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INDONESIA RESEARCH PARTNERSHIP ON INFECTIOUS DISEASE

KEMENTERIAN KESEHATAN REPUBLIK INDONESIA

NEWSLETTER

May 2023

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Central Laboratory

HEALTH POLICY AGENCY

MINISTRY OF HEALTH REPUBLIC OF INDONESIA

2023

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FEATURES

INA-RESPOND Newsletter

InVITE & PROACTIVE Study Updates

By: Eka Windari R., I Wayan Adi Pranata, Lois E. Bang, Melinda Setiyaningrum, Nur Latifa Hanum, Retna Mustika Indah, Restu Amalia, Riza Danu Dewantara

InVITE

As of May 4, 2023, out of the 700 participants who enrolled in the study, 166 (23.71%) have ended their participation, while 533 (76.14%) are still ongoing. The study is being conducted at three different sites, and all sites are currently on visit 4. The details of each site's visits are listed in Table 1.

It is worth mentioning that the study has had some difficulties keeping participants. Out of the 167 subjects who ended their participation, 106 (15.14%) completed the study, while 44 (6.29%) withdrew from the study due to personal reasons or loss of interest. Reasons for withdrawal also included participant decision. Additionally, some participants did not receive the complete vaccine regimen within 12 months of enrollment, which resulted in three (0.43%) subjects being excluded from the study. Two (0.29%) subjects were not allowed to continue because continuation was not in their best interest, and one (0.14%) subject was non-compliant with study procedures. Unfortunately, one (0.14%) subject passed away during the study, and ten (1.43%) subjects had other reasons for ending their participation.

Furthermore, the study has been tracking symptomatic visits among participants. Table 2 provides the details of these visits as of May 4, 2023 . It is important to note that while some participants have experienced COVID-19 symptoms, this does not necessarily mean that they have contracted the disease.

Site	Symptomatic Visit		
	# of visit	Positive	Negative
01	100	61	39
02	14	6	8
03	2	1	1
Total	116	68	48

Table 2. Symptomatic Visit Details per May 4, 2023

Site	Screening / Visit 1	Enrollment Failure	Enrolled	Ongoing	Add. Visit 1	Visit 2	Add. Visit 2	Add. Visit 3	Visit 3	Agree Ext.	Not Agree Ext.	Ext. Visit 4	Ext. Visit 5
01	345	2	343	287	88	326	314	306	315	287	28	186	0
02	228	1	227	152	97	214	191	188	195	152	43	151	0
03	130	0	130	95		130			129	95	35	51	0
Total	703	3	700	534	185	670	505	494	639	534	106	388	0

Table 1. Details of Visits per site per March 6, 2023

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As of May 4, 2023, out of the 4,336 subjects enrolled, 1% (20 participants) are still ongoing in the study, and 99% (4,316 participants) have completed their study. The only site with active participants remaining is site 520, which will conduct their final follow-up visit in May 2023.

Regarding the end-of-study subjects, a total of 3,485 subjects have already completed the study until the 36th follow-up month. There are 506 subjects lost to follow-up, 248 who have passed away, 32 who have withdrawn their consents, 38 who have moved to a city without a PROACTIVE Site, 5 who tested negative for HIV, and 2 who are currently suspended (imprisoned). Figure 1 illustrates the study progress at each site, while Table 1 provides a list of completed study participants.

After the completion of the follow-up period, the Sites will make preparations for the last monitoring visit and site closeout visit. All last monitoring visits will be concluded by May 2023. In June 2023, several sites are scheduled for the closeout visits, including site 510, 590, 600, 640, and 650. Other sites will have their visits scheduled in the subsequent months. In anticipation of these visits, sites are required to fulfill all study-related aspects mentioned in the closeout visit checklist. These include completing the Case Report Form/Source Documents, providing all Adverse Event/Serious Adverse Event/Unanticipated Problem reports, managing data, organizing the Site Regulatory Binder, maintaining logs, equipment, supplies, and handling specimens.

For sites that have undergone the closeout visit, the archiving of study documents will be carried out within one month after the visit. These documents will be retained for a period of five years following the completion of the study.

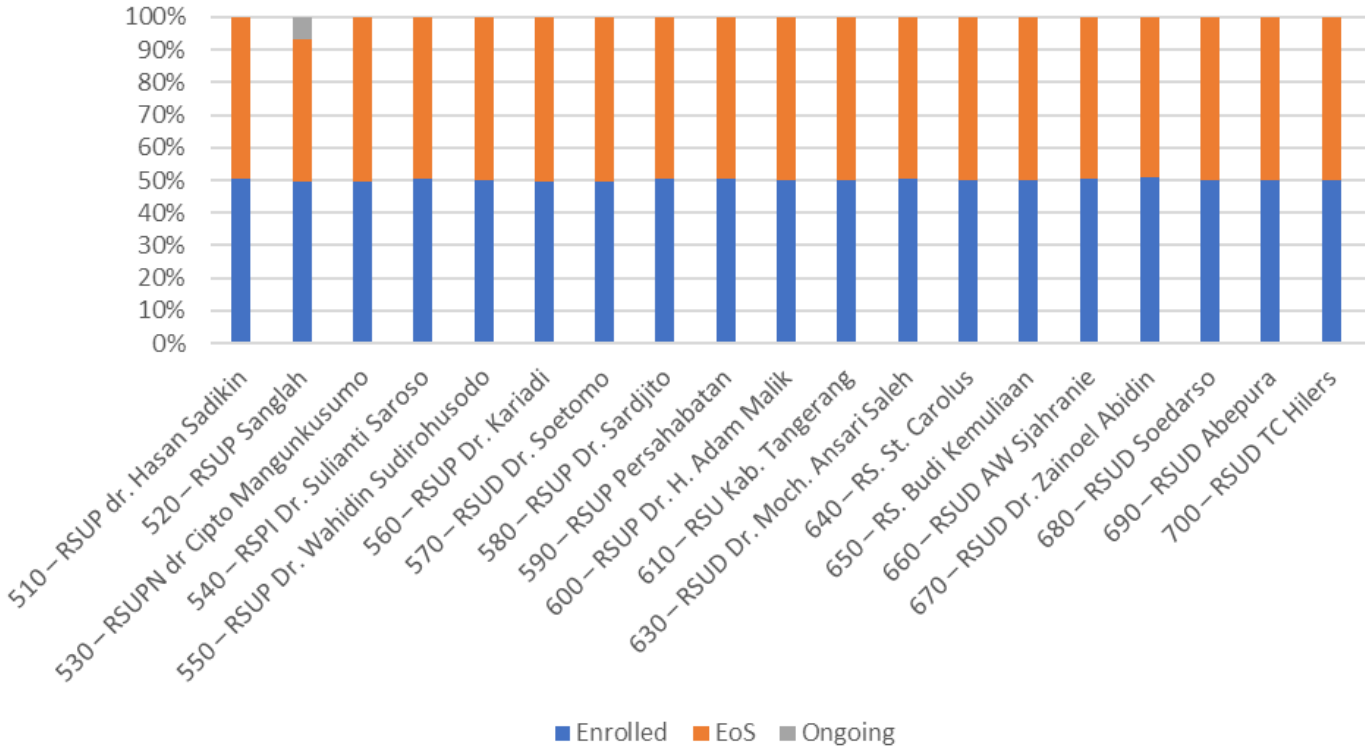


Figure 1. Site's Study Progress

No	Site	End of Study Duration/ Complete	Withdrew Consent	Participants with HIV negative	Moved	Death	Investigator Discretion	Lost to Follow Up	Other	Total
1.	510 – RSUP Dr. Hasan Sadikin	189	1	0	5	5	0	6	0	206
2.	520 - RSUP Sanglah	120	0	0	1	4	0	1	0	126
3.	530 – RSUPN Dr. Cipto Mangunkusumo	284	0	0	0	17	0	15	0	316
4.	540 – RSPI Dr. Sulianti Saroso	132	0	0	3	8	0	37	0	180
5.	550 – RSUP Dr. Wahidin Sudirohusodo	240	0	0	5	25	0	67	0	337
6.	560 – RSUP Dr. Kariadi	199	1	3	0	15	0	16	0	234
7.	570 – RSUD Dr. Soetomo	261	13	0	4	21	0	21	0	320
8.	580 – RSUP Dr. Sardjito	168	1	0	5	6	0	38	0	218
9.	590 – RSUP Persahabatan	186	0	1	0	37	0	22	0	246
10.	600 – RSUP Dr. H. Adam Malik	253	3	0	2	21	0	61	0	340
11.	610 – RSU Kabupaten Tangerang	272	6	0	4	20	0	22	2	326
12.	630 – RSUD Dr. M. Ansari Saleh	215	1	0	1	7	0	17	0	241
13.	640 – RS St. Carolus	211	0	0	0	1	0	15	0	227
14.	650 – RSU Budi Kemuliaan Batam	179	3	0	5	9	0	33	0	229
15.	660 – RSU A. Wahab Sjahranie	183	0	0	2	6	0	26	0	217
16.	670 – RSUD Zainoel Abidin	89	0	0	0	11	0	21	0	121
17.	680 – RSUD Soedarso	75	0	0	0	11	0	29	0	115
18.	690 – RSUD Abepura	84	2	1	1	7	0	42	0	137
19.	700 – RSUD TC Hillers	145	1	0	0	17	0	17	0	180
	Total	3485	32	5	38	248	0	506	2	4316

Table 1. Subjects' End of Study Reasons

INA-RESPOND Newsletter

NIAID'S PANDEMIC PREPAREDNESS EFFORTS: AN OVERVIEW

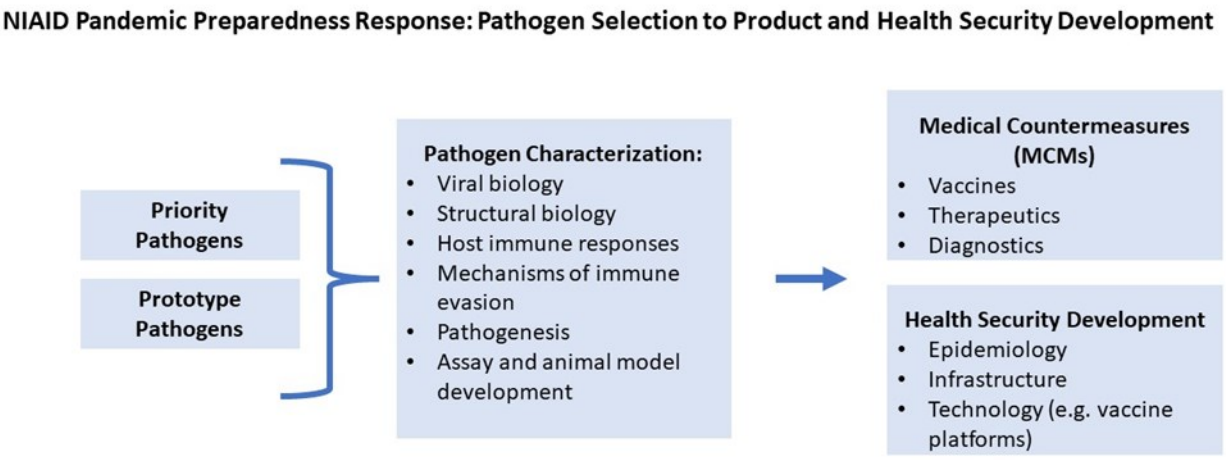
By: Lucas Buyon, Aaron Neal

FROM OUR PARTNER

Part of NIAID's longstanding mission is to study the biology of pathogens with pandemic potential and support the development of medical countermeasures (MCMs) against them. MCMs broadly include any medicines, vaccines, protective equipment, or other medical supplies that can be used to diagnose, prevent, or treat diseases. The emergence and rapid spread of SARS-CoV-2 demonstrated the need for NIAID to develop a pandemic preparedness strategy to rapidly respond to outbreaks and develop MCMs. With approximately 120 viruses known to cause human disease, and a large number of those known to have pandemic potential, there is not enough time or resources available to develop the sophisticated research programs necessary to effectively address each potential pandemic threat. Given the need to prioritize research funding and maximize the impact it can have on future pandemic threats, NIAID developed a Pandemic Preparedness Plan in December 2021 with three broad goals [1]:

- Characterize pathogens of concern through research and surveillance
- Shorten timelines between pathogen emergence and development and authorization of MCMs
- Bridge or eliminate gaps in research, testing and laboratory infrastructure, and technology

The plan will build upon years of advances in pathogen-specific research (called "priority pathogens") and support research portfolios built around pathogens that are representative of a major viral family with pandemic potential (called "prototype pathogens"). Priority pathogens are pathogens that are established threats to human health. Ebolaviruses, Zika virus, Dengue virus, Lassa virus, and Influenza viruses are examples of priority pathogens. Prototype pathogens are pathogens that are representative of a broad viral family and can provide insight into the biology of the entire viral family. Viral families share significant similarities in their genetics, biological functions, and pathologies. Research on an ideal member of a viral family will lead to broad knowledge about other viruses from that same family. This knowledge can be applied to the development of MCMs for an emerging pathogen from that same family, and lead to faster MCM development timelines. For example, years of research into SARS-CoV-1 and MERS-CoV provided key insights into vaccine development for SARS-CoV-2, highlighting the power of this approach. Priority pathogens can be the prototype pathogen for their viral family (e.g., Lassa virus for the Arenaviridae family), but this is not always necessarily the case (e.g., Zika virus is a priority pathogen, but Dengue virus serves as a better prototype pathogen for Flaviviridae). NIAID's research investment into these pathogens will lead to important knowledge about the immunology and biology of these viruses, supporting breakthroughs in MCM development. NIAID also supports research on broad technolog-



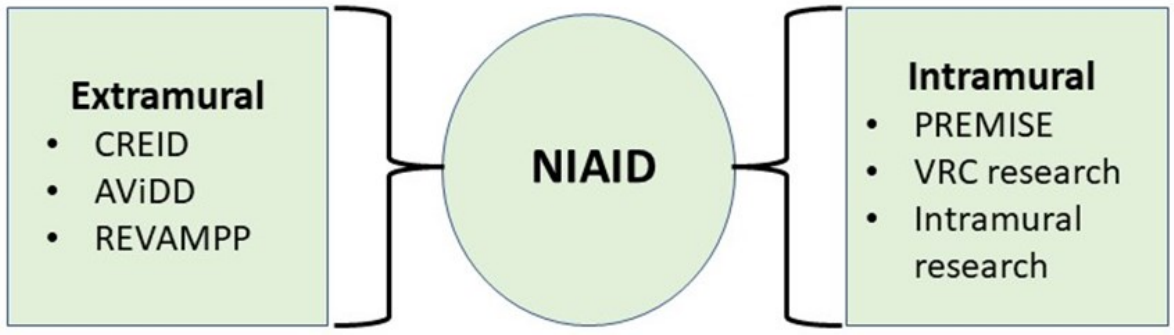
ical platforms, such as mRNA technology, mucosal vaccines, and monoclonal antibodies, that can support the iterative and rapid development of MCMs. NIAID intramural investigators will support these efforts by studying the biology and epidemiology of pathogens, as well as help test monoclonal antibodies and vaccine candidates through NIAID's Vaccine Research Center (VRC).

NIAID supports several intramural research programs and extramural networks to implement its pandemic preparedness plan. Extramural networks include the Centers for Research in Emerging Infectious Diseases (CREID) [2], the Antiviral Drug Discovery Centers for Pathogens of Pandemic Concern (AViDD) [3], and the recently announced Research and Development of Vaccines and Monoclonal Antibodies for Pandemic Preparedness (ReVAMPP) network [4]. NIAID intramural programs focused on pandemic preparedness include the Pandemic Response Repository through Microbial and immune Surveillance and Epidemiology (PREMISE) program [5], other vaccine programs at the VRC, and NIAID intramural research programs focused on pathogen biology and epidemiology. INA-RESPOND, though established long before the current NIAID Pandemic Preparedness Plan, also serves a critical role in preparing for future outbreaks and pandemics in the Southeast Asia and Pacific regions.

The CREID network, launched in 2020, is a competitive grant-funded global network of 10 research centers across 30 different countries that study the epidemiology, pathogenesis, and biology of emerging pathogens to inform surveillance for these diseases through assay development and knowledge generation. The program also supports capacity building efforts through training scientists around the world in developing and conducting diagnostic testing, genomic surveillance, and scientific program management. The network is positioned to help rapidly support research response during an outbreak.

The AViDD network, launched in 2022, supports antiviral discovery and development, with a specific effort to develop antivirals that can be administered in an outpatient setting. AViDD supports nine research centers that conduct early-stage research into small molecules and other biotherapeutics that block viral targets. AViDD centers also have industry partners to help accelerate research and move promising candidates into drug development pipelines. The program focuses on drug development for several viral families including paramyxoviruses, bunyaviruses, togaviruses, filoviruses, picornaviruses, and flaviviruses.

The future ReVAMPP network will support vaccine and monoclonal antibody development for pathogens with pandemic potential. ReVAMPP recently



announced three notices of funding opportunities to fund centers to develop vaccines and monoclonal antibodies against Flaviviruses, Togaviruses, Bunyaviruses, Paramyxoviruses and Picornaviruses. The funding opportunities were recently announced in April 2023, and ReVAMPP centers will be important additions to the NIAID-supported pandemic preparedness ecosystem.

NIH intramural research programs also contribute to NIAID's pandemic preparedness efforts. Several intramural labs have studied pathogens of pandemic concern for decades, leading to insights into their biology and pathogenesis. The Vaccine Research Center (VRC) plays a key role in leading pandemic preparedness efforts, including helping co-develop the Moderna mRNA SARS-CoV-2 vaccine. The VRC has active vaccine and monoclonal antibody development programs focused on a range of priority and prototype pathogens. Ongoing projects at the VRC include efforts to develop a universal flu vaccine, Ebola therapeutic antibodies, Nipah virus vaccines [6], and other MCMs. The VRC also supports the PREMISE program as part of its pandemic preparedness efforts. PREMISE began in 2021 and combines research on human immune responses to pathogens with pathogen sequence data from humans and animal reservoirs to inform MCM development. The goal of PREMISE is to develop a stockpile of immunological countermeasures (monoclonal antibodies and vaccine candidates) that are ready for further development in the event of an emerging pathogen outbreak. Together, NIAID's intramural programs form a critical part of its pandemic preparedness strategy.

NIAID has made significant investments in its pandemic preparedness efforts since the beginning of the COVID-19 pandemic. NIAID's pandemic preparedness plan will support global health security efforts against known microbial threats while also laying the scientific and technological groundwork to prevent and rapidly respond to emerging pathogen threats.

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INA-RESPOND Newsletter

SCIENCE CORNER

THE SHIFT TO A CENTRALIZED LABORATORY APPROACH IN CLINICAL RESEARCH

By: Yan Mardian

Clinical research is a vital aspect of the healthcare industry that aims to improve patient outcomes and advance medical knowledge. One of the critical components of successful clinical research is accurate and reliable laboratory testing. However, laboratory testing can be challenging to standardize, and results can vary significantly depending on the testing facility, personnel, equipment, and even factors like local temperature and humidity. A central laboratory provides standardized testing services that ensure consistency and reliability across different sites in multi-site studies. Therefore, there is a growing need for incorporating centralized reference laboratories in clinical research.

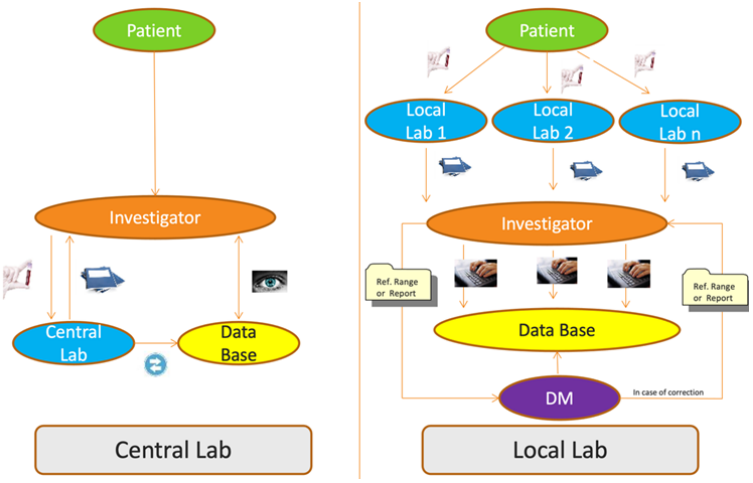

Figure 1. Central lab and local lab in clinical research.

What is the difference between a local lab and a central lab?

As its name suggests, a central laboratory is an advanced laboratory where all the samples obtained from a trial's investigator sites are centrally processed and tested using standardized procedures and equipment. By contrast, a local laboratory is any laboratory that may perform limited testing for one or a few study sites as part of a multi-site study. While local labs may have advantages when it comes to processing times, they typically do not offer the deep range of specialty testing services (e.g., flow cytometry, genomics, etc.) and high-quality combinable data that a central lab can provide.

Commonly, centralized reference laboratories provide specialized laboratory testing services to multiple research sites. These facilities have state-of-the-art technologies, experimental assays, and experienced staff who can perform various tests. The central laboratory concept was first implemented in the mid-1980s in the United States, driven by the need for a more rigorous way to collect, combine, and report trial data from different clinical sites. In the mid-1990s, the creation of a European Union simplified cross-border transportation in Western Europe and triggered the setup of central laboratories in Europe. The main goal among central labs was a consolidation of the test results and data originating from different clinical sites.

Combining for consistency

In multi-center trials, clinical laboratory testing can generally be performed in the local laboratory of each participating site or in a central laboratory. Routine tests such as complete blood cell counts, general chemistries, and urinalysis are usually performed at the respective local laboratory of each participating site since specimens must be analysed immediately for accurate results. Special tests

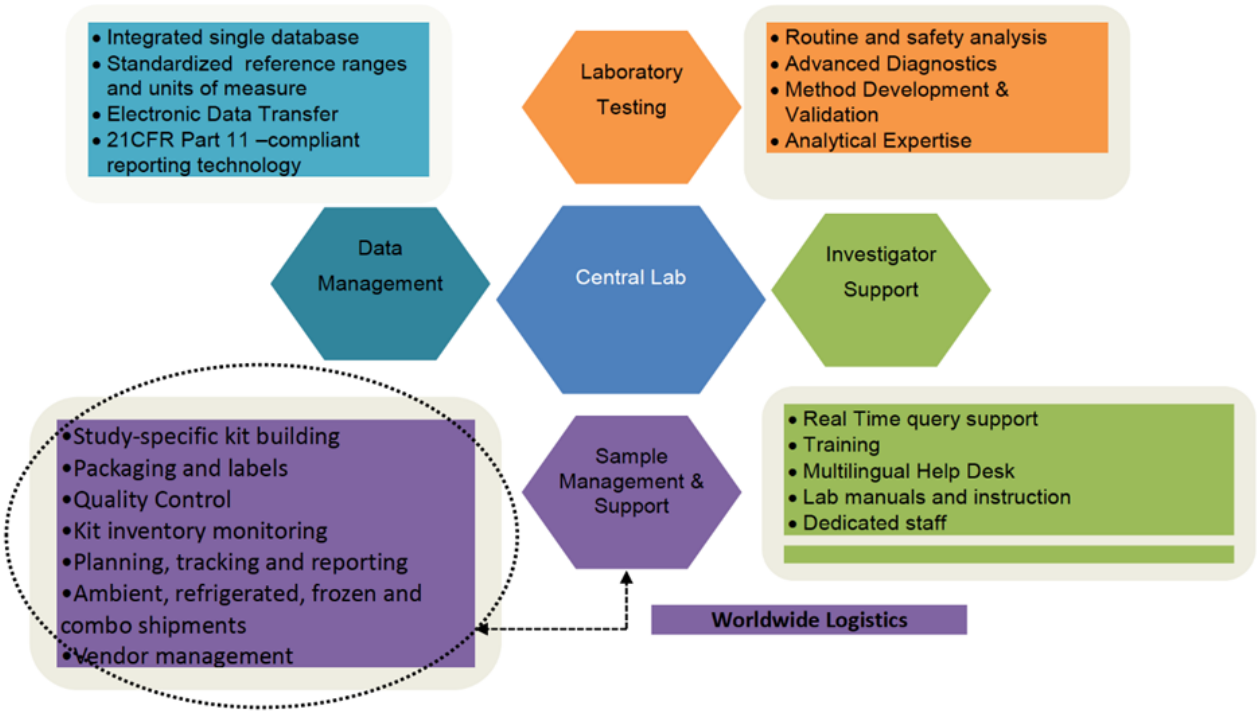

Figure 2. Central laboratory services

such as drug concentration, antibody titres, genetic testing, and culture-based assays are best performed in a central laboratory. Though researchers may assume that various methods for measuring or evaluating an analyte produce the same results, they may not be aware of the variability in results between methods or environments. As all laboratories do not use the same analytic methods, measurement principles, calibrators, and reagents, the study test results may vary based on the laboratory, making comparing results from different laboratories difficult. Fundamentally, having multiple local labs perform separate testing and then combining the results into a single database can introduce an element of variation in the data that can not be separated out or easily understood.

The central lab core value is consistency. A centralized reference laboratory can help reduce the risk of errors and natural variation in laboratory testing. When different laboratories use different testing methods, equipment, personnel, environments, etc., comparing results and identifying potential errors or explaining variation can be challenging. Centralized reference laboratories are essential for maintaining the quality and accuracy of laboratory testing. They have strict quality control measures to minimize errors and ensure consistent results across different studies and locations. By using a centralized reference laboratory, specimens from all sites are processed using the same testing methods and equipment, making it easier to identify potential errors and ensure that results are accurate, reliable, and inherently less variable. This ensures that all samples are tested the same way, reducing variability and improving the consistency of results. Using a centralized reference laboratory gives researchers confidence in their results, which is essential for accurate diagnoses and effective treatments. Standardization is crucial for clinical research, enabling researchers to compare results across different studies and locations.

When local laboratories perform testing, their results will be inherently different, not due to a lack of skill or capability, but due to natural variation arising from factors that simply cannot be controlled. Central laboratory testing, on the other hand, offers "combinable data" generated from the same analytic method platform to correlate and

Challenge	Situation	Impact
Vendor management	• Each investigator site may use a different laboratory (and possibly more than one) • Large global studies may use several hundred local laboratories • Reference ranges and units are gathered separately from results	• Requires additional staff to oversee 100s of laboratories in addition to sites • Translation of local laboratory results and reference ranges is difficult • Testing methodologies are inconsistent globally
Site personnel and CRA time	• Investigator site personnel must enter laboratory results into the database or CRF • CRAs required to follow up on ranges and unit updates	• Increased burden on sites and CRAs
Data consistency	• Investigator site personnel may not have laboratory/ scientific knowledge; not trained to catch errors	• Results inaccurate • Additional queries, delays in data lock

Figure 3. Challenges in local laboratory data management

standardize results. The end product is that a result from a central laboratory is similar regardless of the site the specimen came from. In contrast, local laboratories use many different analytic methods, often breaking down into "low, medium, and high" between local labs. Less variation in central lab results also makes it easier for trial sponsors to assemble meaningful statistics. Ultimately, results from the central laboratory are easier to defend to regulatory agencies, and in some cases, centralized testing is required by those agencies. Central labs promote scientifically objective results through independence of action on a contractual basis with the sponsor, transparency via a durable audit trail, and are responsible to governmental regulatory bodies through licensing and certification. These conditions work to remove bias due to local pressure, whether cultural, economic, medical, political, or scientific. Thus, scientific objectivity in clinical trial results carries its value through active work to avoid the accusation of and exposure to improper influence.

Data Management and Integrity

Laboratory data collection and management in clinical trials are becoming increasingly complex, especially in multi-center or biomarker-guided trials. Working with multiple laboratories, whether regional, reference, or analytical/esoteric, amplifies the risks associated if poor data management processes exist. In addition, numerous contracts, data agreements, timelines, and procedures can increase the workload for clinical trial management staff. Utilizing a consolidated data management platform allows the integration of complex, high-volume information collected from multiple laboratories, ensuring the delivery of clean, merged data according to exact user specifications. This function is particularly pertinent as today's trials produce large quantities of data from geographically disparate sources that may be using a variety of platforms. A single, coordinating laboratory data management team operating under a single data transfer agreement can coordinate the programming, coding, cleaning, and conditioning of data from disparate sources. Potential benefits are consistency, fast query resolution, and identification of integrity issues. In the case of local labs, the Clinical Research Coordinator (CRC) has to share the reference range manuals with the Clinical Research Associate (CRA), and the CRA enters the reference ranges in the clinical database (eDC). In the case of the central lab, manual data entries of reference ranges are not needed. In local lab settings, harmonization may become a prerequisite, especially in multi-center trials. The compatibility of data generated by multiple laboratories is not guaranteed due to different methods, reagents, calibrators, etc., used, and management of data from multiple sites is difficult and requires more effort for statistical analysis than what is needed.

In addition, centralized reference laboratories provide a secure and reliable location for the storage of samples. Samples are stored in a controlled environment under consistent conditions, which helps to ensure their quality and integrity. This is particularly important for long-term studies, enabling researchers to access samples for future testing and analysis. As trial sponsors, whether academic institutions, companies, or contract research organizations, continue to preserve more biological specimens for future research efforts, tracking and managing patient samples requires considerable work and coordination. The centralized digital storage of sample information improves productivity, efficiency, compliance, and data integrity.

Cost-benefit analysis

Cost savings is a significant consideration as well. One of the critical benefits of a centralized reference laboratory is that it saves time and money for researchers. Consolidation enables a laboratory to standardize pre-analytic, analytic, and post-analytic practices in microbiology and offers cost savings on instruments, reagents, and personnel. Researchers can send their samples to a single laboratory, which reduces costs and saves time. A number of authors have recently estimated the expenditure in clinical trials for laboratory services to be above $1 billion (€750 million). Such laboratory services include preclinical and clinical lab testing. It is envisioned that the proportion of this analytical budget spent at central laboratories in contrast to local laboratories will continue growing.

Investigators (and sponsors) expect lab results to be reported immediately after the central lab receives the samples. Result reporting within 12 to 24 hours may be easy to achieve for routine testing methods. Interestingly, for more complex and specialized methods, the frequency of running a specific assay in the laboratory directly depends on the number of samples received. The high cost of instrumentation (up to $250,000) and reagents ($1000 for a kit to test approximately 40 samples), in addition to the need for qualified technicians, explains why laboratories need a minimum batch size to offer competitive lab fees to sponsors. A small laboratory processing 50 or 100 samples a day may only receive five to 10 samples for a specific immunology method. This imaginary laboratory would only be able to run the immunology assay two to three times a month at a rather high cost per unit. The chances are very high that small laboratories refer their samples to larger laboratories (often hospital-based laboratories with poor quality standards and missing cross-validation data). A central laboratory with the capability to process 5000 or more samples per day may have the advantage of both offering competitive prices and reporting lab results with the shortest delays.

	Central Labs	Local Labs
Sample Handling	All samples shipped to the central lab for analysis and reporting	Samples are analyzed at the local lab. No shipping
Cost	Relatively expensive but may be inexpensive compared with local laboratory testing.	Relatively inexpensive but may be expensive if compared with high-throughput centralized testing.
Results availability	Need extra time due to sample shipping	Quick
Reference Range and Units	One set of reference range and units	Multiple lab specific reference ranges and units
Data handling	Usually data can be electronicaly transferred and uploaded into the database	Data needs to be manually entered into the database
Data Quality	High quality of data	High risk of transcription error
Data Analysis	Units conversion not needed and results are comparable	Need units conversion

Table 1. Side-by-side comparison of central and local lab use in clinical research.

However, logistical issues can also be cost-problematic in a central lab setting, especially when transporting specimens to a centralized location. The geographic location of the study site is also an important factor in the selection process when looking for a central laboratory. From a logistical point of view, selecting a central European lab for a U.S.-only study would not be a good idea since it would require shipping all samples over the Atlantic. In general, courier costs, schedules, and routes are of critical importance. For instance, timely inoculation of specimens into microbiology culture media provides the best opportunity to recover infectious disease pathogens. Likewise, delays in transport and extreme environmental conditions can lead to false-negative culture results. Transporting specimens also raises the risk of getting lost *en route* to the central laboratory. Excellent communication between laboratories and couriers, remote and central hospitals, and ordering clinicians is essential to successfully managing these issues, especially if problems arise.

In summary, a high-quality centralized reference laboratory is a critical component of clinical research that enables researchers to conduct accurate and reliable laboratory testing. It provides a centralized location for specialized and standardized laboratory testing services, access to specialized testing and expertise, saves time and money, reduces the risk of errors and biases, enables the evaluation of new diagnostic technologies, and provides a secure and reliable location for the storage of samples. Ultimately, results from the central laboratory are ideal for achieving meaningful analysis and reporting to regulatory agencies. The laboratory plays a significant role in ensuring better patient outcomes by improving the quality and accuracy of laboratory testing.

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INA-RESPOND Newsletter

MANAGING AGE-RELATED MUSCLE LOSS (SARCOPENIA)

By: Ria Lestari

Introduction

Indonesia is predicted to experience a demographic bonus in 2035, and there is a possibility that the peak will occur earlier, in 2032. After the demographic bonus era ends, the population of productive age, which was previously dominant, will automatically transition to old age, resulting in an aging population[1].

With advancing age, the human body undergoes various undesirable changes, one of which is sarcopenia. Sarcopenia refers to the age-related decline in muscle mass, muscle strength, and performance. It is typically characterized by a 3-5% loss in muscle mass every decade after the age of 25.[2,3]

According to the European Working Group on Sarcopenia in Older People (EWGSOP), the prevalence of sarcopenia in individuals aged 50 years or older varies between 1% and 29% in community-dwelling populations, 14% and 33% in long-term care settings, and 10% in an acute care setting.[3]

Muscle mass is essential for maintaining muscle function, functional independence, managing daily activities, and leading a healthy, active lifestyle.[4]

Inactive adults experience a 3% to 8% loss of muscle mass per decade, accompanied by a lower resting metabolic rate, accumulation of fat, and weight gain. Evidence also indicates that strength declines at a greater rate than muscle loss, at about 12-15% per decade after the fifth decade of life. The loss of muscle mass is often associated with frailty and a decline in strength later in life, which can ultimately lead to falls, hip fractures, loss of independence, and premature death.[5,6]

Intervention

Exercise

In the absence of effective pharmacological interventions for sarcopenia, non-pharmacological interventions offer an effective alternative to slow down the progression of sarcopenia. Among the available interventions, physical training has shown promise in reducing age-related muscle mass and strength loss. Among various training modes, resistance training has proven to be the most effective method for increasing muscle mass and strength in older individuals. It promotes improvements in body composition and muscle strength, thus mitigating the detrimental effects of aging.[7-9]

Furthermore, resistance training has demonstrated benefits such as increasing bone mineral density by 1-3%, improving cardiovascular health by reducing resting blood pressure and cholesterol levels, enhancing cognitive abilities, regulating glucose levels, and aiding in the prevention of type 2 diabetes.[10]

Studies have confirmed the effectiveness of resistance training in older adults with sarcopenia. For instance, Jeon et al. revealed that a 6-week squat exercise routine could enhance hand grip strength (HGS) and knee extensor strength (KES) in older women with sarcopenia.[11] Negaresh et al. demonstrated that an 8-week progressive re-

Training frequency	Two sessions per week	
Exercise selection	*Lower body* Squat/leg press Knee extension Leg curl Calf raise	*Upper body* Chest press Seated row Pull down
Exercise intensity	*Repetition-continuum based prescription* 40–60% 1RM *progressing to* 70–85% 1RM	*RPE-based prescription* RPE 3–5 on CR10 scale *progressing to* RPE 6–8
Exercise volume	1–3 sets of 6–12 repetitions	
Rest periods	*Within session* 60–120 s between sets; 3–5 min between exercises *Between sessions* At least 48 h	

Figure 1. A proposed resistance exercise prescription for older adults with sarcopenia.[14]

sistance training program could significantly improve the appendicular skeletal muscle mass index (ASMI) in healthy older men with sarcopenia.[12]

When designing resistance exercise programs for sarcopenia, several exercise variables need to be considered, including training frequency, exercise selection, exercise intensity, volume, and rest periods.[13]

Protein Intake

From a nutritional perspective, there is substantial evidence supporting the consumption of high-quality protein in amounts exceeding the current Recommended Dietary Allowance (RDA) for optimal health outcomes, including promoting healthy aging, increasing muscle mass and strength, regulating appetite, and managing weight. Current evidence suggests that intakes ranging from 1.2 to 1.6 g/kg per day of high-quality protein are necessary to achieve optimal health outcomes for active adults, compared to the current RDA guideline of 0.8 g/kg per day for all adults, including older individuals.[15]

Supplementations

Supplementing with protein before and after exercise in the form of a protein shake can effectively promote muscle anabolism. It is ideal to meet the additional protein needs through a well-balanced diet, and supplementation may be considered when dietary protein intake alone is insufficient to meet the increased protein requirements associated with resistance training.[16]

Creatine is a nutritional supplement that has been reported to be a safe ergogenic aid for healthy adults.[17] Several studies have demonstrated that combining creatine supplementation with resistance training can lead to increased lean tissue mass and muscle strength in aging adults. Additionally, creatine supplementation may hold promise for improving bone mineral density.[18,19]

Conclusion

In conclusion, age-related muscle loss and strength decline can impact functional independence and an active, healthy lifestyle. Resistance training, increased protein intake, and creatine supplementation in conjunction with resistance

training have been shown to be effective interventions for preventing muscle loss and maintaining strength in the aging population. It is important to note that these recommendations are intended for healthy adults with appropriate medical clearance and guidance regarding dosing and administration.

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INA-RESPOND Newsletter

UNLEASHING THE POWER OF IMPLEMENTATION RESEARCH IN HEALTHCARE

By: Aly Diana

COMIC CORNER

"The latest research shows that we really should do something with all this research."

Source: https://sph.uth.edu/research/centers/chppr/workshops/tiis/img/TIIS_Intro%20to%20Implementation%20Science_9_15_2020.pdf

In the dynamic and ever-evolving field of healthcare, the gap between evidence-based interventions and their successful implementation can hinder the delivery of high-quality care. This is where implementation research steps in, providing valuable insights and strategies to bridge this gap. In this article, we will explore the definition of implementation research, its importance in healthcare, and specific examples of how it improves the efficacy and effectiveness of interventions.

Implementation research can be defined as the scientific study of methods and strategies aimed at promoting the integration of evidence-based interventions into routine practice. It focuses on understanding and overcoming barriers and facilitators to successful implementation, as well as identifying effective approaches to maximize the adoption, scale-up, and sustainability of interventions in real-world settings. Implementation research goes beyond assessing the impact of interventions and delves into the complex factors influencing their successful implementation, such as organizational structures, provider behaviors, patient engagement, and health policy.

Implementation research plays a crucial role in improving the efficacy and effectiveness of interventions by addressing the challenges that hinder their successful implementation. By systematically studying the implementation process and context, researchers can identify and address barriers that impede the adoption and integration of evidence-based practices. For example, imple-

mentation research can help identify organizational or cultural factors that may hinder the acceptance of a new intervention, allowing for targeted strategies to address these barriers.

Furthermore, implementation research provides insights into tailoring interventions to specific contexts, considering factors such as local culture, infrastructure, and resource availability. This customization of interventions increases their relevance and acceptance, leading to improved outcomes. Implementation research also evaluates the effectiveness of implementation strategies, identifying those that are most successful in facilitating the adoption and sustainability of interventions.

Implementation research has yielded significant success in improving the efficacy and effectiveness of interventions across various healthcare settings. One example is the implementation of care bundles to prevent central line-associated bloodstream infections (CLABSIs) in intensive care units (ICUs). Care bundles are sets of evidence-based practices bundled together and implemented simultaneously to improve patient outcomes. Through implementation research, researchers identified the key components of effective care bundles, such as hand hygiene, proper catheter insertion techniques, and daily assessment of line necessity. They also developed strategies to overcome barriers to their adoption, including educational programs, checklist implementation, and audit and feedback. By implementing these care bundles, ICUs experienced significant reductions in CLABSI rates, leading to improved patient safety and reduced healthcare costs.

Another example is the integration of electronic health records (EHRs) to enhance care coordination and information sharing. Implementation research identified the challenges and facilitators of EHR implementation, leading to the development of strategies to optimize EHR adoption and use. These strategies included providing comprehensive training to healthcare providers, ensuring interoperability between different EHR systems, and addressing concerns about data privacy and security. By effectively implementing EHRs, healthcare providers can access comprehensive patient information, leading to more informed decision-making, improved care coordination, and enhanced patient outcomes.

Furthermore, implementation research has been instrumental in implementing evidence-based guidelines for chronic disease management, such as diabetes care. By understanding the barriers to guideline adoption and identifying effective implementation strategies, researchers have improved the delivery of guideline-recommended care, resulting in better disease control and improved patient outcomes. These strategies may include provider education, electronic decision support systems, and quality improvement initiatives.

Implementation research is a vital component in bridging the gap between evidence-based interventions and their successful implementation in healthcare settings. By addressing barriers, tailoring interventions, and evaluating implementation strategies, it enhances the efficacy and effectiveness of interventions, leading to improved patient outcomes and the delivery of high-quality care.

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