resistance; AMR; microbe. The term of 'resistant infections' is recommended rather than 'resistance' alone. Also suggested are 'antibiotic resistant infections'. The report highlights the word, infections rather than the singular use as it shows greater impact. 'Antibiotic resistant bacteria' is also potentially useful although 'bacteria' are less commonly understood as harmful, than 'infections'. Superbugs - the

bane of most infection prevention specialists life is also not recommended, or used only sparingly, although the research suggests that sometimes the colloquialism can be useful, in some contexts.

Knowledge of the local context is important as, for example, the word antibiotics does not translate well into Thai, and in Kenya qualitative research indicates that the public are more familiar with antibiotic brand names than the overall category. The aspect of human activity being involved in the communications is vital, in talking about the overuse of antibiotics in humans and animals, as this suggests that there is a solution or action that may be taken to reduce the effects. The use of the word, 'overuse' is found to resonate well with the public and better than using 'inappropriate use' or the 'way we are using' are both felt to be vague or ambiguous. There is also a statement that for definitive clarity, we need to ensure that it is collective overuse that causes the problem rather than individual overuse. The statements tested in this instance were:

- Antibiotics are overused in humans and animals, which has resulted in them becoming less effective in treating illnesses
- Antibiotics are used inappropriately in humans and animals, which has resulted in them becoming less effective in treating illnesses
- Germs will always look for ways to survive and resist new drugs, but the way we are using antibiotics is accelerating this process

It is essential that the communications emphasise that this is a universal issue that can affect anyone. The inclusion thereafter in the sentence of 'including you' has been found to be important to emphasising the sense of personal relevance and responsibility. The research looked at generalisations such as 'we are all at risk' as being far too generalised and impersonal. However, if 'we are all at risk' is combined with 'including you, your family and friends' this holds the personal jeopardy which highlights the prioritisation of the issue. The research also highlights that the communications need to include a broad base of people and not just mentioning of 'vulnerable people' as individuals often do not include themselves within a vulnerable group. There is mention of the impact of including personal stories to demonstrate the impact of the message. *Sepsis UK* is cited as an excellent example of this and the author remembers MRSA campaigns which used the same technique, effectively.

The research identifies that future statistics do not have the same relevance and widely cited data of antimicrobial resistance killing 10-million people annually by 2050 has little resonance. It is suggested that smaller figures which relate to the place the individual lives and works, would have greater impact.

Focusing on the here and now rather than projections of catastrophic effect into the future, is recommended by the research. The public view is that the apocalyptic effect is seen as sensationalist and as lacking in credibility. Also if the data suggest numbers in 2050s, the implication may be that there is no need for current anxiety or action – which is really not the impression that the professional and scientific community would wish to be heard. Emphasis needs to include the effect that the developing urgency for action is now and not sometime in the future. Immediate action is therefore the fifth principle by framing the issue as solvable - but that this needs a clear call to action.

It is crucial to ensure that we specify that this is an issue on which we can have a positive effect by taking action now. We also need to be clear what those actions are and who needs to take them.

CONCLUSION

This article has stayed close to the report text, as the messages need to be clear. It has demonstrated the importance of having complex issues, simply described so as to have the maximum impact and understanding. Antimicrobial resistance is a global threat to much of what modern medicine has achieved. It would be nonsensical if we were to miss the boat by using lazy or poor language to describe a major issue which we can all hep to reduce. The report should be widely utilised by anyone with an interest in the future of humanity.

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1. Wellcome 2019 Reframing resistance. Accessed at www.wellcome.ac.uk/reframing-resistance
2. Ibid
3. Ibid

This article first appeared in the Clinical Services Journal in April 2020. It appears here, courtesy of the author. Kate Woodhead qualified in 1978. She has worked in peri-operative care since then and runs her own business as an Operating Theatre Consultant. Kate was Chairman of NATN from 1998 to 2001. She is the former President of the IFPN (2002 to 2006) and now works as an Advisor to WHO on the Safe Surgery Saves Lives Campaign. She is the Chairman of Trustees at Friends of African Nursing. For more information on FoAN please go to www.foan.org.uk.

EN13795 - Do your surgical drapes and gowns comply to the right quality standards?

Drapes and gowns provide an essential barrier to help preserve the sterile field during surgery. They protect healthcare workers' exposure to body fluids and potential infectious material, while preventing bacterial contamination of the surgical site.

With Hospital-Acquired Infections (HAI) affecting many patients at high cost to the healthcare system, it is vital to ensure that surgical drapes and gowns offer the best possible barrier protection.
How do we ensure this?

EN 13795 is the European standards relating to general requirements, testing methods and specific performance levels for single-use and multiple-use surgical drapes, gowns and clean air suits. The standard is designed to ensure that a basic level of performance has been achieved in order for a surgical gown or drape to be classed as fit to use for a surgery.

EN 13795 consists of three parts:
Part 1: General requirements for manufacturers, processors and products
- The scope includes testing requirements as follows:

CHARACTERISTICS TO BE TESTED	GOWNS	DRAPES
Resistance to microbial penetration - Dry	✓	✓
Resistance to microbial penetration - Wet	✓	✓
Cleanliness - Microbial	✓	✓
Cleanliness - Particulate matter	✓	✓
Linting	✓	✓
Resistance to liquid penetration	✓	✓
Adhesion for fixation for the purpose of wound isolation		✓
Busting strength - Dry and wet	✓	✓
Tensile strength - Dry and wet	✓	✓

Part 2: Test methods
- This section stipulates the test methods that manufacturers or processors will have to complete in order to ensure that the device will comply with the requirements in parts 1 and 3 of the standard.

Part 3: Performance requirements and performance levels
- The levels of performance are selected as **'standard'** or **'high performance'** and are differentiated by critical and less critical areas on drapes or gowns.
- Standard Performance addresses the minimum performance requirements of medical devices, while High Performance addresses elevated performance requirements. These differ according to levels of mechanical stress, fluid levels and durations of surgical procedures.

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SAFE PERI-OPERATIVE PRACTICE:

How Can We Further Improve Clinical Every Day Work?

By Brattwall M, Stomberg MW, Jildenstål P, Sellbrant I and Jakobsson JG

INTRODUCTION

Anaesthesia has become increasingly safe, adverse effects associated to anaesthetic drugs or directly related to anaesthesia practice are reassuringly low. Risk assessment and improved scoring system to identify patient as risk is of huge importance[1]. Assessing risk factors is important especially in the elderly and fragile patients[2]. Thirty day and one year mortality following acute femur neck fracture is high, but primarily related to patients' age, background, and medical history[3, 4]. The American Society for Anaesthesiologists (ASA) state class, age and functional dependency are factors of huge importance for a positive outcome[5]. Proper, adequate, pre-operative assessment should be made of patients' general health, and function. For patients with compromising disease a more in-depth assessment and optimisation may reduce the peri-operative risks. Pre-operative assessment clinics were suggested already in1992 by Conway *et al.*[6] and Reed *et al.* and describe the positive experiences with a nurse-led pre-operative assessment unit already in 1997[7]. Collaboration and update of critical information is of paramount importance throughout the peri-operative period.

Available anaesthetics - inhaled, halogenated as well as intravenous - are efficacious and safe. The clinical experience of sevoflurane anaesthesia is today enormous and direct toxicity/side effects are most rarely reported[8]. Desflurane with minimal metabolism and low solubility in blood as well as in other body compartments promoting rapid equilibration, rapid wash-in and wash-out is also associated to an extraordinary safety record[9]. Sevoflurane, desflurane, and suxamethonium are known potential triggers of malignant hyperthermia, but cases related to the clinical use are most scarce. Dantrium should be readily available wherever anaesthesia is conducted in order to treat patients exhibiting signs and symptoms of malignant hyperthermia[10]. There was also a concern following the introduction of sevoflurane that its reaction in a soda-creating compound A would cause deleterious effects, and toxicity to liver and kidneys. The toxic production is related to the composition of the carbon dioxide absorber and can be reduced by avoiding soda lime and Baralyme®. Today there are extensive clinical experiences suggesting any explicit organ toxicity being reassuringly low[11].

Anaphylactic reaction may occur. Muscle relaxants[12] rocuronium and sugammadex for reversal is known to potentially cause and IgE-mediated allergic reaction and there is a recent review around mechanism and handling of these reactions[13]. There has also been a discussion whether the commonly-used propofol in lipid emulsion could have a cross sensitivity to certain foods. A recent paper however could find no clear relation and downgraded the possible risk to more or less negligible[14]. Other agents such as contrast media administered intra-operatively for imaging or dextran[15] used as volume replacement are also known to potentially cause allergic reactions. There are most rare case report of reactions to other agents used peri-operatively. There is a recent report around atropine reaction[16]. Vigilance, clinical monitoring and a comprehensive

strategy for adequate treatment is essential. Evidence-based preventative measures are still lacking. There is a recent review providing up-to-date evidence around diagnosis management and possibly preventive measures[17].

INCREASED MONITORING: IS IT JUST FOR FUN OR DOES IT HAVE CLINICAL BENEFITS?

Anaesthesia equipment, anaesthesia machines, monitoring equipment as well as disposable have also become more efficient and sophisticated. The vital signs monitoring with continuous online oxygen saturation, ECG, inspired oxygen and end-tidal carbon dioxide, anaesthetic agent concentrations, and non-invasive automatic blood pressure measure are standards of care today. These basic physiological measures provide us with realtime information, enabling adjustments in order to minimise the occurrence of deviations from set goals. We have also had extensive experience in peri-operative management of patients that has offered us opportunities to control and monitor the brain during anaesthesia using both EEG-based technology such as BIS (bi-spectral index), Entropy or Auditory-Evoked potentials. More recently, near infra-red cerebral spectroscopy has also been introduced to clinical practice[18]. The EEG-based depth of anaesthesia monitoring has been shown to improve anaesthesia performance reducing the need for volatile anaesthetics, hastening early intervention and early recovery, including reduced PONV[19, 20]. There are studies suggesting that these additional monitoring instrument/devices can also give the anaesthesiologists information on whether a patient is at risk for either short-term or long-term risk for post-operative cognitive impairment[21, 22, 23]. Targeted anaesthesia = possibly by close-loop automatic control[24] - also seems to have potential advantages thus improving both short-term and long-term outcomes[25]. Goal directed anaesthesia and fluid regime[26, 27] seem to have obvious benefits.

NOT ONLY ANAESTHESIA BUT POTENTIAL PROTECTION?

Direct toxicity or adverse effects associated to anaesthetics are rare. There is an increasing interest in whether the anaesthetics possess protecting, potentially beneficial effects, for example, on ischaemia reperfusion episodes and post-operative cognitive impairment. Surgical stress and anaesthesia do affect cognition. Cognitive performance is generally rapidly restored and driving, for example, is generally considered safe about 24-hours after surgery. The potential risk for various neuro-cognitive deviations during the recovery is associated to age and presence of cardiovascular and cerebral disease[28]. The search for brain protective pharmaceuticals is on-going, as are studies to analyse anaesthetic techniques. In experimental settings, both halogenated inhaled anaesthetics and propofol possess[29] potential cerebral ischaemia/reperfusion protecting properties. The explicit effects in clinical practice is however still not proven. Present evidence around brain and cardio protection of clinical dignity from the use of sole agents is not conclusive[30, 31]. There are studies suggesting protective effects, reduced risk for neuro-cognitive impairment during recovery from EEG-targeted anaesthesia[32]. Further studies addressing whether targeted anaesthesia with the use of a depth-of-anaesthesia monitoring system such as the BIS is underway[33].

The potential effects from surgery, anaesthesia and peri-operative stress on the risk for dementia also requires further studies. Current knowledge is insufficient to state whether there is any increased risk or a possible protective effect[34]. There are two recent reviews around protection commenting that much of pre-clinical work is not yet confirmed in the clinical setting. However,

it seems reassuring to continue beta-blockers as well as statin therapy, and potentially to use halogenated inhaled anaesthetics although the effects in animal has still not been confirmed[35, 36]. For non-cardiac surgery the choice of main anaesthetic - either a halogenated inhaled agent or propofol - seems not to have any major impact[37].

QUALITY AND SPEED OF RECOVERY

Day, ambulatory surgery, and enhanced recovery pathways are becoming increasingly popular. Minimising the peri-operative stress, avoiding prolonged fasting and supporting and empowering early post-operative directives are basic components of this approach. Adequate pain management and minimising the occurrence of PONV is also essential[38]. Multi-modal analgesia[39] and PONV prophylaxis has become standards of care[40]. Follow-up and assessing up to 30-day patient outcomes is increasingly being requested. Tele-medicine and modern communication tools, as well as smartphone apps provide new opportunities to follow-up with patients after discharge. The peri-operative nurse has an obvious place in the preparation of patients, as well as for follow-up[41].

FOLLOW UP

There is an increasing interest in making healthcare more efficacious and patient-centred. Shortening hospital care has been widely accepted and is one way of reducing hospital costs while increasing the number of surgical procedures that can be performed on a fast track basis. Value-based Healthcare Delivery is suggested as a tool to further improve patient focus, providing healthcare aimed at attaining patients' satisfaction with care and good outcomes. This calls for better and more patient-focused tools to assess post-operative recovery. These tools should objectively provide for the recovery process and be used both in order to assess the individual patient outcome, and be centred on the quality of care provided. A recent mini review identified 10 multi-dimensional, post-operative assessment tools with a focus on pain, physiological function, activities of daily living (ADL), emotions, nausea/vomiting and nutrition/elimination.

Objective and patient-subjective reported outcomes were commonly addressed by a visual analogue scale (VAS) or pre-graded scales[42].The Post-operative Quality of Recovery scale (PostopQRS) was the instrument covering most of the domains mentioned, including cognition[43]. Residual impairment in cognition and failure of complete cognitive recovery, is not uncommonly seen during the three first days after surgery, and may interfere with activities of daily living[44] . The PostopQRS is validated and used in seven countries and in five languages around the world. An assessment modification of cognitive domain of the original PostopQRS tool including a tolerance factor to account for performance variability has been incorporated; 'returned to baseline values or better' was modified to 'not exactly to be back at baseline values but nearly'[45]. Lindqvist *et al.* compared anaesthesia based on desflurane or propofol in a randomised study during ambulatory breast surgery using the Cognitive Failure Questionnaire (CFQ) and a modified version of the PostopQRS. They found that the cognitive recovery was still not complete one week after surgery in any of the groups. No difference was however found in the cognitive recovery comparing middle-aged patients receiving desflurane or propofol anaesthesia during ambulatory breast surgery[46]. The PostopQRS has also been tested to investigate the impact of the stress associated waiting for cancer surgery showing an 'overall low performance' but no major variability[47]. When analysing the quality of recovery tools, Bowyer found that they has progressed from the assessment

of merely early and immediate recovery to on-going assessment of broader post-operative ability up to 30 days after surgery/anaesthesia.

They comment however that 'no single recovery tool' is perfect and concluded that the assessment tool must be multi-dimensional, address recovery over time, and be complementary to current clinical databases[48]. It is of utmost importance also to assess overall benefit, to consider aspects such as the measurement of disability-free survival after surgery with the WHO Disability Assessment Schedule 2.0 that has been found clinically acceptable, valid, reliable, and to be a responsive instrument for measuring post-operative disability[49].

In conclusion, anaesthesia is safe and effective, but we should aim for further refinements and improvements, focusing on rapid and complete recovery and patients' satisfaction. The peri-operative handling of a patient is a team effort and we must further improve inter-professional collaboration and jointly compile and analyse data around performance. The peri-operative nurse is an important part of that team and working together in a lean peri-operative process is most certainly the road to better, and safer, peri-operative patient care.

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Brattwall M - *Department of Anaesthesiology and Intensive Care, Unit of day Surgery, Sahlgrenska University Hospital, Mölndal/Göteborg, Sweden*

Stomberg MW, Jildenstål P & Jildenstål P - *The Sahlgrenska Academy, Institution of Health and Care Sciences, University of Gothenburg, Gothenburg, Sweden*

Sellbrant I - *CCapio Lundby Hospital, Gothenburg, Sweden*

Jakobsson JG - *Anaesthesia and Intensive Care, Institution for Clinical Science, Karolinska Institutet, Danderyds University Hospital, Stockholm, Sweden. Jan G Jakobsson, MD, is a corresponding and Adj. Professor Anaesthesia and Intensive Care, Institution for Clinical Science, Karolinska Institutet, Danderyds University Hospital, Stockholm, Sweden*

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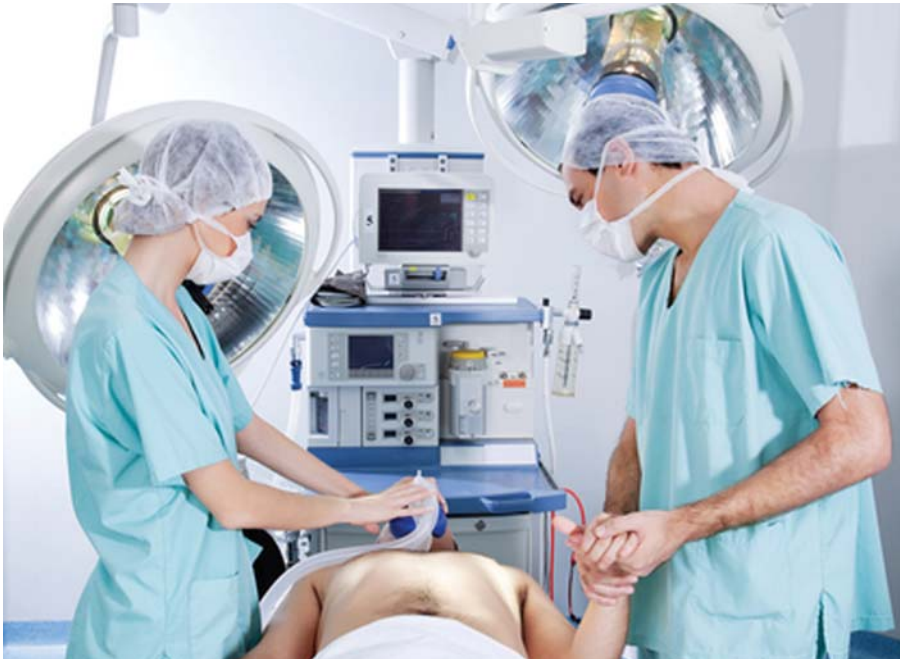

UNIVERSITY OF THE FREE STATE, BLOEMFONTEIN CAMPUS
NTNV 1726 Department Of Nursing

PLEASE WRITE LEGIBLY AND USE A NEW LINE FOR EACH FACT

QUESTION 1

An 80-year-old man is brought into the operating theatre after falling at home. He broke his left hip.

Assess the above-mentioned scenario and answer the following questions:

1.1 Define hip arthroplasty (1)

1.2 Plan the preparation of the operating theatre for this patient specific to this orthopaedic procedure's requirements (10)

1.3 Outline the key steps in hip arthroplasty (10)

TOTAL FOR QUESTION 1: 21

ANSWER GUIDE: APPSA ORTHOPAEDIC GUIDELINE

1.1 Define hip arthroplasty (1)

Total replacement is a major operation which involves completed removing of the worn or damaged hip joint due to osteorthritis of the hip with disability

1.2 Plan the preparation of the operating theatre for this patient specific to this orthopaedic procedure's requirements (10)

- Routine dampdusting, checking of theatre
- Basic anaesthetic equipment
- Diathermy and suction apparatus
- C-arm and radiographer
- X-Ray gown protection (shields, gowns, dosimeters; signage)
- Orthopaedic traction table
- Arm table and accessories
- Tourniquet
- Positioning aids – gelpads, straps
- Plaster trolley
- Arthroscopy equipment
- Warming device for long cases
- Packs and sterile extras
- Power tools and drills
- Loan sets obtained

1.3 Outline the key steps in arthroplasty (10)

- A linear incision from 5cm below the postero-inferior iliac spine towards the posterior aspect of the greater trochanter and distally along the posterior aspect of the proximal femur
- Capsule is entered and femoral head dislocated and removed with a skid
- The femoral head is then measured using a calliper and a prosthesis is selected and tested for a good fit in the acetabulum
- Fragments that may be loose in the acetabulum or attached to the ligamentum teres are removed

- Trial head is inserted into the acetabulum and axial compression applied while clearance of lateral motion is checked
- The femoral neck is fashioned to achieve and accurate prosthetic fit
- A punch is then used to open the medullary canal from the femoral neck
- The intra-medullary canal is reamed and rasped to accommodate the prosthesis
- Once the canal is prepared, the prosthesis of choice is inserted with or without bone cement
- A unipolar of bipolar assembly is snapped onto the neck of the femoral stem
- The height of the head determines the neck length and is selected after trial reductions
- The hip is reduced
- Closure is accomplished in layers over suction drains

QUESTION 2

Mr X was in a motorcycle accident and broke his nose. He has an obvious displacement of his nasal septum

Assess the above-mentioned statement.

2.1 Identify and define the surgical operation that the surgeon is going to perform (½ x 2 = 1)

2.2 Plan the operating theatre specific to this patient's surgery (3)

2.3 Outline the surgical procedure with the instrumentation the surgeon is going to need for each step (10)

TOTAL FOR QUESTION 2: 14

ANSWER GUIDELINE: APPSA ENT GUIDELINE

2.1 Identify and define the surgical operation that the surgeon is going to perform (½ x 2 = 1)

- SMR – Submucosal resection of the nasal septum
- The excision of a portion of the cartilaginous or osseous nasal septum beneath the flaps of the mucous membrane, perichondriuma and/or periosteum

2.2 Plan the operating theatre specific to this patient's surgery (3)

- Basic nasal and rhinoplasty tray
- Fibre-optic headlight and power source
- Haemostatic plugging – cocaine
- Throat pack
- Eye covering
- Dental syringe

2.3 Outline the surgical procedure with the instrumentation the surgeon is going to need for each step (10)

NOTE: Marker/moderator: Give credit for providing relevant and correct instrumentation names given with each step

STEPS WITH INSTRUMENTATION

- Incision made anterior over the septum, including the mucous membrane
- Mucous membrane is raised of the cartilage and bone of the septum with a dissector
- The cartilage is incised taking care not to penetrate the mucosa membrane on the opposite side
- A rongeur is used to remove any spurs from the nasal bone
- Retracting the flaps, the cartilage is excised (not removed)

- Punch rongeur or cutting forceps is used to excise bony fragments of the ethmoid bone or deviated vomer
- A gouge of mallet may be used for the vomer
- A fine nozzle suction is used throughout the operation to keep the operation site dry
- Normal saline is used to help clear away the debris
- The intra nasal incisions are sutured using fine absorbable sutures
- Nasal plugs are inserted to keep the mucous membranes in the midline and aid haemostasis
- A 'moustache' or a 'Dolly' dressing is placed under the nose

QUESTION 3

A male patient is booked for surgery in the urology operating theatre. The surgeon suspects that he has an enlarged prostate.

3.1 Identify and define the endoscopic examination the surgeon will perform in the operating theatre to confirm his diagnosis. (½ x 2 = 1)
The surgeon confirmed his diagnosis and will now continue with the operation to remove the enlarged prostate

3.2 There are five (5) types of prostatectomy procedures. The surgeon chose the one mostly performed in the urology operating theatre. Identify and define the procedure he chose to perform (2)

3.3 Describe the operative procedure with the equipment needed (½ x 14 = 7)

3.4 Define the Brickers operation (3)

3.5 Differentiate between Vasovasostomy and Varicocelectomy (2)

3.6 Debate how you would prevent infection in the care of the genito-urinary patient peri-operatively (5)

TOTAL FOR QUESTION 3: 20

ANSWER GUIDE: Alexander's patient care - p 509/518/543/544/575

3.1 Identify and define the endoscopic examination the surgeon will perform in the operating theatre to confirm his diagnosis. (½ x 2 = 1)

- Cystoscopy
- An endoscopy examination of the lower urinary tract, including visual inspection of the interior of the urethra, the bladder and the ureteral orifices

The surgeon confirmed his diagnosis and will now continue with the operation to remove the enlarged prostate

3.2 There are 5 types of prostatectomy procedures. The surgeon chose the one mostly performed in the urology operating theatre. Identify and define the procedure he chose to perform (2)

- TURP – Transurethral resection of the prostate gland
- A resectorscope is passed into the bladder through the urethra, and successive pieces of tissue are resected from around the bladder neck and the lobes of the prostate gland. Leaving the capsule intact

3.3 Describe the operative procedure with the equipment needed (½ x 14 = 7)

NOTE: Marker/moderator: Give credit for providing relevant and correct instrumentation names given with each step

- Urethra is dilated with sounds

- Cystourehtroscopy is performed to assess the degree of prostatic obstruction and to inspect the bladder
- Postresectoscope sheath with its fitted Timberlake obturator is passed into the urethra
- Timberlake obturator is removed and the working element (resectoscope) assembled with the Foroblique telescope and cutting loop, is inserted through the sheath
- The irrigation tubing, light cord and high-frequency cord are connected and irrigation fluid fills the bladder
- Inspection of prostatic urethra and bladder trigone is carried out
- Locating the ureteral orifice, surgeon initiates electro-dissection, alternating cutting and coagulating currents as required
- Bladder is drained, washing out prostatic tissue and small blood clots – Ellik evacuator
- When prostate resection is completed the prostatic fossa is inspected to ensure that all bleeding points have been coagulated
- Resectoscope removed – 22/24 two-way or three-way foley catheter inserted into bladder for urinary drainage, balloon inflated and pulled gently against the bladder neck to help control venous bleeding
- Continuos irrigation with gravity drainage is initiated with 3l to 4l normal saline

3.4 Define Brickers operation (3)

- A segment of the ileum for the diversion of urinary flow from the ureters
- The segment is resected from the intestine with nerves and blood supply intact
- The proximal end of the segment is closed, forming a pouch, and the ends of the ureters are sutured to it
- The distal end is brought to the outside of the abdominal wall and effaced to form a stoma
- The remaining ends of the small intestine are anastomosed to re-establish bowel continuity, the ileal loop no longer being a part of the intestinal tract
- Called also urinary ileostomy, ileal loop, and Brickers procedure

3.5 Differentiate between Vasovasostomy and varicocelectomy (2)

VASOVASOSTOMY	**VARICOCELECTOMY**
Surgical procedure under general anaesthesia where two (2) parts of the vas deference is anatomised	It is a surgical procedure done under general anaesthesia through an abdominal (paramedian) incision
Done after a vasectomy	This is the excision of the varices of the pampiniform plexus

QUESTION 4

Mrs V bleeds profusely every month during her menstrual cycle. Her doctor advises surgery immediately and decides on a vaginal hysterectomy.

4.1 Define and give two (2) contra-indications for the operation (3)

4.2 Discuss the surgical procedure. (17)

TOTAL FOR QUESTION 4: 20

ANSWER GUIDE: Alexander's patient care p 471

4.1 Define and give two (2) contra-indications for the operation (3)

- Large uterine tumour

- Pelvic malignancy because of inflammatory in fallopian tubes and ovaries
- Possibility of missing metastatic disease that may be present

4.2 Discuss the surgical procedure. (17)

- The labia may be retracted with sutures
- A vaginal retractor is inserted to retract the vaginal wall
- Dilatation and curettage may be performed
- A Jacobs vulsellum, tenaculum, or suture ligature is placed through the cervical lips to permit traction on the cervix
- The vaginal wall is incised with a knife anteriorly through the full thickness of the wall
- The bladder is freed from the anterior surface of the cervix by sharp and blunt dissection
- The bladder is then elevated to expose the peritoneum of the anterior cul-de-sac, which is entered by sharp dissection
- The peritoneum of the posterior cul-de-sac is identified and incised
- The uterosacral ligaments containing blood vessels are clamped, cut, and ligated
- The ends of the ligatures are left long and are tagged with a clamp
- The uterus is drawn downward, and the bladder is held aside with retractors and moist, small laparotomy packs
- The cardinal ligament on each side is clamped, cut, and ligated
- The uterine arteries are doubly clamped, cut, and ligated
- The fundus is delivered with the aid of a uterine tenaculum
- When the ovaries are to be left, the round ligament, the uterovarian/wide ligament, and the fallopian tube on each side are clamped together and cut, and the uterus is removed
- These pedicles are then ligated
- The peritoneum between the rectum and vagina is approximated with a continuous suture
- The retroperitoneal obliteration of the cul-de-sac is done by sutures that pass from the vaginal wall through the infundibulopelvic ligament and round ligament, through the cardinal/tranverse servical ligament, and out the vaginal wall
- The round, cardinal, and ureterosacral ligaments may be individually approximated for additional support
- Any existing cystocele and rectocele and the perineum are repaired
- In the presence of prolapse, reconstruction of the pelvic floor may be required
- An indwelling urethral or suprapubic catheter is usually inserted
- The vagina may be packed, and a drain may be inserted

QUESTION 5

Mrs S is diagnosed with a disfunctional choledochus. No stones were found in her common bile duct after the applicable tests were done. She is booked for a laparoscopic cholecystectomy on your operating theatre list.Compile a checklist for the necessary instrumentation, supplies and equipment needed for the abovementioned procedure (½ x 10 = 5)

TOTAL FOR QUESTION 5: 5

ANSWER GUIDE: Alexander p 471

Compile a checklist for the necessary instrumentation, supplies and equipment needed for the abovementioned procedure (½ x 10 = 5)

Endoscopic tower with:

- Video unit with second monitor

- Camera and control unit
- Light source
- Insufflators
- Coagulator
- Suction unit
- CO_2 tank

Laparoscopic set with:

- Laparoscope
- 5mm trocars and sheaths
- 7mm trocars and sheaths
- BP handles and knives – 15 and 11 blades
- Clip appliers
- Blunt grasping forceps
- Alligators
- Babcocks
- Spatula retractor
- Laparoscopic scissors
- Filtered insufflations, tubing
- Electrocautery
- Pressure bag for IV saline

QUESTION 6

A female patient is booked for an excision biopsy of a breast tumour. The pathology examination was negative for cancer and confirmed a benign tumour. Describe the steps of the operative procedure needed and include the instruments needed for each step (½ x 10 = 5)

TOTAL FOR QUESTION 6: 5

ANSWER GUIDE: Alexander p 625

Describe the steps of the operative procedure needed and include the instruments needed for each step (½ x 10 = 5)

- Incision in the direction of the skin lines or along the border of the areola is made over the tumour mass – PB handle and 15/22 blade
- Gentle traction is applied to the mass with a Allis forceps
- Small lesion – entire mass and an edge of normal tissue are removed by sharp dissection – Mcindoe scissors and Gillies forceps
- Large lesion – small incision biopsy of the main mass is done. Specimen given for immediate frozen section for diagnosis while patient is still under anaesthesia
- If benign the subcutaneous breast tissue of the wound is approximated with Vycral suture on a Higgs/Mayo Hegar needle holder
- Skin is sutured with fine subcutaneous sutures or skin clips - Vycral suture on a Higgs/Mayo Hegar needle holder
- If malignant – wound is closed and mastectomy is done

PREVENTING SURGICAL SITE INFECTIONS (SSI)
After Gynaecological Surgical Procedures

Two percent of patients who undergo a hysterectomy are likely to present with a post-op surgical site infection? After gynaecological surgery patients can develop superficial incisional infections like vaginal cuff cellulitis, deep incisional infections like pelvic cellulitis and intra abdominal pelvic abscesses. Preventing SSI is tricky when doing gynaecological surgery as the risk of infection is always present by virtue of the microbes that are found in the areas that are entered.
The three things to review are:

- Risk factors
- Recommendations specifically in gynaecology
- SSI prevention bundles

Risk Factors
Some risk factors for SSI are unique to gynaecology and this includes complications associated with previous Caesarean section. Other risk factors are obesity, smoking, poor nutritional status, presence of microorganisms in the vagina and the potential of other remote infection like UTI (urinary tract infection). Subcutaneous tissue depth of at least three centimetres could be an additional unique risk factor to consider.

Recommendations
The American College of Obstetricians and Gynaecologists recommends that 'remote infections' like possible UTI's must be treated before patients have routine or elective gynaecological surgery. Pre-op UTI's can increase post-op morbidity. Although treating a UTI could delay surgery its is the preferred approach. Patients should also be tested for bacterial vaginosis and this too should be treated before attempting surgery. It is best to avoid removing patients' hair surrounding the incision, unless it will impede the surgery. If hair must be removed it should be removed using an electric clipper not by shaving as using a razor increases the risk of infection. Pre-op bathing or showering using chlorhexidine-based soaps have been shown to be effective. Chlorhexidine-alcohol based skin prep is generally used for abdominal skin preparation and povidone-iodine is commonly used for vaginal prep before a hysterectomy or vaginal surgery.

SSI prevention bundles
All hospitals should have their own SSI prevention bundle. These bundles should be based on published research and should incorporate important aspects of SSI prevention like:

- Using properly cleaned and sterilized surgical instruments
- Environmental decontamination of the operating room (including surgical lights)
- Pre-op bathing
- Skin prep
- Antibiotic use and timing of commencement of antibiotics
- Preventing hypothermia
- Intraoperative aseptic technique

Operating theatre personal pride themselves as being the patients advocate and as such, we should also strive to prevent SSI's. Applying these techniques and approaches will go a long way to help with the fight against surgical site infections.

References available on request. This article first appeared in SurgiView and appears courtesy of Safmed.

APPSA Gauteng News

By Villi Pieterse (Honorary Life President) and Marilyn de Meyer (Gauteng Chapter President)

Welcome to 2021, and the second wave of the COVID-19 pandemic. We had hoped and prayed that 2021 will see us move forward without the threat of the virus, but we were terribly wrong. News of the devastation of this infection is well documented and reported on. Fatalities are rising, and we all know of, or have a family member, who has been hard hit by this pandemic.

As the APPSA Gauteng Chapter Executive Committee, we would once again like to express our deepest appreciation to all our members, friends and colleagues for their commitment and dedication during these difficult times. We know many of you became ill, or had family who contracted the virus. Some lost loved ones, and we have lost a number of colleagues. We salute every one of you and appreciate all you have done. We pray that this will soon be over so that we can meet, talk and get back to normal. For the moment, however, all our activities are on hold, as per Lockdown Level 3 regulations. We circulated the dates for our educational programme in December 2020, and are hoping to still potentially hold a congress later this year. We will ensure that you receive all the necessary and important information through our APPSA Journal and on our website **www.theatrenurse co.za.** The journal is also available on the website so no one needs to miss out on their very interesting information.

Through our newsletters we endeavour to keep in touch with all our members.Please take advantage of the opportunity to respond and send us information or news that we can share with other peri-operative practitioners. This is a time when we all need the support of those who are faced with severe challenges of the healthcare sector - and understand the considerable strain we are under. We are a unique group of professionals who can only depend on our skills and knowledge to carry us safely across these difficult waters.

I would like to share the following encouraging and comforting words with all of you.

- Every night we go to bed without any assurance of being alive the next morning, but still we set alarms to wake up! That is HOPE
- We plan big things for tomorrow in spite of zero knowledge of the future. That is CONFIDENCE
- Today is a day that will never come again, use your words to heal and not to hurt
- There is no storm that God will not carry you through, no bridge that you cannot cross, no battle God will not help you win

In conclusion, remember: Where there is hope there is faith, where there is faith, miracles happen

Stay safe, be blessed, and hope to see you all soon. Together in peri-operative care we are STRONG!

Association for Peri-operative Practitioners in South Africa

APPLICATION FORM FOR APPSA MEMBERSHIP

FOR THE PERIOD 01/03/2021 UNTIL 28/02/2022
Annual membership fee for South African members: **R300-00**
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☐ Kwa-Zulu Natal
☐ Western Cape
☐ Eastern Cape
☐ Free State/Northern Cape

EMPLOYMENT DETAILS:

Hospital: ..... Department: .....

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Professional qualifications: .....

.....

Are you in possession of a Diploma in Operating Theatre Nursing Science:

☐ Yes ☐ No ☐ Student

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+27 (0) 21 797 1878

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+27 (0) 31 502 2363

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+27 (0) 41 451 0128

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