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A modified Delphi approach to enhance nurturing of professionalism in postgraduate medical education in Singapore

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ABSTRACT

Introduction: Nurturing professional identities instils behavioural standards of physicians, in turn facilitating consistent professional attitudes, practice, and patient care. Identities are socioculturally constructed efforts, thus we must account for the social, cultural, and local healthcare factors that shape physicians' roles, responsibilities and expectations. This study aims to forward a program to nurture professionalism amongst physicians in Singapore.

Methods: A 3-phased-evidenced-based-approach was used. First, a systematic scoping review (SSR) was conducted to identify professionalism elements. Second, a questionnaire was created drawing from the SS's findings. Third, a modified Delphi involving local experts identifying socioculturally appropriate elements to nurture professionalism was conducted.

Results: The 124 included articles in the SSR revealed definitions, knowledge, skills, and approaches to nurturing professionalism. The modified Delphi identified professional traits, virtues, communication, ethical, self-care, teaching and assessment methods, and support mechanisms.

Conclusion: Results formed the basis to a holistic and longitudinal program focused on instilling professional traits and competencies over time through personalised and holistic support of physicians. Findings will be of interest to medical communities in the region and beyond.

Keywords: medical curriculum, medical education, modified Delphi, nurturing professionalism, Singapore

INTRODUCTION

Professionalism in medicine is defined as humanistic attributes and behavioural standards that define a doctor and the doctor-patient relationship.[1,2] Whilst agencies such as Accreditation Council for Graduate Medical Education (ACGME), American Board of Internal Medicine (ABIM), Canadian Medical Education Directives for Specialists (CanMEDS) and General Medical Council (GMC), Singapore Medical Council (SMC) have detailed concepts of professionalism that all physicians are expected to adhere to,[3-8] current literature recognises nurturing professionalism to be a dynamic, evolving, and socioculturally attuned process that must be instilled over time, in stages, and with support from mentors and educators in a contextually sensitive, clinically appropriate manner.[9-16] Critically, data also suggests that nurturing professionalism impacts personal identities, societal roles and responsibilities, and even relational self-concepts. This new perspective shifts focus away from merely teaching and assessing professional values and principles, to developing and nurturing the formation of a physician's professional identity.[9-16]

Jarvis-Selinger, Pratt[17] describe the holistic and personalised development of professional identity as "*an adaptive developmental process that happens simultaneously at two levels: (1) at the level of the individual, which involves the psychological development of the person and (2) at the collective level, which involves the socialization of the person into appropriate roles and forms of participation in the community's work*". This evolving personalised and longitudinal process of professional identity formation (PIF) occurs in an organised stage-like manner, underlining the need for longitudinal structuring and holistic support.[18,19]

Structuring efforts to nurture PIF, a comprehensive training program must include competency-based assessments of progress that direct personalised, appropriate, specific,

timely, accessible, achievable, feedback and support of a physician's evolving PIF.[18,19] This program must also view nurturing PIF through the lens of prevailing sociocultural norms, values and beliefs and the influence of regnant healthcare, education and healthcare funding structures.[20]

A systematic review by Berger, Niedra[21] on teaching professionalism in the postgraduate medical setting reaffirms that efforts to nurture professionalism amongst physicians must incorporate prevailing contextual and sociocultural factors. Efforts in Singapore must account for her unique family centric practices, healthcare funding system, and medical education curriculum that draws on the fusion of US based residency programs and remnants of the British based training system it inherited.[22] This study aims to guide the design of a socioculturally sensitive program aimed at nurturing professionalism amongst physicians in Singapore.

METHODS

To achieve its goals of creating an evidence based socioculturally sensitive program, this study adopts a 3-phased approach –

Phase 1: Conduct a systematic scoping review (SSR) using Krishna's Systematic Evidenced Based Approach (SEBA) to identify key elements of a program aimed at nurturing professionalism amongst physicians.

Phase 2: Create a content-valid questionnaire from data drawn from SSR.

Phase 3: Employ the tool to determine the views of Singapore's local experts on the content and manner of nurturing professionalism in the local postgraduate medical setting.

Phase 1: SEBA guided SSR

Given the absence of *a priori* concepts of professionalism and diverse approaches to its study, a 5-member research team applied Krishna's Systematic Evidence-Based Approach (SEBA)[23-25] to guide a SSR (henceforth SSR in SEBA).[26-28] Use of an SSR in SEBA facilitates identification of available data, key characteristics and knowledge gaps in nurturing professionalism in the extant literature.[22,26-40]

The SEBA methodology facilitates a reproducible, accountable and transparent means of identifying patterns, relationships, and disagreements across a wide range of study formats and settings.[23-25] Built on a constructivist perspective and relativist lens, SSRs in SEBA accounts for the historical, sociocultural, ideological and contextual circumstances surrounding professional identity.[23-25]

In keeping with the SEBA, a team of experts were engaged to oversee and advise the research team at all stages of the research process.[23-25] They comprised of a medical librarian from the Yong Loo Lin School of Medicine (YLLSoM), and local educational experts and clinicians at the NCCS, Palliative Care Institute Liverpool, and Duke-NUS Medical School (henceforth the expert team). The expert team served to enhance accountability and promote a balanced approach in design, analysis and synthesis of the review.[23-25] To ensure that data was meaningfully pieced together, both research and expert teams adopted an interpretivist approach.[41-44] As will be discussed, this process will be supplemented by adaptation of Noblit and Hare's[45] seven phases of meta-ethnography as part of the Funnelling Process. The six stages of SEBA are shown in *Figure 1* and described below.

Stage 1 of SEBA: Systematic Approach

A. Determining the title and background of the review

The research and expert teams reviewed overall objectives and determined the population, context and concept to be evaluated. This decision was guided by the preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 checklist.[46,47]

B. Identifying research questions and Inclusion Criteria

Both teams agreed the primary research question to be "*What are the key aspects of professionalism that should be integrated into postgraduate medical education?*" and the secondary research question to be "*What are the best practices for nurturing professionalism amongst physicians in Singapore?*"

A PICOs format framed the research process[29,33] (*Supplementary File 1*). Guided by the expert team and prevailing descriptions of PIF, the research team developed a search strategy for PubMed, Embase, PsycINFO, ERIC, Cochrane Database of Systematic Reviews, and Scopus databases. Searches were done for articles published between 1 January 1990 and 31 December 2018. The full PubMed search strategy can be found in *Supplementary File 2*. All research methodologies (quantitative and qualitative) or articles translated into English were included.

C. Extracting and charting

Using an abstract screening tool, the research team independently reviewed the titles and abstracts to identify a list of relevant articles believed to be of relevance that met the inclusion and exclusion criteria that were set out in Supplementary File 1. Next, they individually evaluated full text articles within this filtered list in a second sieving process, resulting in a final list of included articles. These individual lists were discussed amongst the researchers at online meetings and Sandelowski and Barroso's[48] 'negotiated consensual validation' was used to achieve consensus on the final list of articles to be included. Here, negotiated validity

sees "*research team members articulate, defend, and persuade others of the "cogency" or "incisiveness" of their points of view or show their willingness to abandon views that are no longer tenable. The essence of negotiated validity is consensus*." (p.229) This final list was then reviewed by the last author. The research team then evaluated the references of the included articles and performed 'snowballing' of references, in keeping with the SEBA methodology, to ensure a more comprehensive review of the articles.

Stage 2 of SEBA: Split Approach

To increase reliability and transparency of the analysis, three independent research sub-teams employed the Split Approach.[48,50] One group used Braun and Clarke's[51] approach to *thematic analysis,* whilst the second group employed Hsieh and Shannon's[52] *directed content analysis* of prevailing accounts of nurturing professionalism. The reviewers within each sub-team achieved consensus on their analyses before comparing with the other. This concurrent analysis of evidence-based and non-evidence-based data was to make transparent their influence on the synthesis of the narrative. A third group tabulated summaries of the accrued data to ensure key information was not lost and that the findings are viable and comparable with regnant practices.

A. Thematic Analysis

In the absence of rigorous definitions of PIF, two members of the research team adopted Braun and Clarke's[51] approach to identify key themes across different learning settings, goals, as well as learner and instructor populations.[53-61] This allowed for a wide range of research methodologies within the articles to be circumnavigated, preventing the use of statistical pooling and analysis.[62,63] This sub-team independently reviewed the included articles, constructed codes from surface meaning of the text and collated these into a code book, which was used to code and analyse the rest of the articles in a reiterative process. New codes were

associated with prior codes and concepts.[64-66] An inductive approach allowed for the themes to be "defined from the raw data without any predetermined classification".[67] Finally, the sub-team discussed their independent analyses in online and face-to-face meetings and used Sandelowski and Barroso's[48] 'negotiated consensual validation' to derive the final themes.

B. Directed Content Analysis

In tandem, two members of the research team independently employed Hsieh and Shannon's[52] approach to directed content analysis. This involved "identifying and operationalising *a priori* coding categories" by classifying text of similar meaning into categories drawn from prevailing theories.[52,68-72] Four members first used deductive category application[70] to extract codes and categories from Cruess, Cruess's[19] article, "*A schematic representation of the professional identity formation and socialization of medical students and residents: A guide for medical educators*". A code book was developed, and individual findings were discussed through online and face-to-face meetings. Differences in codes were discussed and Sandelowski and Barroso's[48] 'negotiated consensual validation' was used to arrive at the final list of categories.

Stage 3 of SEBA: Jigsaw Perspective

The Jigsaw Perspective hinges on Moss and Haertel's[73] suggestion that complementary qualitative data should be reviewed together to give "*a richer, more nuanced understanding of a given phenomenon*". This notion inspired careful consideration of the themes/categories identified in the Split Approach. In the Jigsaw Perspective, each theme and category are viewed as a piece of a jigsaw that may be combined with appropriate or complementary pieces, allowing for a more complete picture.

Guided by the Jigsaw perspective, the research team determined and combined themes/categories that showed overlaps and similarities between them in order to garner a more realistic and holistic picture of available data on nurturing professionalism.

Stage 4 of SEBA: Funnelling

The findings of the Jigsaw Perspective were compared with the tabulated summaries of the included articles. Two research team members independently summarised and tabulated the included full-text articles according to Wong, Greenhalgh's[74] RAMESES publication standards and Popay, Roberts's[75] guide to conducting narrative synthesis in systematic reviews. This verified that key aspects of included articles were not lost.

The funnelling process allowed for the comparison of themes/categories with the tabulated summaries to verify if the results were an accurate representation of existing data. To aid this process the research team adopted Phases 3 to 6 from France, Uny's[76] adaptation of Noblit and Hare's[45] seven phases of meta-ethnography to study the included articles.[77] In Phase 3, they described the nature, main findings and conclusions of the included in the tabulated summaries. In Phase 4, they juxtaposed the themes and the categories, primarily by grouping the themes and categories by their focus. This was helped by the commensurate focus of the included articles from which the themes and categories were drawn from. The homogeneity of the themes and categories allowed the adoption of reciprocal translation and latterly the mapping of the various themes/categories in Phase 6.

These themes/categories that will form the basis of the new storyline or overarching explanation of a phenomena Noblit and Hare[45] refer to as 'the line of argument' are presented in the results section.

Stage 5 of SEBA: Reiterative Process

As with all the stages, the findings of the funnelling process were scrutinised by the expert team.

Stage 6 of SEBA: Discussion: Synthesis of SSR in SEBA

The Best Evidence Medical Education (BEME) Collaboration guide[62] and the STORIES (Structured approach to the Reporting In healthcare education of Evidence Synthesis) statement[78] were adopted to guide the synthesis of the discussion.

Phase 2: Creating a content-valid questionnaire

Findings of the SSR in SEBA formed the basis for a content-valid questionnaire. All members of the research team independently reviewed Phase 1's findings and drew up a list of questions to be included in the questionnaire. Sandelowski and Barroso's[48] 'negotiated consensual validation' approach was employed to achieve the final list of questions. The final list was reviewed by the expert team.

Phase 3: Modified Delphi Approach – Administering questionnaire to local senior clinician educators

Following IRB exemption (ref 2020/2817), Phase 3 saw the administering of the newly designed curricula framework questionnaire (see *Supplementary File 4*) amongst a purposive sample of six senior clinician educators who were neither part of the research or expert team as part of a Modified Delphi approach.[79] The participants were acknowledged experts in curricular design, professionalism and/or had published on these subjects. The participants were also from medical and surgical backgrounds and from more than one organisation and healthcare group.

Participants assessed specific elements of a particular professionalism curriculum and whether these elements should warrant inclusion in a new professionalism curriculum tailored specifically to the postgraduate medical setting. The importance of the elements to be included in the new curriculum was rated using a single best-answer questionnaire and participants

indicated whether to include or exclude the item in the curriculum. Additionally, participants were also provided with an opportunity to comment on and add to items within each section.

A 70% consensus agreement for each item's inclusion was pre-specified by the research team where only items with more than 70% of participants agreeing should be incorporated in a new professionalism curriculum. The final list constituted of specific elements that were incorporated into the new professionalism curriculum.

RESULTS

Phase 1: SSR in SEBA Findings

Literature searches identified 14458 articles. 951 full-text articles were reviewed, of which 124 full-text articles were included and analysed (*Supplementary File 3*). A summary of the PRISMA process can be found in *Figure 2.*

The following themes/categories were derived from the Funnelling Process in Stage 4 and 5 of SEBA: (45, 74-77)

1. Definition of professionalism
2. Establishing training domains
3. Published professionalism topics in postgraduate medical education
4. How professionalism is nurtured in practice
5. Challenges to the teaching of professionalism within the workplace

1. Definition of professionalism

Professionalism can be defined by clinical competency – the set of values, behaviours and relationships that underpins the trust the public has in doctors,[80,81] demonstrated through a foundation of competence in communication skills, ethical, and legal understanding upon which the aspiration and application of principles of professionalism are built.[2,13,21,80-129] It is

believed to be centred around accountability and the strive for excellence, such as a commitment to lifelong learning and duty, advocacy, and service.[83,96]

Some papers also acknowledged that professionalism should be considered in more dynamic and behavioural terms,[9-16] such as being governed by principles of excellence, humanism, accountability and altruism,[81] entailing elements of honour, integrity, duty, advocacy, humanistic qualities, ethical and moral standards, and respect in service of others,[99] which can be manifested in professional behaviours, including but not limited to, punctuality, confidentiality, honesty, objectivity and teamwork.[13,81-83,85-100,102-106,108-128,130-132] Some recognised it as an attitude that transcends over a physician's self-interest, only to be focused on their patient's needs, and building upon the principles of patient welfare, autonomy and social justice.[93,94,97,99,126,127,133-144]

In essence, prevailing definitions acknowledge the evolving nature of concepts of professionalism that are built on attaining clinical competence, instilling humanistic and altruistic values and lifelong learning.

2. <u>Establishing training Domains</u>

Approaches involved in training professionalism include the following (outlined in *Table I*).

Table 1. *Domains of Professionalism*

Domains	**Elaboration**
Competency and assessment	Competency in aspects of clinical skills include: knowledge, clinical reasoning and decision making, effective communication with patients and the healthcare team[11,148,162-165] Competency in aspects of moral standards include: altruism, honour, demonstration of respect, integrity and empathy[126] Assessment can be viewed as an opportunity for feedback and self-improvement[96,104,141,148,165-168] Competency in navigating challenging conversations[109,135,169]

Competing interest and priorities	This involves navigation of the multiple interests, competing priorities and interpersonal relationships in workplace practices. Acting professionally requires the physician to balance complex and competing values and perspectives across spheres of influence from patients, immediate care team and within the larger practice environment[104,112,113,170-172] Mentee well-being, established through teaching coping strategies and providing emotional support[104,112,113,170-172]
Self-directed learning and reflection	Room for refection and discussion to foster a professional identity on the basis of affiliation, representation and attention which are needed in graduate medical education and learning from individual professional experiences. This also includes the journey of personal excellence and self-improvement, enabled through timely feedback avenues[16,86,87,96,104,133,142,147,148,150,152,153,155,173-181] Supporting professional identity formation[112,125,139,182-185]

3. Key topics to be included

Key aspects of an effective program to nurture professionalism are set out in *Table II.* These topics must be accompanied by clear specific, measurable, achievable, relevant and time-bound objectives.[145]

Table 2. *Professionalism Topics*

Topic	**Elaboration**
Communication and Challenging Scenarios	Interpersonal communication, verbal and non-verbal communication skills[104,112,141,186-189] Delivery of bad news and difficult conversations[167,169] Physician-patient communication[190] End-of-life issues[109,187,191,192] Informed consent[153] Communication skills relating to ethical issues[191] Challenging interactions[193] Conflict resolution[110,172] Medical improv[20]
Ethics	Ethics and legal issues including issues of unsolicited medical opinion, ethics of whistle blowing, publication ethics, drug pricing, research ethics and commercial conflicts of interest[153,191,194] Code and principle of professional ethics[153,194] Issues relating to mental capacity, informed consent and delivery of bad news[191,194] Bringing ethical theory to bedside[194]

Professionalism	Teamwork and collaboration[190] Coping skills training including coping strategies, conflict management, communication training, learning from mistakes, admitting mistakes, handling difficult situations, delivery of bad news, practice-based learning and improvement[2,16,21,110,163,167,170,195] Professional interactions with patients and society, surgeons, colleague, team members of support team, interdisciplinary respect, working as a team, coordination of care, working across languages and cultures[10,188,195-197] Professional attitudes and behaviours including leadership skills training, self-management, team leading and teamwork, professional judgment, self-awareness, humanistic care, professional integrity, the pursuit of excellence, humility, respect for others, resource management, situational awareness[10,109,143,167,169,187,191,196,198-205] Cultural competence and professionalism in culture[21,192,198,206] Experiential learning including practice-based learning, improvement and modelling of professional behaviour[110,112,163,198,201]
Virtues	Compassion, respect and empathy[10,142] Honesty, integrity and accountability[10,142,199] Implication of values in practice[191] Excellence and continuous improvement[199] Reliability and responsibility[142] Knowledge of limits[142] Communication and collaboration[142] Altruism and advocacy[142,163]
Self-care and Reflection	Self-directed learning and self-assessment[200,207] Self-awareness and self-improvement[142,143] Responsibility to self[200] Mindfulness and self-care[112] Reflective exercises including self-reflection, goal setting, recognition of achievements[16,189,197,201,203] Admitting limitations[193] Depression and burnout[109] Time management[109,110,143,188,203]
Clinical skills	Prevention, Diagnosis and Treatment of Major clinical threats[208]

4. <u>How professionalism is nurtured</u>

In keeping with the notion that professionalism develops upon the twin elements of knowledge and skills, and reflections and guided exposure, we summarise both aspects in *Table III*.

Table 3. *Proposed strategy for nurturing professionalism*

Curriculum	**Subthemes**	**Elaboration**
Knowledge and skills	Role modelling & mentoring	Emulate humanism and professional values through role modelling of non-verbal and verbal behaviours[87,209,210] *Non-verbal cues refer to:* listening closely to patients, appropriate touching, demonstration of respect and building a personal connection *Verbal behaviours refer to:* tone of voice, pace of speech and communication components, eliciting and addressing emotional responses Creating role models for faculty members offers an area of learning, an opportunity to implement professionalism and a chance to develop faculty members[86,87,108,124,127,144,185,193,200,203,211] Reward exemplary behaviour demonstrating professionalism[125,212]
	Experiential learning	Experiential learning is a means of learning through experience, whereby there is an integration of knowledge and doing in which both are repeatedly transformed[10,166]
	Workshops & seminars	Tackling issues of ethical conflicts and preparation[210] Formal lectures on professionalism concepts to effectively define expectations for professional behaviour[110,112,154,170,177,181,185,194,202,208] Includes case-based discussion, role playing and standardised patient exercises[2,205,213]
Reflections and guided exposure	Reflection-on-practice (16, 148, 155, 179, 201)	Reflection-on-practice where physicians learn from their own professional experiences to develop a professional identity and improvement. Reinforces the learning that happens experientially[16,148,155,179,201]
	Exposure during professional practice	Skilful navigation of challenging social and ethical situations that cannot be taught in a didactic setting[203] Emotionally intense experiences as triggers for personal growth and creates opportunities to challenge and reinforce a physician's beliefs[147]
	Decision making	Emphasis on multidisciplinary expertise[87,169,214] Stepwise learning through practice[96] Day to day interactions amongst trainees and mentors allowing exchange of ideas, experiences and environmental values, norms and expectations[200]

5. Challenges to nurturing professionalism

Challenges include lack of consistent and objective assessment tools,[16,139,146] individualisation – failure to adapt the approach to individual needs,[11,12,147-153] time constraints,[154] lack of institutional support in terms of protected time for teaching,[10,11,154-156] and heterogeneity in teaching professionalism.[21]

Phase 2: Creating a Content-Valid Questionnaire

Based on findings from SSR in SEBA, a 67-item questionnaire was created comprising of the following sections: **Communication and challenging scenarios** (8 items), **ethics and legal issues** (9 items), **professional attributes** (14 items), **virtues** (4 items), **self-care and reflection** (10 items), **teaching methods** (12 items), **assessment methods** (3 items) and **institutional support** (3 items).

Phase 3: Modified Delphi Process

Five out of six senior clinician educators completed all sections of the framework questionnaire, while one left sections 7 and 8 uncompleted. List of items and responses are summarised in *Supplementary File 5,* and the final proposed curricula framework is presented in *Supplementary File 6.*

Overall, all items within the sections 'communication and challenging scenarios', 'virtues', and 'self-care and reflection' met the 70% inclusion threshold to be included in the postgraduate professionalism curriculum.

Contrary to recent studies, *role modelling, 'lectures on the expectations for professional behaviour', 'portfolio that documents professional behaviour and participation in on-the-job experiences that build professionalism and reflection', 'regular evaluation in the professionalism domains',* and *'establish feedback portal where physicians can identify their learning gaps and request for more training'* were excluded as they did not meet the 70% inclusion threshold.

With general consensus of the items in the survey and no additional items proposed, a second round of the survey was not carried out.

DISCUSSION

To begin efforts in developing a campus-wide approach to nurturing professionalism must be seen as part of work on building PIF amongst postgraduate physicians. Whilst it is also evident that this process must be evidence-based, professionalism's very character underscores the need for it to be informed by prevailing sociocultural considerations and healthcare, healthcare financing, education and legal systems. Thus, use of a Modified Delphi process built on evidence-based data and guided by local experts would appear to be an appropriate means of getting 'buy in' into this project within the local setting.[157,158]

Phase 1's SSR in SEBA sought to answer the first research question – "*What are the key aspects of professionalism which should be integrated into postgraduate medical education?*" Our analysis on various professionalism definitions found led to the definition that professionalism is a longitudinal, evolving, and abstract concept built on attaining clinical competence, instilling humanistic and altruistic attributes with a commitment to life-long learning and self-improvement. This perspective echoes many of the features set out by accredited bodies such as ACGME, ABIM, CanMEDs, GMC, and SMC.[3-8] Perhaps just as significant as seeing professionalism as an abstract concept, is affirmation that professionalism includes a lifelong commitment to honing individual skills, competencies and reaffirming values, beliefs, principles and practices of professionalism in changing conditions. Together, this definition reaffirms a number of key insights on key concepts of professionalism and how it is to be nurtured.

The wide range of available training domains, topics and approaches to nurturing PIF in current medical education curriculums focus on integrating requisite clinical knowledge and skills, pointing to the notion of developing PIF in stages. This concept of developmental stages in PIF is consistent with Cruess, Cruess's[18] concept of an organised, stage-like progression of PIF that culminated in their article, "*A schematic representation of the professional identity*

formation and socialization of medical students and residents: A guide for medical educators". Cruess, Cruess's[18] addition of an 'IS' level atop Miller's pyramid signifying the attainment of a professional identity also reaffirms the notion that progress along the various stages were determined by attainment of specific competencies at each stage of development. In turn this also lent weight to Cruess, Cruess's[18] posit of regular competency based assessments and personalised, appropriate, specific, timely, accessible, achievable, longitudinal and holistic feedback guiding progress.

Many factors undermine the success of nurturing professionalism, though perhaps most significant is the failure to individualise such an approach to individual needs. The provision of personalised and holistic support of physicians highlights the need for a mentoring program. Mentoring flush with aspects of role modelling, supervision, coaching, networking, sponsorship and advising would allow the provision of personalised, appropriate, specific, timely, holistic and longitudinal support needed to nurture the ethical, professional, moral and personal traits and practices of trainees.[159] Just as importantly, mentoring would allow opportunities for continuous assessments, regular sharing, supported reflections, timely feedback and potential remediation for clinicians even after they have attained the 'IS' level of Cruess, Cruess's[18] adaptation of Miller's pyramid. This is in acknowledgement of the need for support in maintaining and realigning values, beliefs, principles and thinking in different settings.

Phase 2 and 3 sought to answer our second research question "*What are the best practices for nurturing professionalism amongst physicians?*", local experts in line with the definition proffered above suggest that nurturing professionalism in the postgraduate setting should focus on a 'dual approach'. Drawn from findings in the Modified Delphi process, the 'dual approach' confers equal considerations to attaining competencies and providing personalised and holistic support of trainees. Under the 'dual approach', knowledge and skills

training as well as approaches that focus on shaping attitudes need to be structured and accompanied by effective scaffolding to support postgraduates at different stages of their careers, with different needs, skills, abilities, motivations, goals and sociocultural, personal and professional considerations. Thus, a consistent approach to nurturing professionalism must be adopted replete with clear objectives, approaches and assessment methods.

In contrast with prevailing literature, responses from the Modified Delphi rejected portfolio use. This is rather surprising despite acknowledgement of PIF's longitudinal and personalised nature, local experts did not feel the need to adopt this approach to training which could be due to the lack of understanding in its use for nurturing professionalism. Deeper consideration and discussions with the expert team paints a different view, pointing instead to the limitations posed by running a portfolio-based approach (in terms of 'buy in' from the users), the maintenance and regular review of the portfolio and the need for assessors to support growth, reflections, provide guidance, feedback and utilising effective assessment tools; suggests a pragmatic rejection of portfolios. In its stead, it could be argued that the local experts favour the inculcation of values and principles, ethical concepts, and professional competencies that are supported by self-directed learning, supported reflections, role modelling of virtues and practices as well as mentoring to provide physicians with the skills and support to navigate professional issues effectively, knowing where and when to ask for support in a timely manner. Incumbent upon this process, however, is the "judgement that the learner has enough experience to act appropriately when facing unexpected challenges". This reflects the importance placed by local experts on verifying and documenting competency at the 'Does' level of Miller's Pyramid[160] or even at the level of the 'Is Trusted' level of Ten Cate, Carraccio's[161] 'extended' pyramid. Such an approach would in the local setting seem more sustainable.

LIMITATIONS

There are a number of limitations to this study. Whilst the selection of the databases used were identified by the expert team, critical papers could have likely been missed despite our efforts to use independent selection processes. Similarly, whilst use of the Split Approach and tabulated summaries allowed for triangulation and transparency in the selection of the direction of the SSR in SEBA, inherent biases amongst the reviewers would still impact the analysis of the data. The inclusion of the grey literature may also bias results and may provide these opinion-based views with a 'veneer of respectability' despite a lack of evidences to support it. This raises the question as to whether grey literature should be accorded the same weight as published literature.

CONCLUSION

Findings from the SSR in extend prevailing knowledge on definition and best practices in nurturing professionalism in medical education. Whilst the later part of the study focused on nurturing PIF in Singapore, our results and analysis from the Modified Delphi adds to medical education by introducing a more holistic approach applicable to practice in other countries in the region and beyond who have similar healthcare systems to Singapore.

Additionally, it has opened the door to a number of related discussions and studies, by highlighting the significance of mentoring in the local setting. Perhaps given growing evidence that mentoring could provide the holistic personalised support desired for trainees and offer a means of holistic assessment and longitudinal oversight required, it is clear that further study of mentoring's role in supporting and assessing holistic development, assessment tools to assess PIF and training of mentors; is required. Such data in tandem with the verified inculcation of appropriate traits and practices of a professional would facilitate a sustainable means of supporting PIF.

Glossary Terms

Professional Identity Formation – an adaptive developmental process that involves the psychological development of an individual, and the socialisation of the individual into appropriate roles and participation at work

Krishna's Systematic Evidenced Based Approach (SEBA) – A structured and accountable approach used to guide analyses to ensure reproducible and robust data.

Split Approach – combines content and thematic analysis of data to enhance the trustworthiness and depth of an analysis.

Jigsaw Perspective – Comparing overlaps between the themes and categories delineated by content and thematic analysis are considered in tandem, like complementary 'pieces of the jigsaw'. This allows for holistic perspective of data.

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FIGURES

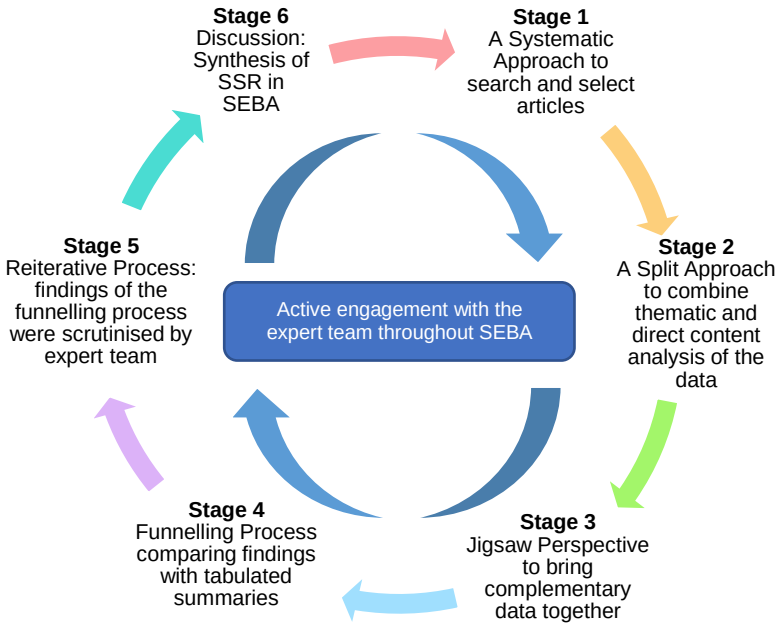

Figure 1. *Systematic Evidence-Based Approach (SEBA) Process*

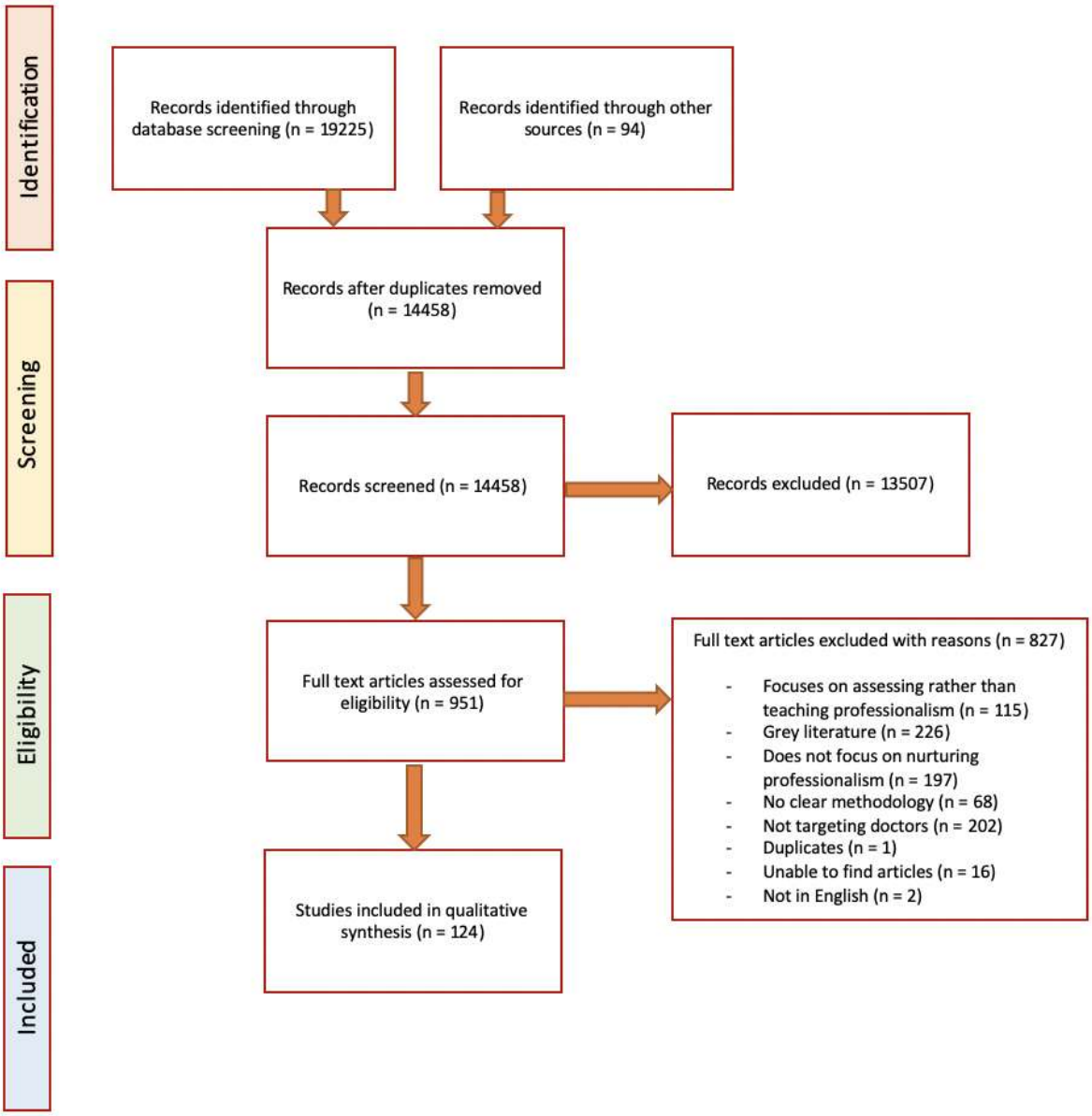

Figure 2. *PRISMA flowchart*

Supplementary File 1. *PICOS inclusion and exclusion criteria applied to database search*

PICOS	Inclusion Criteria	Exclusion Criteria
Population	Physicians within the clinical, medical, research and/or academic settings	Allied health specialties such as Pharmacy, Dietetics, Chiropractic, Midwifery, Podiatry, Speech Therapy, Occupational and Physiotherapy Non-medical specialties such as Clinical and Translational Science, Alternative and Traditional Medicine, Veterinary, Dentistry
Intervention	Nurturing and teaching Professionalism and/or Professional Competencies for physicians	NA
Comparison	Comparisons of the various practices (approaches, modalities, processes, objectives, motivations, challenges, facilitating characteristics/resources)	NA
Outcome	Approaches, modalities, processes, objectives, motivations, challenges, facilitating characteristics/resources in nurturing and teaching professionalism Impact of teaching professionalism on host organisation, assessors, and assessees (doctors)	NA
Study design	Articles in English or translated to English All study designs including: • Mixed methods research, meta-analyses, systematic reviews, randomised controlled trials, cohort studies, case-control studies, cross-sectional studies, and descriptive papers Year of Publication: 1 January 1990 – 31 December 2018 Databases: PubMed, Embase, PsycINFO, ERIC, Cochrane Database of Systematic Reviews, Scopus	Grey Literature / electronic and print information not controlled by commercial publishing Case reports and series, ideas, editorials, and perspectives Articles focusing on non-human subjects

Supplementary File 2. *PubMed Search Strategy*

Search	Concept	Subject Headings (MeSH)	Keywords [tiab]
1	Nurturing	"Hospitals, Teaching"[MeSH]	teaching[tiab] OR teachings[tiab] OR teach[tiab] OR teacher[tiab] OR teachers[tiab] OR tutor[tiab] OR tutors[tiab] OR tutoring[tiab] OR education[tiab] OR educations[tiab] OR educating[tiab] OR educator[tiab] OR educators[tiab] OR nurture[tiab] OR nurtures[tiab] OR nurturing[tiab] OR train[tiab] OR trains[tiab] OR training[tiab] OR trainer[tiab] OR develop[tiab] OR develops[tiab] OR developing[tiab] OR learn[tiab] OR learns[tiab] OR learning[tiab] OR promote[tiab] OR promotes[tiab] OR promoting[tiab] OR coach[tiab] OR coaching[tiab]
2	Professionalism	"Professionalism"[MeSH] OR "Professional Competence"[MeSH] OR "Professional Role" [MeSH] OR "ethics, medical"[MeSH] OR "patient-centered care"[MESH]	Professional[tiab] OR Professionalism[tiab]
3	Doctors/Medical Students	Physicians[MeSH] OR "Students, Medical"[MeSH] OR "Education, Professional"[MeSH] OR "Clinical Clerkship"[MeSH]	Physician[tiab] OR Physicians [tiab] OR resident[tiab] OR residents[tiab] OR residency[tiab] OR residencies[tiab] OR practice[tiab] OR practitioner[tiab] OR practitioners[tiab] OR doctor[tiab] OR doctors[tiab] OR houseman[tiab] OR housemanship[tiab] OR housemen[tiab] OR "medical officer"[tiab] OR "medical officers"[tiab] OR "medical student"[tiab] OR "medical students"[tiab]
4	Medical education	"Education, Medical, Graduate"[Mesh] OR "Education, Medical, Undergraduate"[Mesh] OR "Clinical Clerkship"[Mesh] OR "Medicine"[Mesh] OR "Schools, Medical"[Mesh]	Medicine[tiab] OR "medical education"[tiab] OR "medical school*"[tiab]
5	ACGME Professionalism Core Competency		"Accreditation Council for Graduate Medical Education"[tiab] OR ACGME[tiab] OR "Professional Conduct"[tiab] OR Accountability[tiab] OR Humanism[tiab] OR "Cultural Proficiency"[tiab] OR "Emotional Health"[tiab] OR "Physical Health"[tiab] OR "Mental Health"[tiab] OR "Personal Growth"[tiab] OR "Professional Growth"[tiab]
6	General Medical Council (GMC) Generic Professional Capabilities Framework-Professional values and behaviours		"General Medical Council Generic Professional Capabilities Framework"[tiab] OR GMC[tiab] OR "Professional Value*"[tiab] OR "Professional Behavio*"[tiab]

Supplementary File 2. *PubMed Search Strategy*

7	CanMEDS (Canadian Medical Education Directions for Specialists-name is no longer in use) Physician Competency Framework-Professional role		"Canadian Medical Education Directions for Specialists"[tiab] OR CanMEDS[tiab] OR Commitment[tiab]

SEARCH STRATEGY:

1 AND 2 AND 3 AND 4 AND (5 OR 6 OR 7)

Supplementary File 3. *List of full-text articles*

No.	Title	Authors	Year	Journal
1	"Once when i was on call…," theory versus reality in training for professionalism	S. Eggly, S. Brennan, and W. Wiese-Rometsch	2005	Academic Medicine
2	A behavioral and systems view of professionalism	C. S. Lesser, C. R. Lucey, B. Egener, C. H. Braddock, S. L. Linas, W. Levinson	2010	JAMA
3	A continuing medical education approach to improve sexual boundaries of physicians	W. A. Spickard, Jr., W. H. Swiggart, G. T. Manley, C. P. Samenow and D. T. Dodd	2008	Bulletin of the Menninger Clinic
4	A framework for developing excellence as a clinical educator	E. A. Hesketh; G. Bagnall; E. G. Buckley; M. Friedman; E. Goodall; R. M. Harden; J. M. Laidlaw; L. Leighton-Beck; P. McKinlay; R. Newton; R. Oughton	2001	Medical Education
5	A good clinician and a caring person: longitudinal faculty development and the enhancement of the human dimensions of care	W. T. Branch; R. Frankel; C. F. Gracey; P. M. Haidet; P. F. Weissmann; P. Cantey; G. A. Mitchell; T. S. Inui	2009	Academic medicine
6	A multi source feedback program for anesthesiologists	J. M. Lockyer; C. Violato; H. Fidler	2006	Canadian journal of anaesthesia = Journal canadien d'anesthesie
7	A prospective study of the relationship between medical knowledge and professionalism among internal medicine residents	C. P. West; J. L. Huntington; M. M. Huschka	2007	Academic Medicine
8	A qualitative study of improving preceptor feedback delivery on professionalism to postgraduate year 1 residents through education, observation, and reflection	R. A. Brauch, C. Goliath, L. Patterson, T. Sheers, N. Haller	2013	Ochsner Journal
9	ACGME core competency training, mentorship, and research in surgical subspecialty fellowship programs	M. Francesca Monn, M. H. Wang, M. M. Gilson, B. Chen, D. Kern and S. L. Gearhart	2013	Journal of surgical education
10	An integrative approach to cultural competence in the psychiatric curriculum	K. Fung, L. Andermann, A. Zaretsky and H. T. Lo	2008	Academic Psychiatry
11	An internet-based learning portfolio in resident education: the KOALA multicentre programme	M. F. Fung; M. Walker; K. F. Fung; L. Temple; F. Lajoie; G. Bellemare; S. C. Bryson	2000	Medical Education
12	An Overview of Cultural Competency Curricula in ACGME-accredited General Surgery Residency Programs	S. S. Shah, F. B. Sapigao, 3rd and M. B. J. Chun	2017	Journal of surgical education
13	Application of the core competencies after unexpected patient death: consolation of the grieved	D. Taylor, A. Luterman, W. O. Richards, R. P. Gonzalez and C. B. Rodning	2013	Journal of surgical education
14	Assessing residents' competency in care management: report of a consensus conference	J. G. Frohna; A. Kalet; E. Kachur; S. Zabar; M. Cox; R. Halpern; M. G. Hewson; M. J. Yedidia; B. C. Williams	2004	Teaching and Learning in Medicine
15	Assessment of resident physicians in professionalism, interpersonal and communication skills: a multisource feedback	B. Qu, Y. H. Zhao, B. Z. Sun	2012	Int Sci

Supplementary File 3. *List of full-text articles*

16	Attributes of excellent attending-physician role models	S. M. Wright; D. E. Kern; K. Kolodner; D. M. Howard; F. L. Brancati	1998	New England Journal of Medicine
17	Being prepared to work in Gynecology Medicine: evaluation of an intervention to promote junior gynecologists professionalism, mental health and job satisfaction	S. Mache, L. Baresi, M. Bernburg, K. Vitzthum and D. Groneberg	2017	Archives of gynecology and obstetrics
18	Can poetry make better doctors? Teaching the humanities and arts to medical students and residents at the University of California, Irvine, College of Medicine	J. Shapiro; L. Rucker	2003	Academic Medicine
19	Can professionalism be taught? Encouraging evidence	M. S. Hochberg, A. Kalet, S. Zabar, E. Kachur, C. Gillespie and R. S. Berman	2010	The American Journal of Surgery
20	Case-based multimedia program enhances the maturation of surgical residents regarding the concepts of professionalism	A.S. Kumar, D. Shibru, M. K. Bullard, T. Liu, and A. H. Harken	2007	Journal of surgical education
21	Causes of resident lapses in professional conduct during the training: A qualitative study on the perspectives of residents	H. J. Chang, Y. M. Lee, Y. H. Lee and H. J. Kwon	2017	Medical teacher
22	Critical incidents as a technique for teaching professionalism	R. Rademacher, D. Simpson, K. Marcdante	2010	Medical teacher
23	Cultural sensitivity training among foreign medical graduates	K. J. Majumdar, C. LA	1999	Medical Education
24	Defining professionalism in anaesthesiology	R. A. Kearney	2005	Medical Education
25	Development and Early Piloting of a CanMEDS Competency-Based Feedback Tool for Surgical Grand Rounds	C. Fahim, M. Bhandari, I. Yang and R. Sonnadara	2016	Journal of surgical education
26	Development and evaluation of standardized narrative cases depicting the general surgery professionalism milestones	A. Rawlings, A. D. C. Knox, Y. S. Park, S. Reddy, S. R. Williams, N. Issa, A. Jameel, and A. Tekian	2015	Academic Medicine
27	Development of a physician attributes database as a resource for medical education, professionalism and student evaluation	D. Rabinowitz; S. Reis; R. Van Raalte; G. Alroy; R. Ber	2004	Medical teacher
28	Development of the first guideline for professional conduct in medical practice in Iran	S. Saeedi Tehrani, F. Nayeri, A. Parsapoor, A. Jafarian, A. Labaf, A. Mirzazadeh, H. Emadi Kouchak, F. Shahi, N. Ghasemzadeh and F. Asghari	2017	Archives of Iranian medicine
29	Difficult conversations in health care: cultivating relational learning to address the hidden curriculum	D. M. Browning, E. C. Meyer, R. D. Truog, M. Z. Solomon	2007	Academic medicine
30	Diving for PERLS-working and performance portfolios for evaluation and reflection on learning	L. E. Pinsky; K. Fryer-Edwards; T. P. Webb; C. Aprahamian; J. A. Weigelt; K. J. Brasel; J.; D. Snadden	2006	Internal Medicine
31	Doctors in acute and longitudinal care specialties emphasise different	J. M. Garfield; F. B. Garfield; N. D. Hevelone; N. Bhattacharyya; D. F.	2009	Medical Education

Supplementary File 3. *List of full-text articles*

	professional attributes: implications for training programmes	Dedrick; S. W. Ashley; E. S. Nadel; J. T. Katz; C. Kim; A. A. Mitani		
32	Doctors in society. Medical professionalism in a changing world.	W. P. o. t. R. C. o. Physicians (Working Party of the Royal College of Physicians)	2005	Clinical Medicine
33	Educating for professionalism: trainees' emotional experiences on IM and pediatrics inpatient wards	D. L. Kasman, K. Fryer-Edwards and C. H. Braddock	2003	Academic Medicine
34	Effect of multisource feedback on resident communication skills and professionalism: a randomized controlled trial	W. B. Brinkman, S. R. Geraghty, B. P. Lanphear, J. C. Khoury, J. A. Gonzalez del Rey, T. G. Dewitt and M. T. Britto	2007	Archives of pediatrics & adolescent medicine
35	Emergency Medicine Resident Perceptions of Medical Professionalism	J. Jauregui, M. O. Gatewood, J. S. Ilgen, C. Schaninger and J. Strote	2016	Western Journal of Emergency Medicine
36	Ethics education for dermatology residents	L. Bercovitch, T. P. Long	2009	Clinics in dermatology
37	Ethics education in family medicine training in the United States: a national survey	H. M. Manson, D. Satin, V. Nelson and T. Vadiveloo	2013	Family Medicine
38	Exploring the transition into practice of general paediatricians from a Canadian residency program	M. Chan and M. A. Van Manen	2018	Paediatrics & child health
39	Factors predicting doctors' reporting of performance change in response to multisource feedback	K. Overeem; H. C. Wollersheimh; O. A. Arah; J. K. Cruijsberg; R. P. Grol; K. M. Lombarts	2012	BMC medical education
40	Faculty development for teaching and learning professionalism	Y. Steinnert; R. L. Cruess; S. R. Cruess; Y. Steinert	2009	Medical Education
41	Faculty development to enhance humanistic teaching and role modeling: a collaborative study at eight institutions	W. T. Branch, Jr., C. L. Chou, N. J. Farber, D. Hatem, C. Keenan, G. Makoul, M. Quinn, W. Salazar, J. Sillman, M. Stuber, L. Wilkerson, G. Mathew and M. Fost	2014	Journal of general internal medicine
42	Fostering professional formation in residency: Development and evaluation of the “forum” seminar series	M. Nothnagle, S. Reis, R. E. Goldman and G. Anandarajah	2014	Teaching and Learning in Medicine
43	General surgery morning report: a competency-based conference that enhances patient care and resident education	B. M. Stiles, T. B. Reece, T. L. Hedrick, R. A. Garwood, M. G. Hughes, J. J. Dubose, R. B. Adams, B. D. Schirmer, H. A. Sanfey and R. G. Sawyer	2006	Current surgery
44	Graduate medical education at the Medical College of Wisconsin: new initiatives to respond to the changing residency training environment	M. S. Kochar, D. E. Simpson and D. Brown	2003	Wisconsin Medical Journal
45	Graduate medical education competencies for international health electives: A qualitative study	H. C. Nordhues, M. U. Bashir, S. P. Merry and A. P. Sawatsky	2017	Medical teacher
46	High-Quality Feedback Regarding Professionalism and Communication Skills in Otolaryngology Resident Education	E. A. Faucett, H. C. McCrary, J. Y. Barry, A. A. Saleh, A. B. Erman and S. L. Ishman	2018	Otolaryngology–Head and Neck Surgery

Supplementary File 3. *List of full-text articles*

47	Human dimensions in bedside teaching: focus group discussions of teachers and learners	S. Ramani and J. D. Orlander	2013	Teaching and Learning in Medicine
48	Human simulation in emergency medicine training: a model curriculum	S. A. McLaughlin, D. Doezema and D. P. Sklar	2002	Academic Emergency Medicine
49	Humanism and professionalism education for pediatric hematology-oncology fellows: A model for pediatric subspecialty training	J. C. Kesselheim, M. Atlas, D. Adams, B. Aygun, R. Barfield, K. Eisenman, J. Fulbright, K. Garvey, L. Kersun, A. Nageswara Rao, A. Reilly, M. Sharma, E. Shereck, M. Wang, T. Watt and P. Leavey	2015	Pediatric Blood and Cancer
50	Identifying professional characteristics of the ideal medical doctor: The laddering technique	S. Miles, S. J. Leinster	2010	Medical teacher
51	Implementation of a Needs-Based, Online Feedback Tool for Anesthesia Residents With Subsequent Mapping of the Feedback to the ACGME Milestones	P. Tanaka, S. Bereknyei Merrell, K. Walker, J. Zocca, L. Scotto, A. L. Bogetz and A. Macario	2017	Anesthesia & Analgesia
52	Implementation of peer review into a physical medicine and rehabilitation program and its effect on professionalism	J. Bonder, D. Elwood, J. Heckman, A. Pantel and A. Moroz	2010	PM&R
53	Implementing a Narrative Medicine Curriculum During the Internship Year: An Internal Medicine Residency Program Experience	T. Wesley, D. Hamer and G. Karam	2018	The Permanente journal
54	Improving professionalism: making the implicit more explicit	B. D. Joyner and V. M. Vemulakonda	2007	The Journal of urology
55	Improving surgical residents' performance on written assessments of cultural competency	A. Krajewski, C. Rader, A. Voytovich, W. E. Longo, R. A. Kozol and R. Y. Chandawarkar	2008	Journal of surgical education
56	Incorporating palliative care into primary care education. National Consensus Conference on Medical Education for Care Near the End of Life	S. D. Block, G. M. Bernier, L. M. Crawley, S. Farber, D. Kuhl, W. Nelson, J. O'Donnell, L. Sandy and W. Ury	1998	Journal of general internal medicine
57	Incorporating professionalism into medical education: the Mayo Clinic experience	P. S. Mueller	2009	The Keio journal of medicine
58	Initial use of a novel instrument to measure professionalism in surgical residents	P. G. Gauger; L. D. Gruppen; R. M. Minter; L. M. Colletti; D. T. Stern	2005	The American Journal of Surgery
59	Introducing the Professional-ism Mini—Evaluation Exercise (P-MEX) in Japan: Results from a multicenter, cross-sectional study	S. Ohbu; R. Cruess; S. Cruess; T. Okubo, T sugawa Y , T akahashi O	1822	Academic Medicine
60	MAP-IT program to enhance professionalism in pathology residency training	S. Roychoudhury and M. J. Esposito	2017	Academic Pathology
61	Mapping the Balint groups to the Accreditation Council for Graduate Medical Education family medicine competencies	A. Lichtenstein, J. Antoun, C. Rule, K. Knowlton and J. Sternlieb	2018	The International Journal of Psychiatry in Medicine

Supplementary File 3. *List of full-text articles*

62	Objective Structured Video Examinations (OSVEs) for geriatrics education	D. Simpson; R. Helm; T. Drewniak; M. M. Ziebert; D. Brown; J. Mitchell; N. Havas; K. Denson; S. Gehl; D. Kerwin; D. S. A. Bragg; S. Denson; M. Gleason Heffron; H. H. Harsch; E. H. Duthie	2006	Gerontology & geriatrics education
63	Observation, reflection, and reinforcement: surgery faculty members' and residents' perceptions of how they learned professionalism	J. Park, S. I. Woodrow, R. K. Reznick, J. Beales, and H. M. MacRae	2010	Academic Medicine
64	Occupational physicians' perceived value of evidence-based medicine intervention in enhancing their professional performance	N. I. R. Hugenholtz, F. G. Schaafsma, J. F. Schreinemakers, F. J. H. van Dijk and K. Nieuwenhuijsen	2008	Scandinavian Journal of Work, Environment and Health
65	On reflection: doctors learning to care for people who are dying	R. D. MacLeod	2001	Social Science & Medicine
66	Operationalizing professionalism: a meaningful and practical integration for resident education	B. G. Nichols, L. M. Nichols, D. M. Poetker, and M. E. Stadler	2014	The Laryngoscope
67	Organisational strategies to cultivate professional values and behaviours	A. T. Cunningham, E. C. Bernabeo, D. B. Wolfson, C. S. Lesser	2011	BMJ quality & safety
68	Pathology, professionalism, portfolios and progress: A phenomenological study of professional identity formation in pathol-ogy, and the development of an educational model to promote professionalism	W. M. Pryor	2010	University of Sydney
69	Personal growth during internship: a qualitative analysis of interns' responses to key questions	R. B. Levine; P. Haidet; D. E. Kern; B. W. Beasley; L. Bensinger; D. W. Brady; T. Gress; J. Hughes; A. Marwaha; J. Nelson; S. M. Wright	2006	Journal of general internal medicine
70	Physician professional behaviour affects outcomes: A framework for teaching professionalism during anesthesia residency	W. Bahaziq and E. Crosby	2011	Canadian Journal of Anesthesia
71	Portfolios in continuing medical education--effective and efficient?	N. J. Mathers; M. C. Challis; A. C. Howe; N. J. Field	1999	Medical Education
72	Preceptors' understanding and use of role modeling to develop the CanMEDS competencies in residents	L. Côté, P. Laughrea	2014	Academic Medicine
73	Professionalism and Communication Education in Pediatric Critical Care Medicine: The Learner Perspective	D. A. Turner, G. M. Fleming, M. Winkler, K. J. Lee, M. F. Hamilton, C. P. Hornik, T. Petrillo-Albarano, K. Mason and R. Mink	2015	Academic pediatrics
74	Professionalism and maintenance of certification: using vignettes describing interpersonal dilemmas to stimulate reflection and learning	E. C. Bernabeo, S. G. Reddy, S. Ginsburg and E. S. Holmboe	2014	Journal of Continuing Education in the Health Professions
75	Professionalism and non-technical skills in Radiology in the UK: a review of the national curriculum	F. Daley, D. Bister, S. Markless and P. Set	2018	BMC research notes
76	Professionalism in obstetrics-gynecology residency education: the view of program directors	M. H. Fries	2000	Obstetrics & Gynecology

Supplementary File 3. *List of full-text articles*

77	Promoting success: a professional development coaching program for interns in medicine	K. Palamara, C. Kauffman, V. E. Stone, H. Bazari, K. Donelan	2015	Journal of Graduate Medical Education
78	Reflection as a Learning Tool in Graduate Medical Education: A Systematic Review	A. F. Winkel, S. Yingling, A. A. Jones and J. Nicholson	2017	Journal of Graduate Medical Education
79	Reflective Practice: Assessing Its Effectiveness to Teach Professionalism in a Radiology Residency	J. W. Kung, P. J. Slanetz, G. C. Huang and R. L. Eisenberg	2015	Academic Radiology
80	Reliability of the physical medicine and rehabilitation resident observation and competency assessment tool: a multi-institution study	D. W. Musick; W. L. Bockenek; T. L. Massagli; M. A. Miknevich; K. R. Poduri; J. A. Sliwa; M. Steiner	2010	American journal of physical medicine & rehabilitation
81	Resident Self-Assessment and Learning Goal Development: Evaluation of Resident-Reported Competence and Future Goals	S. T. T. Li, D. A. Paterniti, D. J. Tancredi, A. E. Burke, R. F. Trimm, A. Guillot, S. Guralnick and J. D. Mahan	2015	Academic Pediatrics
82	Resident-generated versus instructor-generated cases in ethics and professionalism training	A.A. Kon	2006	Philosophy, Ethics, and Humanities in Medicine
83	Residents' perceptions of professionalism in training and practice: barriers, promoters, and duty hour requirements	N. Ratanawongsa; S. Bolen; E. E. Howell; D. E. Kern; S. D. Sisson; D. Larriviere	2006	Journal of general internal medicine
84	Role modeling humanistic behavior: learning bedside manner from the experts	P. F. Weissmann, W. T. Branch, C. F. Gracey, P. Haidet and R. M. Frankel	2006	Academic Medicine
85	Role modeling: A precious heritage in medical education	A. Mirhaghi, H. K. Moonaghi, S. Sharafi and A. E. Zeydi	2015	Acta Facultatis Medicae Naissensis
86	Self-assessment in the health professions: a reformulation and research agenda	K. W. Eva; G. Regehr	2005	Academic medicine
87	Serving as a physician role model for a diverse population of medical learners	S. M. Wright; J. A. Carrese	2003	Academic Medicine
88	Sometimes you can't make it on your own: the impact of a professionalism curriculum on the attitudes, knowledge, and behaviors of an academic plastic surgery practice	C.S. Hultman, E. G. Halvorson, D. Kaye, R. Helgans, M. O. Meyers, P. A. Rowland, A. A. Meyer	2013	journal of surgical research
89	Stimulating preventive procedures in primary care. Effect of PIUPOZ program on the delivery of preventive procedures	E. Gowin, D. Avonts, W. Horst-Sikorska, J. Dytfeld and M. Michalak	2012	Archives of Medical Science
90	Student and resident perspectives on professionalism: beliefs, challenges, and suggested teaching strategies	S. Miranda, A. Abraham, S. Hudkins, J. Emily, B. Klug, L. Kathy, A. DH. Monroe	2014	International journal of medical education
91	Teaching and assessing professionalism in ophthalmology residency training programs	A. G. Lee, H. A. Beaver, H. C. Boldt, R. Olson, T. A. Oetting, M. Abramoff and K. Carter	2007	Survey of ophthalmology
92	Teaching and assessment of ethics and professionalism: a survey of pediatric program directors	A. F. Cook, S. A. Sobotka and L. F. Ross	2015	Academic Pediatrics

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93	Teaching and evaluating professionalism for anesthesiology residents	I. Dorotta; J. Staszak; A. Takla; J. E. Tetzlaff	2006	Medical teacher
94	Teaching approaches that reflect and promote professionalism	C. J. Hatem	2003	Academic Medicine
95	Teaching professional and humanistic values: suggestion for a practical and theoretical model	W. T. Branch	2015	Patient education and counseling
96	Teaching professionalism to junior doctors: experience of a multidisciplinary approach in the Foundation Programme	M. G. Masding, W. McConnell and C. Lewis	2009	Clinical medicine
97	Teaching professionalism to residents	E. Klein, J. C. Jackson, L. Kratz, E.K. Marcuse, H.A. McPhillips, R.P. Shugerman, S. Watkins, F. B. Stapleton	2003	Academic Medicine
98	The developing physician—becoming a professional	D. T. Stern, M. Papadakis	2006	New England Journal of Medicine
99	The expected results of faculty development programs in medical professionalism from the viewpoint of medical education experts	N. Yamani, M. Shakour and A. Yousefi	2016	Journal of Research in Medical Sciences
100	The Heroic and the Villainous: a qualitative study characterising the role models that shaped senior doctors' professional identity	K. Foster and C. Roberts	2016	BMC medical education
101	The impact of facilitation of small-group discussions of psychosocial topics in medicine on faculty growth and development	A. K. Kumagai, C. B. White, P. T. Ross, R. L. Perlman, J. C. Fantone	2008	Academic medicine
102	The informal curriculum: what do junior doctors learn from a palliative care rotation?	C. H. Poi, H. S. Khoo, Y. H. M. Koh and A. H. Y. Mei	2018	BMJ supportive & palliative care
103	The majority of accredited continuing professional development activities do not target clinical behavior change	F. Légaré, A. Freitas, P. Thompson-Leduc, F. Borduas, F. Luconi, A. Boucher, H. O. Witteman and A. Jacques	2015	Academic Medicine
104	The path to professionalism: cultivating humanistic values and attitudes in residency training	K. M. Markakis; H. B. Beckman; A. L. Suchman; R. M. Frankel	2000	Academic medicine
105	The patient panel conference experience: what patients can teach our residents about competency issues	C. Y. Colbert, C. Mirkes, C. T. Cable, S. J. Sibbitt, G. O. VanZyl, P. E. Ogden	2009	Academic Medicine
106	The patient-physician relationship. Teaching the human dimensions of care in clinical settings	W. T. Branch; D. Kern; P. Haidet; P. Weissmann; C. F. Gracey; G. Mitchell; T. Inui	2001	JAMA
107	The positive role of professionalism and ethics training in medical education: a comparison of medical student and resident perspectives	L. W. Roberts; K. A. Green Hammond; C. M. A. Geppert; T. D. Warner	2004	Academic Psychiatry
108	The professionalism curriculum as a cultural change agent in surgical residency education	M. S. Hochberg, R. S. Berman, A. L. Kalet, S. R. Zabar, C. Gillespie and H. L. Pachter	2012	The American Journal of Surgery

Supplementary File 3. *List of full-text articles*

109	The professionalism disconnect: do entering residents identify yet participate in unprofessional behaviors?	A. Nagler, K. Andolsek, M. Rudd, R. Sloane, D. Musick and L. Basnight	2014	BMC medical education
110	Through the looking glass: How reflective learning influences the development of young faculty members	S. Higgins, L. Bernstein, K. Manning, J. Schneider, A. Kho, E. Brownfield, and W. T. Branch Jr	2011	Teaching and Learning in Medicine
111	Transformative professional development of physicians as educators: assessment of a model	E. G. Armstrong, J. Doyle and N. L. Bennett	2003	Academic Medicine
112	Transforming practice organizations to foster lifelong learning and commitment to medical professionalism	D. M. Frankford, M. A. Patterson and T. R. Konrad	2000	Academic Medicine
113	Twelve tips on teaching and learning humanism in medical education	L. G. Cohen and Y. A. Sherif	2014	Medical teacher
114	Understanding, teaching and assessing the elements of the CanMEDS Professional Role: canadian program directors' views	A. E. Warren, V. M. Allen, F. Bergin, L. Hazelton, P. Alexiadis-Brown, K. Lightfoot, J. McSweeney, J. F. Singleton, J. Sargeant and K. Mann	2014	Medical teacher
115	Using the morbidity and mortality conference to teach and assess the ACGME General Competencies	J. C. Rosenfeld	2005	Current Surgery
116	Young physicians' recall about pediatric training in ethics and professionalism and its practical utility	A. F. Cook and L. F. Ross	2013	The Journal of pediatrics
117	Common Ground: Frameworks for Teaching Improvisational Ability in Medical Education	Belinda Fu	2019	TEACHING AND LEARNING IN MEDICINE
118	Does a socially-accountable curriculum transform health professional students into competent, work-ready graduates? A cross-sectional study of three medical schools across three countries	Torres Woolley, Amy Clithero-Eridon, Salwa Elsanousi & Abu-Bakr Othman	2019	medical teacher
119	Guided Self-Assessment and Action Plans: What Do Residents Need to Succeed?	Lori R. Berkowitz1,2 & Natasha R. Johnson1,3 & Sharon Muret-Wagstaff4	2019	springer
120	how to Foster Professional Values during Pathology Residency	Yong-Jin Kim	2019	Journal of Pathology and Translational Medicine
121	Humanistic medicine in anaesthesiology: development and assessment of a curriculum in humanism for postgraduate anaesthesiology trainees	Cecilia Canales1,2,*, Suzanne Strom1, Cynthia T. Anderson1, Michelle A. Fortier3, Maxime Cannesson4, Joseph B. Rinehart1, Zeev N. Kain1,4 and Danielle Perret1,5	2019	British Journal of Anaesthesia
122	Key stakeholder opinions for a national learner education handover	Aliya Kassam , Mariela Ruetalo , Maureen Topps , Margo Mountjoy , Mark Walton , Susan Edwards and Leslie Nickell2	2019	BMC Medical Education

Supplementary File 3. *List of full-text articles*

123	Optimizing the Learning and Working Environment for Radiology Residents	Seth Stalcup, MD, Rebecca Leddy, MD, Jeanne Hill, MD, Madelene Lewis, MD	2019	Academic Radiology
124	Teaching Professionalism in Postgraduate Medical Education: A Systematic Review	Berger Arielle S. MD; Niedra Elizabeth MD; Brooks Stephanie G.; Ahmed Waleed S. MD; Ginsburg Shiphra MD, PhD	2019	Academic Medicine

Professionalism Curriculum Development - Modified Delphi Survey

Overview
Using this online platform, we invite you to assess specific elements of prevailing professionalism curricula, and determine if these elements should warrant a place in a new and ideal professionalism curriculum program tailored specifically for the postgraduate medical setting. These will be rated using a single best-answer questionnaire.

*If you agree that the item should be included, please indicate 'Include'.
*If you disagree that the item should be included, please indicate 'Exclude'.
*If you have further comments specific to the item, please provide them in the Comments column.

Other suggestions or input would be very much welcomed. An opportunity will be given at the end of the survey page. Through your input, each item will be accorded a final score.

There are two important considerations during the modified Delphi process.
1. Balancing the number of items listed with what is deemed to be important and feasible in a professionalism curriculum program for doctors
2. Ensuring that there is enough depth to the item to capture the dynamic nature of professionalism

We look forward to your invaluable input. Please proceed to the next page for the modified Delphi survey. Thank you.

This section pertains to 'Professionalism Topics'.

The following questions are derived from existing data of "professionalism topics". As a broad and dynamic field, professionalism involves numerous concepts and skills, some of which are interwoven with other ethical concepts. However, **within this wide range of topics, some stand out more than others in terms of importance and relevance to everyday practice.** Hence, it is pertinent to teach physicians these core skills through didactic and experiential teaching methods for them to become professional doctors.

In the section below, **please indicate as to whether the following professionalism content topics should be included or excluded in an ideal professionalism curriculum program**. Inclusion would mean deeming the topic important and deserving of time and resources for further teaching and/or nurturing.

1. Communication and Challenging Scenarios:

	Include	Exclude
Communication with patients (verbal)		
Communication with patients (non-verbal skills, including bedside manners)		
Conflict management with patients		
Breaking bad news to patients		
Addressing end-of-life issues with patients and family		
Taking informed consent from the patient or relevant stakeholders		
Communication with the interprofessional healthcare team		
Conflict management within the healthcare team		

Comments

2. Ethics and Legal issues:

	Include	Exclude
Fundamental code and principle of professional ethics		
Ethical and legal considerations related to mental capacity		
Ethical and legal considerations related to informed consent		

Ethical and legal considerations related to the delivery of bad news		
Unsolicited medical opinion		
Ethics of whistleblowing within the organisation		
Publication and research ethics		
Drug pricing		
Commercial conflicts of interest		

Comments

3. Professional Attributes:

	Include	**Exclude**
Teamwork with other healthcare professionals		
Interdisciplinary respect		
Coordination of care within the healthcare team		
Coordination of care with the patient and caregivers		
Teamwork with patients as part of shared decision making		
Working with patients who speak different languages		
Working with healthcare staff who speak different languages		
Interacting with patients from a different culture (how to be considerate and respectful)		
Interacting with healthcare staff from a different culture (how to be considerate and respectful)		
Admitting medical mistakes, professional integrity		
Learning from medical mistakes		
Leadership skills training		
Situational awareness		
Resource management		

Comments

4. Virtues:

	Include	**Exclude**
Compassion and empathy to patients		
Respect		
Excellence, continuous improvement		
Reliability and responsibility		
Implications of values in practice		
Knowledge of own limits		
Altruism		
Advocacy		

Comments

5. Self-care and reflection:

	Include	**Exclude**
Self-directed learning		
Self-awareness in the moment, mindfulness		
Emotional regulation		
Responsibility to self		
Reflective exercises (act of doing reflection): goal setting, self-reflection, acknowledging achievements		
Admitting limitations		
Addressing depression and burnout		
Time management		
Self-care techniques		
Strategies to cope with stress		

Comments

6. What other topics do you think should be included?

_____
_____
_____
_____

This section pertains to 'Teaching Methods'.

The following questions are derived from existing data of "teaching methods". This refers to the **avenues by which the professionalism topics are taught to** the students.

In the section below, **please indicate as to whether the following teaching methods should be included or excluded in an ideal professionalism curriculum program**. Inclusion would mean deeming the teaching method important and deserving of time and resources to further develop and execute.

7. Teaching Methods

	Include	Exclude
Formal assigned mentor within the faculty to act as a role model		
Have a guideline of professional values and behaviours that the mentor can use for discussion with the learner/ lets the learner experience. Experience may be through informal opportunities or coordinated tutorials.		
Recognition (eg. Awards) to commend exemplary behaviour demonstrating professionalism		
Workshop/seminars (on 'professionalism topics' in previous section)		
Lectures on the expectations for professional behaviour		
Case-based discussions - what what would you do as an individual		
Role playing scenarios		
Improvisation exercises and discussions		
Standardised patient (SP) exercises		
Portfolio that documents professional behaviour and participation in on-the-job experiences that build professionalism and reflection		
Team discussions about challenging social and ethical situations		
Multidisciplinary discussions to practice interprofessional communications		

Comments

8. What other methods do you think should be included?

_____
_____
_____
_____

This section pertains to 'Assessment Methods'.

The following questions are derived from existing data of "assessment methods". This refers to the **methods by which professionalism may be assessed** in physicians.

In the section below, **please indicate as to whether the following assessment methods should be included or excluded in an ideal professionalism curriculum program**. Inclusion would mean deeming the assessment method important and deserving of time and resources to further develop and execute.

9. Assessment Methods

	Include	**Exclude**
Self assessment tools		
Personalised learning plans e.g. portfolio to encourage physicians to reflect and record their experiences		
Regular evaluation of knowledge, skills, and attitude in the relevant domains of professionalism (stated above) e.g. through a professionalism evaluation form		

Comments

10. What other assessment methods do you think should be included?

_____
_____
_____
_____

This section pertains to 'Institutional Support.

The following questions are derived from existing data of "support provided by the institution". This refers to **areas where the faculty can lend support** to facilitate the execution and success of the professionalism curriculum.

In the section below, **please indicate as to whether the following forms of support from the institution should be included or excluded in an ideal professionalism curriculum program**. Inclusion would mean deeming the form of institutional support important and deserving of time and resources to further develop and execute.

11. Institutional Support:

	Include	**Exclude**
Allocate formal curriculum time for professionalism teachings		
Provide welfare support for all physicians		
Feedback portal where physicians can identify their learning gaps and request for more training		

Comments

12. What other forms of institutional support do you think should be included?

_____
_____
_____
_____

Thank You

Supplementary File 5. *Nurturing professionalism curriculum framework questionnaire and responses*

Section and items	Proportion of participants who indicated that the item should be included	Included/ excluded in the new curriculum
1. Communication and Challenging Scenarios:		
Communication with patients (verbal)	100.00%	Included
Communication with patients (non-verbal skills, including bedside manners)	100.00%	Included
Conflict management with patients	100.00%	Included
Breaking bad news to patients	83.33%	Included
Addressing end-of-life issues with patients and family	83.33%	Included
Taking informed consent from the patient or relevant stakeholders	100.00%	Included
Communication with the interprofessional healthcare team	100.00%	Included
Conflict management within the healthcare team	100.00%	Included
2. Ethics and Legal issues:		
Fundamental code and principles of professional ethics	100.00%	Included
Ethical and legal considerations related to mental capacity	100.00%	Included
Ethical and legal considerations related to informed consent	100.00%	Included
Ethical and legal considerations related to the delivery of bad news	100.00%	Included
Unsolicited medical opinion	66.67%	Excluded
Ethics of whistleblowing within the organisation	66.67%	Excluded
Publication and research ethics	100.00%	Included
Drug pricing	50.00%	Excluded
Commercial conflicts of interest	100.00%	Included
3. Professional Attributes:		
Teamwork with other healthcare professionals	100.00%	Included
Interdisciplinary respect	83.33%	Included
Coordination of care within the healthcare team	83.33%	Included
Coordination of care with the patient and caregivers	83.33%	Included
Teamwork with patients as part of shared decision making	100.00%	Included
Working with patients who speak different languages	50.00%	Excluded
Working with healthcare staff who speak different languages	33.33%	Excluded
Interacting with patients from a different culture (how to be considerate and respectful)	83.33%	Included
Interacting with healthcare staff from a different culture (how to be considerate and respectful)	83.33%	Included
Admitting medical mistakes, professional integrity	100.00%	Included
Learning from medical mistakes	100.00%	Included
Leadership skills training	66.67%	Excluded
Situational awareness	66.67%	Excluded
Resource management	50.00%	Excluded

Supplementary File 5. *Nurturing professionalism curriculum framework questionnaire and responses*

4. Virtues:		
Compassion and empathy to patients	100.00%	Included
Respect	100.00%	Included
Excellence, continuous improvement	100.00%	Included
Reliability and responsibility	100.00%	Included
Implications of values in practice	83.33%	Included
Knowledge of own limits	100.00%	Included
Altruism	83.33%	Included
Advocacy	100.00%	Included
5. Self-care and reflection:		
Self-directed learning	83.33%	Included
Self-awareness in the moment, mindfulness	100.00%	Included
Emotional regulation	83.33%	Included
Responsibility to self	100.00%	Included
Reflective exercises (act of doing reflection): goal setting, self-reflection, acknowledging achievements	83.33%	Included
Admitting limitations	100.00%	Included
Addressing depression and burnout	100.00%	Included
Time management	83.33%	Included
Self-care techniques	100.00%	Included
Strategies to cope with stress	100.00%	Included
6. Teaching methods:		
Formally assigned mentor within the faculty to act as a role model	66.67%	Excluded
Having a guideline of professional values and behaviours that the mentor can use for discussion with the learner/ lets the learner experience. Experience may be through informal opportunities or coordinated tutorials.	100.00%	Included
Recognition (eg. Awards) to commend exemplary behaviour demonstrating professionalism	33.33%	Excluded
Workshop/seminars (on 'professionalism topics' in previous section)	100.00%	Included
Lectures on the expectations for professional behaviour	66.67%	Excluded
Case-based discussions on what what one would do as an individual	100.00%	Included
Role playing scenarios	83.33%	Included
Improvisation exercises and discussions	83.33%	Included
Standardised patient (SP) exercises	100.00%	Included
Portfolio that documents professional behaviour and participation in on-the-job experiences that build professionalism and reflection	66.67%	Excluded
Team discussions about challenging social and ethical situations	100.00%	Included
Multidisciplinary discussions to practice interprofessional communications	83.33%	Included
7. Assessment methods:		
Self assessment tools	80.00%	Included
Personalised learning plans e.g. portfolio to encourage physicians to reflect and record their experiences	80.00%	Included

Supplementary File 5. *Nurturing professionalism curriculum framework questionnaire and responses*

Regular evaluation of knowledge, skills, and attitude in the relevant domains of professionalism (stated above) e.g. through a professionalism evaluation form	60.00%	Excluded
8. Institutional Support:		
Allocate formal curriculum time for professionalism teachings	100.00%	Included
Provide welfare support for all physicians	80.00%	Included
Establish feedback portal where physicians can identify their learning gaps and request for more training	60.00%	Excluded

Supplementary File 6. *Finalised nurturing professionalism curriculum framework*

Section and items	Proportion of participants who indicated that the item should be included
1. Communication and Challenging Scenarios:	
Communication with patients (verbal)	100.00%
Communication with patients (non-verbal skills, including bedside manners)	100.00%
Conflict management with patients	100.00%
Breaking bad news to patients	83.33%
Addressing end-of-life issues with patients and family	83.33%
Taking informed consent from the patient or relevant stakeholders	100.00%
Communication with the interprofessional healthcare team	100.00%
Conflict management within the healthcare team	100.00%
2. Ethics and Legal issues:	
Fundamental code and principles of professional ethics	100.00%
Ethical and legal considerations related to mental capacity	100.00%
Ethical and legal considerations related to informed consent	100.00%
Ethical and legal considerations related to the delivery of bad news	100.00%
Publication and research ethics	100.00%
Commercial conflicts of interest	100.00%
3. Professional Attributes:	
Teamwork with other healthcare professionals	100.00%
Interdisciplinary respect	83.33%
Coordination of care within the healthcare team	83.33%
Coordination of care with the patient and caregivers	83.33%
Teamwork with patients as part of shared decision making	100.00%
Interacting with patients from a different culture (how to be considerate and respectful)	83.33%

Interacting with healthcare staff from a different culture (how to be considerate and respectful)	83.33%
Admitting medical mistakes, professional integrity	100.00%
Learning from medical mistakes	100.00%
4. Virtues:	
Compassion and empathy to patients	100.00%
Respect	100.00%
Excellence, continuous improvement	100.00%
Reliability and responsibility	100.00%
Implications of values in practice	83.33%
Knowledge of own limits	100.00%
Altruism	83.33%
Advocacy	100.00%
5. Self-care and reflection:	
Self-directed learning	83.33%
Self-awareness in the moment, mindfulness	100.00%
Emotional regulation	83.33%
Responsibility to self	100.00%
Reflective exercises (act of doing reflection): goal setting, self-reflection, acknowledging achievements	83.33%
Admitting limitations	100.00%
Addressing depression and burnout	100.00%
Time management	83.33%
Self-care techniques	100.00%
Strategies to cope with stress	100.00%
6. Teaching methods:	
Having a guideline of professional values and behaviours that the mentor can use for discussion with the learner/ lets the learner experience. Experience may be through informal opportunities or coordinated tutorials.	100.00%
Workshop/seminars (on ‘professionalism topics’ in previous section)	100.00%

Case-based discussions on what what one would do as an individual	100.00%
Role playing scenarios	83.33%
Improvisation exercises and discussions	83.33%
Standardised patient (SP) exercises	100.00%
Team discussions about challenging social and ethical situations	100.00%
Multidisciplinary discussions to practice interprofessional communications	83.33%
7. Assessment methods:	
Self assessment tools	80.00%
Personalised learning plans e.g. portfolio to encourage physicians to reflect and record their experiences	80.00%
8. Institutional Support:	
Allocate formal curriculum time for professionalism teachings	100.00%
Provide welfare support for all physicians	80.00%