Review

‘Organised’ cervical screening 45 years on: How consistent are organised screening practices?

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Abstract
Organised screening programmes have been remarkably successful in reducing incidence and mortality from cervical cancer, while opportunistic screening varies in its effectiveness. Experts recommend that cervical screening or HPV testing be carried out only in the context of an organised programme. We sought to answer the following study questions: What does it mean for a cervical screening programme to be organised? Is there a place for opportunistic screening (in an organised programme)? We reviewed 154 peer-reviewed papers on organised and opportunistic approaches to cervical screening published between 1970 and 2014 to understand how the term ‘organised’ is used, formally and in practice. We found that despite broad recognition of a prescriptive definition of organisation, in practice the meaning of organisation is much less clear. Our review revealed descriptions of organised programmes that differ significantly from prescribed norms and from each other, and a variety of ways that opportunistic and organised programmes intersect. We describe the breadth of the variation in cervical cancer screening programmes and examine the relationships and overlaps between organised and opportunistic screening. Implications emerging from the review include the need to better understand the breadth of organisation in practice, the drivers and impacts of opportunistic screening and the impact of opportunistic screening on population programme outcomes. Appreciation of the complexity of cervical screening programmes will benefit both screeners and women as programmes are changed to reflect a partially vaccinated population, new evidence and new technologies.

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1. Introduction

Cervical screening has a long history in most well-resourced countries around the world. Many countries have commenced with *ad hoc* screening offered and taken up by a few, followed by a wider policy of promoting opportunistic screening, and eventually by the development and implementation of a national or regional ‘organised’ screening programme [1–5]. It is widely held that organised programmes are more effective than non-organised, or opportunistic, screening programmes in preventing cervical cancer, and it is well recognised that organised cervical screening reduces cervical cancer incidence and mortality [6–15].

Early observational studies compared different populations by screening activity [8,14,16–18]. Most of these studies compared screened populations in Iceland or Finland, where national programmes have been organised since 1963–4, with similar populations in locations where screening was organised later or not organised. Nordic studies continued into the 1990s and provide a strong evidence base about the forms of organised screening that were adopted in those countries [19,20]. The evidence particularly suggests that this kind of organisation maximises the proportion of the population screened, and shows that the more women screened (as differentiated from the more tests done), the less morbidity and mortality from cervical cancer [4,7,11, 20–22]. In contrast, opportunistic screening is often characterised by the over-screening of a minority of women, while those women most at risk tend to be screened rarely or not at all [6,11,23,24].

Organised screening is often defined in opposition to widespread opportunistic or *ad hoc* screening. We will argue that this dichotomisation of organised and opportunistic cervical cancer screening is more theoretical than practical and does not reflect actual policy and practice. A review of the literature revealed that, while prescriptive definitions of ‘organisation’ are widely recognised, in practice organised programmes differ significantly from prescribed norms and from each other, and opportunistic and organised programmes intersect in a variety of ways. In this paper we describe the breadth of the variation in cervical cancer screening programmes and examine the relationships and overlaps between organised and opportunistic screening.

2. Methods

We sought to answer the following study questions

1. What does it mean for a cervical screening programme to be organised?
2. Is there a place for opportunistic screening (in an organised programme)?

We searched Medline and Web of Science for peer-reviewed papers from 1970 until 1st April 2014, restricted to English language papers. The Medline search was: [Uterine Cervical Neoplasms (MESH) OR pap* OR smear* OR Pap* test*] AND [opportunistic OR organised OR organised] AND [Mass screening (MESH)] OR [Mass screening/og (organisation)(MESH) AND Uterine Cervical Neoplasms (MESH)]. This search returned 765 results. The Web of Science search string was: [Cervical screening] AND [organis* OR organiz*], which yielded 866 results.

We combined the searches and excluded duplicate papers, letters, conference abstracts and those that did not contribute to answering the review questions. 124 papers remained. We then conducted a hand search of bibliographies and for outputs of international meetings that generated screening guidelines, which led to an extra 30 papers being included in the final count. The total number of papers included in the review was 154. Paper selection is summarised in Fig. 1.

We identified a broad literature and included the following categories in our review: reports of meetings that laid out prescriptions for optimal organisation; descriptions of cervical screening programmes; evidence supporting organised cervical screening; and papers describing organised programmes and approaches to opportunistic screening. Regarding the latter category: because our aim was to determine the characteristics of programmes described as ‘organised’, we did not apply pre-determined definitions of ‘organised’ to determine whether authors were ‘correctly’ or ‘incorrectly’ referring to a programme as organised. Rather, we examined descriptions of programmes, so as to determine how the label ‘organised’ was being used in practice.

3. Results

We found that although, in principle, there is a shared formal definition of what constitutes an organised programme, the practice of organised cervical screening is wide-ranging and complex. There is significant variation in how programmes are organised between and within countries and regions. Our review revealed that in all jurisdictions with organised screening programmes, at least some and often a great deal of opportunistic screening is also undertaken, and data from that opportunistic screening are often not captured. The way opportunistic and organised screening intersect varies and the impact of one on the other is uncertain.

3.1. There are formal criteria for the organisation of cervical screening

European guidelines recommend that cervical screening should happen only in the context of an organised programme [25–27]. In the mid-1980s, regional European cancer bodies outlined what was needed institutionally and operationally for a Nordic-style organised programme to be put in place and defined the elements that made a programme ‘organised’ [4,6,9,28,29]. Formal European guidelines for cervical screening organisation were produced in 1993 [30] and comprehensively updated in 2008 [25,31–33]. Recent guidelines remain strongly based on those first developed in 1984, paraphrased in Box 1 [4,33].

Box 1 Guidelines for organising.

1. The target population has been identified – there is policy on ages for starting and stopping screening, screening intervals, and screening post-hysterectomy;
2. Individuals are identifiable via a population-based register;
3. Recruitment measures are available to guarantee high coverage, for example recruitment via personal invitation;
4. Adequate facilities exist for taking and reading smears;
5. Quality control exists for taking and reading of smears;
6. Adequate facilities exist for diagnosis and treatment of confirmed neoplastic lesions;
7. An established screening pathway exists; and
8. Epidemiological monitoring and evaluation can compare incidence and mortality in screened and unscreened populations at the level of the total target population, and data are controlled for quality.

Further guidelines exist, some with added focus on the need for assigning central responsibility and others on data collection [6,23,30,34–38].

3.2. Definitions of organisation usually hinge on the existence of a population register

While there are comprehensive prescriptive guidelines, and many papers that describe ‘our organised programme’, few authors have explicitly sought to define the difference between ‘organised’ and ‘non-organised’ programmes. Often, ‘programme’ is used without a signal to the reader as to its status. When authors do seek to differentiate, statements like these are typical: ‘Organised screening is distinguished from unsystematic screening primarily on the basis of how the offer of screening occurs—whether by invitation, issued from
centralised population registers or coincidently [...] [39] or ‘organised screening is distinguished from opportunistic screening primarily on the basis of how invitations to screening are extended [40].’ That is, in the literature, consideration of whether or not a programme is organised tends to come down to one key factor: whether or not all eligible women are personally invited to attend screening [5,39–43]. This aspect of organisation relies on the existence and availability of a population register to a screening programme.

3.3. Descriptions of organised programmes show diversity and inconsistency in practice

Thus far we have focused on the abstracted, or ideal, conception of screening organisation. We now turn to organisation in practice. Table 1 outlines the variation that exists within organised screening programmes internationally. Many full descriptions of cervical screening programmes have been published, particularly regarding programmes operating in Europe, and such accounts serve to highlight the differences in organised programme guidelines and operations [2,5,44–66]. In practice there is considerable variation in how programmes are organised [67,68] and how the defining label of organised is used. Note that this variability can attract censure: screening programmes within the EU that are inconsistent with IARC (2005) evidence-based recommendations are often criticised in the literature [13,26,69].

Organised programmes outside the EU are similarly diverse. In South Korea, for example, there is no upper age limit for screening and two different sets of recommendations are in place [59,70]. Australia’s and New Zealand’s organised programmes do not invite eligible women for screening and instead have a reminder system that calls only previously screened women who are overdue for a Pap test. Organised screening in Singapore captures data only from women being screened in government facilities [3].

Screening may be organised inconsistently across and within countries and regions. Examples of different programmes operating within one country can be seen in France, Italy, Greece, Belgium, Spain, Canada and Thailand, where some provinces or local government areas have population-based public health screening programmes while others rely on opportunistic screening [5,50,52,60,71–74]. Populations also have different access to organised programmes based on factors other than geography. The United States, for example, has organised and funded cervical screening programmes in most states for eligible underserved women [75–77]. Conversely, some organised screening programmes may not be available to women who cannot pay to attend.

3.4. Multiple relationships exist between organised and opportunistic screening

Organised screening is often defined in terms of what it is not, that is, an organised screening programme is not opportunistic or unorganised. In reality they are often both occurring and are likely to be complementary. Our close reading of the literature suggests a more complex relationship than the either/or scenario usually implied by guidelines and recommendations.

What is defined as an opportunistic test depends on the way a programme is run. There is no self-evident distinction between opportunistic and organised tests: this distinction requires a decision regarding how the border between programme and non-programme smears will be defined. In a programme with personalised invitations, an opportunistic test might be classed as one that is offered or requested without an invitation. In programmes without invitations, it might be a test offered in a general practice (family physician) consultation outside of normal screening intervals or in the emergency department of a hospital. While some registers have the capacity to record the reason for smears taken [78], most do not. This means that data on the total number of smears will usually include diagnostic and follow-up tests as well as screening tests. Levels of opportunistic testing as a proportion of overall testing are therefore difficult to gauge. Estimates of rates of opportunistic testing may be gained from surveys or questionnaires [79,80], extrapolated from the total number of Pap tests paid for by insurance schemes [78,81], or from the number of women rescreening early [82]. Box 2 summarises the ways opportunistic screening was described in relation to organised programmes in the literature.

Box 2 How opportunistic screening occurs.

- Alongside organised screening, particularly in women at higher risk (in clinics and hospitals) and lower risk (via privately funded gynaecologists)
- In the absence of organised screening, with varied effectiveness
- After an organised programme has been discontinued, often with suboptimal results
- As a quasi-organised programme, where some elements of organisation are adopted

Opportunistic screening occurs alongside organised in all the EU member states that have organised programmes to a greater or lesser degree [13,42]. For
Quality control
The majority of descriptions did not include details of quality control, though guideline based assurance is widely reported [67].

Recruitment
Recruitment systems in use:
- Invitation from a central register (with or without pre-set appointment) [44,53]
- Invitation from GP at the discretion of individual practices [42]
- Many programmes also have mass media and awareness campaigns

Facilities for taking and reading smears
Methods of testing varied widely:
- Smear takers included: GPs [53]/Nurses [53,96]/Midwives [44]/Obstetricians and gynaecologists [2,42,45]
- Screening tests included: Pap test using conventional cytology or liquid based cytology [42]; HPV test (alone or in conjunction with Pap test) [67]; colposcopy [71]; VIA [62,90]

Quality control
The majority of descriptions did not include details of quality control, though guideline based quality assurance is widely reported [67].

Facilities/recommendations for abnormalities
Criteria and method used for follow up of abnormal test results were not often detailed in programme description. The variation that was described included:
- HSIL to colposcopy [44]
- HPV 16/18 to colposcopy [101]
- LSIL to colposcopy [60,95]
- LSIL to HPV test (in older women) [1,95]
- LSIL to repeat cytology in 6 mo/12 mo/24 mo [95]
- VIA-detected abnormality to colposcopy or cryotherapy [90]

Integrated screening pathway
Little mention of this aspect of organisation in the organising literature

Epidemiological monitoring
Little mention of this aspect of organisation in the organising literature

Table 1
Variations in organised screening programmes.

<table>
<thead>
<tr>
<th>Established criteria for organised programmes</th>
<th>Variation observed across existing programmes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defined target population (based on risk)</td>
<td>There was wide variation in the included population:</td>
</tr>
<tr>
<td>Register of individual</td>
<td>- Large variation in starting age (15 [55,59]–30 [78]) [35] and stopping age (60-no specified upper age (55,59)]</td>
</tr>
<tr>
<td>Methods of testing varied widely:</td>
<td>- Screening intervals vary from 1 to 5 years [55,102]</td>
</tr>
<tr>
<td>Screening tests included:</td>
<td>- National population registers [44]</td>
</tr>
<tr>
<td>Facilities for taking and reading smears</td>
<td>- GP registers [1,53]</td>
</tr>
<tr>
<td>Quality control</td>
<td>- State/local government registers [71]</td>
</tr>
<tr>
<td>Facilities/recommendations for abnormalities</td>
<td>- Screened women registers [40,82]</td>
</tr>
<tr>
<td>Recruitment systems in use:</td>
<td>- (National) health insurance lists [40,50]</td>
</tr>
<tr>
<td>Epidemiological monitoring</td>
<td>- Combination of GP and insurance register [49]</td>
</tr>
</tbody>
</table>

Programmes were included if they were referred to as organised in the literature. Some descriptions were of national cervical screening programmes that varied between regions. Where one or more regions had an organised screening programme it was included in the table. Note that this table is not exhaustive and indicates only the variation found rather than the inclusion of all screening programmes in the literature. Many programme descriptions do not include all aspects of the criteria recommended by for EU cervical screening.

For example, Finland’s programme has a long history, and forms the basis for much of the evidence about organisation [35]. It has one of the most successful and least intensive screening programmes in the world. However high levels of opportunistic screening occur outside of the programme, generally estimated at around twice the number of programme-generated screening tests [44,79]. High levels of opportunistic testing also occur alongside the organised programme in Sweden, whereas they are considerably lower in the Netherlands and the United Kingdom (UK) [78]. The influence of opportunistic testing on programme outcomes is unclear. Opportunistic screening of higher risk women occurs in the context of some organised programmes and there is evidence in the literature to support this practice. Examples include offering Pap tests at STI clinics, at genitourinary departments in hospitals, at EDs, and in prisons, all of which are described as more likely to reach un- or under-screened women [83–87]. The US has organised programmes solely for higher risk women [76]. There are also examples of lower risk women being opportunistically screened in addition to or instead of screening prompted by invitation. Some wish (or are encouraged) to be tested more frequently or outside of the age ranges the programme’s screening interval dictates [86,88]. Opportunistic screening of normal or low risk women covered by organised programmes tends to be carried out by gynaecologists [71] and may be routine or sporadic [88]. Some programmes discourage excess testing in low risk women in recognition of the increased harms of non-indicated testing and the unnecessary use of resources. In these cases, diversion away from excess opportunistic testing takes the form of restricting reimbursement [78]. Conversely, some programmes use reimbursement schemes that encourage adherence to programme guidelines [42,53,82].

A minority of countries or regions with opportunistic screening only achieve good outcomes in mortality reduction from cervical cancer. Germany’s programme, not organised and widely criticised for over screening...
Organised and opportunistic screening may also happen in the same jurisdiction sequentially. Most commonly, an organised programme follows years of opportunistic screening but sometimes an organised programme is halted and opportunistic screening encouraged in its place [2,43,89]. In this case, a high uptake of screening in a population programme does not necessarily translate to high uptake of opportunistic screening. For example, stopping organised screening in a county in Denmark did not see continued high levels of screening under an opportunistic model [43]. Similarly, a study in Australia showed that screening rates in remote Aboriginal communities were very high while a visible and active organised programme was in place, but dropped dramatically when the intervention finished [89].

Healthcare reforms in Bulgaria saw the dismantling of an existing National Cervical Screening Programme in that country; subsequent adoption of opportunistic screening has been low and cervical cancer incidence has risen [2]. That is, in those situations the benefits accrued by organised screening were not sustained and the opportunistic screening that followed showed the suboptimal results that are generally expected of unorganised approaches.

Some programmes are described as opportunistic with ‘aspects of organisation’ [90], or call for ‘more organised opportunistic screening’ [91]. This may be in part a response to the need to maximise limited resources for cervical screening. Such cases highlight the fact that (a) the word ‘organised’ has a common language use that may be employed in place of or in addition to its technical use and (b) professional understandings of ‘opportunistic’ and ‘organised’ screening may not be as dichotomous as is suggested by guidelines.

3.5. It is not clear how co-existing opportunistic and organised screening affect each other

Data on screening tend to be routinely captured for organised programmes only, making it difficult to assess any contribution that opportunistic screening makes to overall cervical cancer mortality benefit. As well as contributing to benefit however, opportunistic screening may also detract from population-wide programmes. A description of cervical screening in Hong Kong, Singapore and Taiwan suggests that high levels of opportunistic screening in those countries are detrimental to participation in the organised programmes that operate. Uptake of organised screening is low, and opportunistic data are not captured [3]. However screening levels generally are high and incidence of cervical cancer comparatively low in these countries [92].

4. Discussion

This review indicates that there is significant variation in the organisation and delivery of cervical screening programmes despite consistency in what is considered organised. This practice-based inconsistency is not necessarily problematic (in fact it seems an inevitable response to diverse health systems). However, using a single label to describe programs that may have little in common obscures difference and could perpetuate a narrow understanding of how screening programmes may optimally operate within the confines of each jurisdiction. Since the publication of early studies in support of cervical screening, the literature continues to be heavily dominated by European evidence and programme description. In 2003, a unanimously adopted European Union recommendation promised equal access to organised cervical screening for all women in the cervical screening target population in all EU member states [93,94] making a considerable variation in policy, practice and process performance [95] within the region all the more notable. As the most recent IARC survey highlighted, a large number of women in Europe and beyond do not have access to free Pap testing under any type of programme, including some that are organised [2,35,96].

This variability seems unlikely to change, however. Existing healthcare systems and competing healthcare priorities, particularly in some newer member states, suggest a uniform EU-wide approach to cervical screening is improbable. Furthermore, a Finnish-style prescription for screening is unlikely to be adopted in even well-resourced countries with philosophically different approaches to healthcare such as the United States. Arguments for organisation per se in that context are given much less weight than those of resource allocation [39,97]. Attempts by some LMIC countries to organise screening have not shown any mortality benefit; others have [98]. Attitudes towards privacy vary and determine the political feasibility of the use of population registers in some screening programmes. The evidence and guidelines generated by the Nordic countries may not therefore be transferable to countries with differing resource limitations, health systems, underlying political philosophies, societal norms and values [91], or very different underlying levels of risk [64,91].

Some aspects of organisation did not feature in the literature with any consistency. Anecdotally, funding
of the initial screening encounter appears to vary consider-
ably, from both visit and test being free to women, to
cytology only being subsidised, to women being respon-
sible for payment for both smear taking and cytology.
Discussion of funding arrangements for screening,
whether opportunistic or organised, was seldom
included in the organising literature however. Some
funding arrangements may be a barrier to population-
wide access. Similarly, the organisational literature did
not focus on programme approaches to communication
with women. Maximising participation is key to a utili-
tarian approach to screening, where evidence of benefit
is based on incidence and mortality rates of cervical can-
cer in a population. Different sub-populations have dif-
ferent levels of risk, however, and a one-size-fits-all
approach to communicating risk may not always be
appropriate. This heterogeneity and its implications
for ethical communication are outlined in the EU rec-
ommendations [99,100] and the literature may soon
begin to reflect updated approaches accordingly.
Finally, the descriptions of cervical screening we ana-
ysed largely focused on the initial screening encounter.
Screening programmes should however include not just
an initial test but everything that might conceivably
result from that test, including follow-up tests and any
required treatment [35], and ethical arguments can be
made that a screening programme must ensure access
to all aspects of the screening pathway and not just
the existence of test facilities [24,35]. Finland, with its
model programme, explicitly includes all follow up and
treatment within its funding model as do other countries
with similar healthcare systems [2]. However most
descriptions of screening for cervical cancer do not
include details of how diagnosis or treatment is organ-
ised, accessed or paid for, which has limited our ability
to consider this issue.

There are several implications that emerge from this
review:

1. The high level of opportunistic screening that occurs
in many jurisdictions with organised programmes
needs to be better appreciated and understood. It
may indicate, for example, that some aspects of orga-
nisation (such as screening interval) may not be
acceptable to women or practitioners; that communi-
cation about the rationale for organised programmes
is insufficient; or that practical aspects of the program-
may not be meeting the needs of women or screeners.

2. The effects of opportunistic screening on an organised
programme, and vice versa, need to be better under-
stood. It would be especially valuable to know the
extent to which opportunistic screening does or does
not contribute to low incidence and mortality in coun-
tries with effective organised programmes with wide
population reach, such as those described in Finland,
the Netherlands and England. Many data sources do
not have the capacity to distinguish between an in-
programme smear and one that is taken opportunisti-
cally. As programmes continue to develop in response
to new evidence or changing risk, adapting screening
registers to accommodate test reason would contrib-
ute to research into evidence of effect.

3. An assumption of the homogeneity and exclusivity of
organised programmes is not accurate. Clearer
descriptions of what aspects of an organised pro-
gramme are specifically important in a given context
would allow readers to better interpret and apply
the findings of empirical research. This review shows
that it is not clear what it means for screening to hap-
pen only in the context of an organised programme,
given the variety that exists. This suggests that future
work on the ‘organisation’ of screening should be
explicit about the essential elements, goals and out-
comes of organisation. Organisation, for example,
may hinge on avoidance of over-testing by enforcing
strict screening intervals and target populations; alter-
natively, the goal of organisation may be to ensure
equity and maximise reach by inviting all eligible
women to participate. Until this is clarified, the mean-
ing and significance of ‘organisation’ will be
uncertain. Goals may differ for different programmes
and healthcare systems. Acknowledgement of
difference and description of what an organised
programme entails will help avoid inappropriate
comparison and assist policy makers to articulate
exactly what aspects of organisation are crucial to
their specific situations.

4. The vast bulk of the literature considered was
published before the advent of HPV vaccination. A
future challenge for the organisation of cervical
screening is to link it to this new context of efforts to
vaccinate young people against HPV infection.
Because HPV vaccination is relatively new, the
current literature offers little guidance about how this
can best be done: it remains an important question for
future research.

The literature in support of organised screening as
prescribed by European guidelines is compelling. As
new technologies for cervical and HPV screening are
introduced, the importance of limiting their use to
organised programmes has been stressed [101]. These
newer protections against cervical cancer will likely be
incorporated into existing and updated organised pro-
grammes. A homogeneous approach to organised
screening appears to be unrealistic in the short term.

5. Recommendations

We draw on our review of the literature to make the
following recommendations:
• Experts who make recommendations for the organisation of specific programmes should be explicit about the characteristics necessary to consider that population programme ‘organised’, and should specify what is not likely to be possible given resource constraints or the parameters of existing healthcare systems.

• Similarly, recommendations for new technologies to be used only within organised programmes should be specific about how the technology needs to be supported, by what kinds of organisation, and why.

• Further research into the relative benefit of individual elements of organised screening could assist with decision making when programmes are being developed or adjusted.

A more detailed understanding of the complexity of cervical screening programmes will benefit both screeners and women as programmes change to reflect a partially vaccinated population, new evidence and new technologies.

Conflict of interest statement

None declared.

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References


